Regular Meeting of the Metro Commission and Metro Wastewater JPA

AGENDA

Thursday, April 6, 2017
12:00 p.m.

9192 Topaz Way (MOC II) Auditorium
San Diego, California

"The Metro JPA's mission is to create an equitable partnership with the San Diego City Council and Mayor on regional wastewater issues. Through stakeholder collaboration, open dialogue, and data analysis, the partnership seeks to ensure fair rates for participating agencies, concern for the environment, and regionally balanced decisions."

Note: Any member of the Public may address the Metro Commission/Metro Wastewater JPA on any Agenda Item. Please complete a Speaker Slip and submit it to the Administrative Assistant or Chairperson prior to the start of the meeting if possible, or in advance of the specific item being called. Comments are limited to three (3) minutes per individual.

Documentation Included

1. ROLL CALL

2. PLEDGE OF ALLEGIANCE TO THE FLAG

3. PUBLIC COMMENT

   Persons speaking during Public Comment may address the Metro Commission/ Metro Wastewater JPA on any subject matter within the jurisdiction of the Metro Commission and/or Metro Wastewater JPA that is not listed as an agenda item. Comments are limited to three (3) minutes. Please complete a Speaker Slip and submit it prior to the start of the meeting.

X 4. **ACTION** – CONSIDERATION AND POSSIBLE ACTION TO APPROVE THE MINUTES OF THE REGULAR MEETING OF March 2, 2017 **(Attachment)**

5. **ACTION** – CONSIDERATION AND POSSIBLE ACTION TO APPOINT MEMBERS TO THE FINANCE COMMITTEE, DISCUSSION ON FINANCE COMMITTEE ROLE AND MEETING LOCATION AND SCHEDULE(Chair Jones/Paula de Sousa Mills)

6. **ACTION** – CONSIDERATION AND POSSIBLE ACTION TO CREATE AN AD HOC COMMITTEE ON AMENDMENTS TO METRO JPA BYLAWS TO ESTABLISH A NOMINATION COMMITTEE (Chair Jones/Paula de Sousa Mills)

Documentation
Included

X	7.	**ACTION** – CONSIDERATION AND POSSIBLE ACTION TO APPROVE PUMP STATION 2 POWER RELIABILITY & SERGE PROTECTION (Mark Nassar) **(Attachment forthcoming)**
X	8.	**ACTION:** CONSIDERATION AND POSSIBLE ACTION TO APPROVE AGREEMENT WITH CH2M HILL ENGINEERS, INC. FOR DESIGN ENGINEERING SERVICES FOR THE NORTH CITY METROPOLITAN BIOSOLIDS CENTER (MBC) IMPROVEMENTS (Amy Dorman/Monica Smoczynski) (**Attachment**)
X	9.	**ACTION:** CONSIDERATION AND POSSIBLE ACTION TO APPROVE THE METRO COMM/METROWASTEWATER JPA MID YEAR BUDGET REVIEW (Karen Jassoy) (**Attachment**)
X	10.	**ACTION:** CONSIDERATION AND POSSIBLE ACTION ON CHANGE IN METRO JPA/METRO COMMISSION SUPPORT POSITION REGARDING POINT LOMA WASTEWATER TREATMENT PLANT NPDES MODIFIED PERMIT RENEWAL IN LIGHT OF RECENT REVISIONS TO THE DRAFT TENTATIVE ORDER ON THE MODIFIED PERMIT (REVISION POSTED TO RWQCB WEBSITE ON MARCH 29, 2017 AT 4:29 PM) (Greg Humora) **(Attachment)**
X	11.	METRO TAC UPDATE/REPORT **(Attachment)** (Greg Humora)
X	12.	POINT LOMA PERMIT RENEWAL UPDATE **(Attachment)** (Greg Humora)
	13.	PURE WATER PROGRAM UPDATE (Standing Item)
	14.	IROC UPDATE (Ed Spriggs)
	15.	FINANCE COMMITTEE (John Mullin)
	16.	REPORT OF GENERAL COUNSEL (Paula de Sousa Mills)
	17.	PROPOSED AGENDA ITEMS FOR THE NEXT METRO COMMISSION/METRO WASTEWATER JPA MEETING May 4, 2017
	18.	METRO COMMISSIONERS' AND JPA BOARD MEMBERS' COMMENTS
	19.	CONFERENCE WITH LEGAL COUNSEL – ANTICIPATED LITIGATION INITIATION OF LITIGATION PURSUANT TO PARAGRAPH (4) OF SUBDIVISION (D) OF SECTION 54956.9 NUMBER OF POTENTIAL CASES: 1 (General Counsel)
	20.	ADJOURNMENT OF METRO COMMISSION AND METRO WASTEWATER JPA

The Metro Commission and/or Metro Wastewater JPA may take action on any item listed in this Agenda whether or not it is listed “For Action.”

Materials provided to the Metro Commission and/or Metro Wastewater JPA related to any open-session item on this agenda are available for public review by contacting L. Peoples at (619) 548-2934 during normal business hours.

In compliance with the
AMERICANS WITH DISABILITIES ACT

The Metro Commission/Metro Wastewater JPA requests individuals who require alternative agenda format or special accommodations to access, attend, and/or participate in the Metro Commission/Metro Wastewater JPA meetings, contact E. Patino at (858) 292.6321, at least forty-eight hours in advance of the meetings.

Metro JPA 2017 Meeting Schedule

January 5, 2017	February 2, 2017	March 2, 2017
April 6, 2017	May 4, 2017	June 1, 2017
July 6, 2017	August 3, 2017	September 7, 2017
October 5, 2017	November 2, 2017	December 7, 2017

Attachment 4

Action Minutes of March 2, 2017

Regular Meeting of the Metro Commission
and Metro Wastewater JPA

9192 Topaz Way (MOC II) Auditorium
San Diego, California

March 2, 2017
DRAFT Minutes

Chairman Peasley called the meeting to order at 12:06 p.m. A quorum of the Metro Wastewater JPA and Metro Commission was declared, and the following representatives were present:

1. ROLL CALL

Agencies	Representatives		Alternate
City of Chula Vista	Steve Padilla	X	
City of Coronado	Richard Bailey		(No representative)
City of Del Mar	Sherryl Parks	X	Eric Minicilli
City of El Cajon	Ben Kalasho	X	
City of Imperial Beach	Ed Spriggs	X	
City of La Mesa	Bill Baber	X	
Lemon Grove San District	Jerry Jones	X	
City of National City	Jerry Cano	X	Albert Mendivil
City of Poway	John Mullin	X	
County of San Diego	Dianne Jacob		(No representative)
Otay Water District	Mark Robak	X	
Padre Dam MWD	Jim Peasley	X	
Metro TAC Chair	Greg Humora	X	

Others present: Metro JPA General Counsel Paula deSousa Mills; Metro JPA Secretary Lori Anne Peoples; Scott Tulloch – NV5; Rick Hopkins, Roberto Yano – City of Chula Vista; Ed Walton – City of Coronado; Eric Minicilli – City of Del Mar; Yazmin Arellano – City of El Cajon; Kuna Muthusamy - National City; Karen Jassoy, Al Law, Augie Scalzetti - Padre Dam MWD; Mike Obermiller – City of Poway; Halla Razak, John Helminski,, Seth Gates, Edgar Patino, Raina Amen - City of San Diego Public Utilities; Tom Zeleny – Chief Deputy City Attorney - City of San Diego

2. PLEDGE OF ALLEGIANCE TO THE FLAG

Assistant General Counsel Steve Martin led the pledge.

3. PUBLIC COMMENT

None.

4. <u>ACTION</u>: CONSIDERATION AND POSSIBLE ACTION TO APPROVE THE MINUTES OF THE REGULAR MEETING OF February 2, 2017

ACTION: Upon motion by Vice Chair Jones, seconded by Commissioner Kalasho, the minutes were approved by unanimous vote.

6. <u>ACTION</u>: CONSIDERATION AND POSSIBLE ACTION ON CHANGE IN METRO JPA/METRO COMMISSINO SUPPORT POSITION REGARDING POINT LOMA WASTEWATER TREATMENT PLAN NPDES MODIFIED PERMIT RENEWAL IN LIGHT OF RECENT REVISIONS TO THE DRAFT TENTATIVE ORDER ON THE MODIFIED PERMIT (REVISION DATED February 10, 2017)

MetroTAC Chair Humora stated that the Regional Water Quality Control Board (RWQCB) first heard the NPDES Pt. Loma permit on December 14th, 2016. Testimony was taken at that time including from several of our Commissioners, the EPA, City of San Diego and the San Diego Environmental Community. The RWQCB asked for additional information on the updated schedule for the Pure Water Program. Subsequent to that meeting, a number of Commissioners, PA's and the JPA sent a letter to the Regional Board recommending and requesting they keep the conditions as drafted which was consistent with what they had seen and approved. The main concern was that there be no construction milestones for Pure Water within the five year permit cycle. This was the primary concern as it would give us time for things not being secured yet, for example Secondary Equivalency, giving time to sort that out, time to sort out the financing plan for Pure Water and any potential cost allocation plans for Pure Water. On February 10th a Revised Tentative Order was issued by the Regional Board and the EPA and it included modified language and an updated schedule that was basically consistent with what the City of San Diego has been pursuing now for their schedule and what we call the Accelerated Schedule for the Pure Water Program. There was 30 mgd at North City as a construction deadline of 2022 along with Morena Pump Station, along with North City Construction along with conveyance facilities and also the Co-Gen facility that San Diego is proposing to power the facilities they are proposing to construct. In our view the permit conditions and milestones have changed significantly. The soft or smaller costs, have amped up to about a billion dollars of milestones in the permit. There is a footnote, Footnote 2, which says that construction is still subject to City of San Diego Mayor and City of San Diego Council approval. There has been some debate back and forth on that and Mr. Zeleny and Ms. de Sousa Mills were asked to weigh into this as to the legality of how this is binding and if it is binding within the permit. What happened is they opened it up for a 14 day comment period which ended on February 24th. The Commission sent a letter that was essentially consistent with our previous viewpoint, but the main issue raised was to ask for more time, i.e., for the public comment and hearing period to be continued. The Regional Board is scheduled to meet on April 12th and that if approved, it could go to the Coastal Commission in May as the Coastal Commission will be holding their meeting in San Diego. This would allow for local people to attend and comment. In the interest of the significance of changes to the Tentative Order that have been submitted, the discussions held with MetroTAC and various Commissioners, it is felt there is not enough time to adequately vet and comment on what has happened.

Commissioner Peasley added that himself, Vice Chair Jones, Greg Humora, Scott Tulloch, Lemon Grove staff and several others had met with Executive Officer David Gibson of the Regional Board last week and had a discussion. He seemed sympathetic to the issues we have and suggested we write the letter we did asking for a continuance. He offered that the JPA would not be limited to time limits to communications on April 12th. Scott Tulloch stated that they had the San Diego City Council at 15 mgd, the Environmental approval at 15 mgd, City staff at 15 mgd, the Metro JPA Commission on board at 15 mgd all on the existing schedule so why are you writing 30 mgd. Mr. Gibson responded that this was because this was what the City of San Diego was pursuing. The footnote was part of the discussion as well. Mr. Gibson then realized that at 30 mgd they did not have the City Council approval nor the Metro Commission and he said "we have one bird in the hand at 15 mgd and two in the bush at 30."

Vice Chair Jones thanked the Chair of the Regional Board, Henry Abarbanel for arranging the meeting as a personal thing for him and the Lemon Grove and noted that he had invited the Chair of MetroTAC and members to attend as well. The takeaways he had was on the question of how much effect the San Diego City Council would have on this under the new scenario. They were told that the Regional Board does not see the Footnote as the same or current thing that we currently have as an off ramp under the 15 mgd. milestones. During the course of this conversation, Vice Chair Jones turned to their Engineer and stated that under the new scenario, there were enforceable provisions that included millions of dollars extra that were not envisioned in the original permit and inquired if he saw a scenario under the Footnote that would exempt us from those milestones and enforceable provisions if Secondary Equivalency was not secured. Without giving a definite answer, the response was that they did not think that would be the case, if San Diego said they were struggling with it, it would involve some sort of rescheduling, but the enforceable provisions would most likely still remain. Although only a staff opinion, this was not comforting when sitting on the receiving end of at least 30% of almost $400 million. The other concerns he had were from his inquiry on the enforceable provisions and why they would eliminate the off ramp that we currently have under the 15 mgd scenario, was that the EPA believes that we will continue to get waivers in perpetuity. He commented that this was a nice bureaucratic answer but the political world could change that scenario tomorrow. This is very concerning. Also, they were not aware that the cost sharing, revenue sharing and financing discussions were not completed and have not been held for over a year now and they were concerned with this. Vice Chair Jones then pointed out that as of today, the Metro JPA supported and do support and voted to support the waiver at 15 mgd. and opposed the 30 mgd. advanced scheduling back last year. What is before the Commission today is really consistent with what has been done before and he wants to ensure they stay consistent and reinforce this and send a unified voice to the Regional Board and to the Coastal Commission in terms of opposition to the advanced scheduling as we cannot give up the off ramp, we have to have these guarantees for our ratepayers.

Chair Peasley stated that they fortunately have time between now and April 14th if any PA's need to go back to their governing bodies and Scott Tulloch and Greg Humora would be happy to be present at your meetings to provide input.

General Counsel de Sousa Mills stated that given they have time between now and April, it is probably a good idea to have a full and frank discussion to be had with both the member agencies staffs and perhaps their City Attorneys and General Counsels prior to coming back and taking an official position change if that is what the JPA Metro Commission would like to do in April.

Vice Chair Jones stated that what is present is consistent with what was presented in the past and they are just asking for confirmation on that and the comment letter that was submitted made it clear that the desire was to come back to the full Commission.

Chair Peasley suggested that meetings be scheduled with PA's staff and then be prepared to come back on April 6th to discuss.

Commissioner Mullin stated he was prepared to advocate the position suggested and was clearly on board.

Commissioner Baber inquired as to whether the letter that was sent requesting a continuance would be acted on or would it go straight from the Regional Board to the Coastal Commission to which responses were uncertain.

Commissioner Spriggs stated that there seemed to be a disconnect involving the City and its plans and where the Commission is and how they can continue to support them without great risk to our rate payers. How we got to this point and why we are at this point of being locked into opposing or going along with something that entails considerable risk to our rate payers and why we are put in this awkward position is hard to follow. He registered his concern that the Commission should not be in this position, we are partners in this and have been highly supportive and can't understand why they are being pushed into a corner.

Commissioner Mendivil stated he appreciated the time to have a presentation and the discussion with his staff and Council.

Chair Peasley inquired of Ms. Razak to please explain the actions that resulted in the construction project for 30 mgd being included in the Revised Tentative Order. Ms. Razak stated that when the City initially applied for the waiver, they were at the time planning and dependent on the agreement they have with the Environmental Parties, the 15 mgd. Three years had passed and they did a detailed analysis of their flow and it became evident that for a variety of reasons they were not able to produce 15 mgd of at the North City facility so they then looked at possibility of picking up additional flows and looked at the overall cost of the program and it became evident that it was advantageous for the rate payers in the long run to go ahead and advance to 30 mgd at this point and move forward with that. They had done this and all the technical work in close coordination with the JPA liaisons and consultant. When asked to present in front of the Regional Board what was going on with Pure Water and what was the schedule etc. They never requested the schedule be included in the waiver, but this is the schedule they are moving forward and it is public knowledge. They then saw the revised draft permit and submitted comments to preserve the off ramps which are also very important to the City of San Diego, they obviously need to have the funding and need to make sure they can move forward with the program. So they sent the comment letter asking for this and this is where they are today.

Chair Peasley stated he and the Commission did not understand how it changed from what was submitted to how it is now written. If the Tentative Order says 15 mgd on the original schedule and the City goes on and does 30 mgd at some faster rate, you still check the box with what was submitted. Why do something different that makes everyone get uneasy? The City needs to take a stronger position and say 15 mgd is what we want, if you do it faster, that's fine. Why are we here? What happened?

Ms. Razak stated she was asked what the current schedule was; it is as simple as that. When they were asked and it was public knowledge, they provided it then it got put into the permit. They did not have a conversation stating that they wanted to leave it at 15 mgd as they are agnostic because the City is moving with the schedule and it is hard to move in a certain way and tell someone else oh no we are not moving in that way. They are very consistent with their messaging.

Vice Chair Jones stated that the really big significance is not just the 15 to the 30 mgd, it is first, the original plan recognized investments made at No. City, where the wastewater side of the house is already invested heavily in No. City and that product would go into creating that 15 mgd of Pure Water. This meant that the wastewater rate payers would not have been paying any extra money, no capital costs for wastewater rate payers in this first round and that would not happen until the next permit or in the milestones 2027. The second thing is, Pure Water, from San Diego's own resolution No. 38906 that started all this, Pure Water was always meant to be a means to Secondary Equivalency. Secondary Equivalency was always the prime directive in all of this. What has changed is Secondary Equivalency is no longer driving this bus; it's the Pure Water Project. It has ceased to be a wastewater project and now has become a water project. Now without Secondary Equivalency which is the primary goal here, we need a permanent solution to Pt. Loma, one we are not going to need to keep adding on and adding on or pay $3 billion for Pure Water and then in 2027 or 2030 the political winds change and we have to pay another $3 billion for Secondary Equivalency upgrades a Pt. Loma. This is what the concern is. So how did this change at the Regional Board hearing. Well San Diego did say that they were going onto 30 mgd. That put us on that bus for the ride. We all know that as long as we can get Secondary Equivalency at least there is some benefit of Pure Water to us. If not, there is no benefit to us. What happened at the Regional Board meeting was our Environmental partner, Mr. Marco Limandry, stated he would like to see the 30 mgd included in the enforceable provisions of the new Waiver. This is a violation of the Cooperative Agreement that he signed, a breach of contract. That's what drove this change to the original permit. I think we have lost sight of the fact that Pure Water was originally meant to support Secondary Equivalency and that's not where we are headed today and that is his concern and the concern of his rate payers as well.

Commissioner Mullin inquired as to whether this was correct, that this came because of the Environmental Community comment. The Commission had an understanding of where the time tables were going to be, and he is looking on where the first comment came up of where they should be accelerated. He had heard that the Environmental Community brought up the change and the City of San Diego was agnostic regarding this change.

Ms. Razak stated that the City shared the public information of the schedule and the program and how it was proceeding. There were a variety of speakers at the briefing; some had issues with one aspect or the other. The City never advocated for changing the timeline. The fact is that it is their current timeline.

Commissioner Mullin stated he heard Ms. Razak say that the pump station was necessary to provide source for 15 mgd and there were possible economies of scale to do 30 mgd. At that point, when that discussion was held, it was not noted that this meant increasing production to 30 mgd.

Ms. Razak stated that the pump station was necessary to do 15 mgd, and since building with economies of scale it made sense to do 30 mgd. The 15 mgd needed to happen by the timeline that was in the agreement so they then moved forward to going ahead to doing 30 mgd with the new timeline which was agreed to by everyone on the City of San Diego side so this is what they have been going forward with and presenting to everyone.

Commissioner Mullin stated that the crux of the problem is the separation of Secondary Equivalency and Pure Water. If the Commission knew they had Secondary Equivalency they could probably live with the Pure Water timelines.

Ms. Razak stated she did not understand the separation issue referenced as in her mind they are not completely separate. The City is moving really hard on Secondary. She has staff in Washington DC today having conversations and there are lots of changes going on and the City is quite hopeful that they will get to where they need to go.

Commissioner Mullin stated that the acceleration of the timetable, the reason for the off ramps was to allow time to get Secondary Equivalency and to have one moved up and the other stay fixed has caused the squeeze.

Chair Peasley stated that the City submitted the permit conditions at 15 mgd in the original schedule, then the meeting happened at the Regional Board and then City saw the draft of as it exists today of which the Commission is complaining about as to how much it will cost our ratepayers and the City passively approved it by not doing anything, not writing a letter, talking to staff.

Ms. Razak stated there was one step previously mentioned with some of the JPA liaisons, that she was contacted by the Regional Board saying we understand you have a new schedule, could you please provide us the details of that. From the City's point of view as long as the off ramps are in place and we are comfortable with the language and the City Attorney assures her that they are protected as much as possible, the fact that they have the new schedule that has morphed with time over the last two years, the schedule simply has changed as the reality of the program has changed, so that is the schedule that is in the permit. Again, the City is agnostic on the schedule that is in there, they were asked to provide the most recent schedule and that is what they did.

Chair Peasley asked what the City's position was on the Footnote that is in there as the Commissioners heard different from Regional Board Gibson and it sounds like it might not be consistent with what the City believes.

San Diego Chief Deputy City Attorney Zeleny stated that this was the first he heard that the Regional Board considers the construction of these facilities to be an enforceable condition. That was not his reading of what they submitted. It is a permit condition with conditions. The construction is foot noted to need the City Council approval. They cannot take away the legislative discretion of their Mayor and City Council. Imbedded in City Council approval is a number of considerations, when Council considers whether or not to go forward with construction, they will want to know if they have the money to pay for it. They will want to know the results of the sight specific EIR. They still have to get permission from the State Board to turn the plants on. The City Council might be leery of moving forward with construction without knowing they will be able to turn it on and finally, they will want to know the status of the Federal Legislation. All these issues are imbedded in the City Council approval which have been specifically noted in the table, so if the Regional Board's position is that the City has to build it no matter what, they are missing the footnote. The City also submitted a comment letter that he thought further explained this as it said that the City was committed to the Pure Water Program with a number of conditions, footnoted to being committed pursuant to agreement with the stakeholders which includes the very same off ramps. It sounds like he and City staff need to meet with the Regional Board because there are a lot of legal issues with committing to build something that requires other things that need to happen first.

Ms. Razak stated that the language shown now, is clear in black and white that there are off ramps.

General Counsel de Sousa Mills requested a copy of the City's letter referenced as the Commission had not seen it. Mr. Zeleny apologized and thought it was out there.

Scott Tulloch stated that the real issue, if looking at the Revised Tentative Order is whether what has been added is a binding condition or not. As you recall, we deliberately negotiated with the Environmental Community to NOT put the construction scheduled into the permit application for the reasons mentioned here, we wanted time to make sure we could get Secondary Equivalency and if we didn't we would have an opportunity to decide what to do next. The Environmental folks agreed to this. Now we have a Revised Tentative Order that is problematic. The Regional Board asked for information and it was provided (the accelerated schedule). What is not clear is why this schedule has to become automatically what the Regional Board considers conditions. What was offered was to do the design parts, not construction. When asked for this information it was not an endorsement by the City as it is not good for any of us, because we then lose the leverage to get Secondary. The City should take a stronger stance to say don't put the construction starts in there, we are not offering that. When we talked to staff about that, we were told they were hearing from the City Attorneys Office that they were not required conditions and we could get out of them due to the Footnote. When in discussion with the Regional Board Director and staff, they said no, those are binding conditions. We pointed to the Footnote and they said, nope those are still binding. We asked how would the City get out of those binding conditions for example if they decided they couldn't or didn't want to do them or if the City didn't get Secondary Equivalency, they responded that the City would have to submit a request to amend the permit as it was issued with all the construction starts in it and it would be up to the Regional Board if they were to agree to those amendments. It was apparent that the Attorneys need to speak to the Regional Board to remedy this disconnect in whether or not they are binding or not and if they need different language from the City to make them conditioned as the City thinks they are, that needs to be done, they need to be asked to do that or the City needs to take a strong position so that both sides agree they are not binding.

Ms. Razak stated that this is prudent and she would work with Mr. Zeleny to insure this happens.

Commissioner Padilla stated that in a very general sense, there was clearly an internal breakdown in communication between the City and the JPA and between the City as applicant and the Regional Board and that it was not ok that the answer simply is we made them aware and provided requisite public information and we really don't have any comment on their interpretation or application of that information in the Draft Tentative Order. It just is not acceptable when working in a system that was constructed to foster collaboration. This is extremely disturbing that this is the dynamic that has been occurring lately. At some point this breakdown needs to be remedied.

Commissioner Baber stated that the others spoke eloquently and stated that as Ms. Razak stated the 30 mgd schedule was a public document and inquired as to how it became so, did Council vote at a public meeting to make it so or was it a staff recommendation or was it a strong Mayor executive branch decision. How did that schedule become locked in with the City?

Mr. Zeleny stated he did not recall that schedule going to City Council, he believed it to be just a reflection of where they were currently going and clarified they being City staff and the status of the program if everything fell into place, where they would be when asked by the Regional Board

Commissioner Baber clarified that this was a projection of City staff but even the City Council had not stamped their approval of this.

Mr. Zeleny stated that certainly not for the construction which is why it was footnoted. They certainly don't have authority to build it on the timeline that is in that table which is why it was caviated and they do not interrupted it to be an enforceable provision. Learning this today, there needs to be a discussion with the Regional Board.

Ms. Razak stated that they had taken the many design projects to the City Council and many JPA members were present, when they got approval to move forward with the 30 mgd.

Commissioner Baber inquired as to what was presented and approved at the San Diego City Council.

Vice Chair Jones stated he was at the meeting and that the action the City Council of San Diego took was for planning for the 30 mgd and did not include construction. It was for around $42 million in planning. What we heard here when it was presented was the $42 million and if it went forward there was a $400 million price tag on the wastewater side. The San Diego City Council has not approved construction.

Ms. Razak stated as far as she knows, they have not tied anyone's hands regarding construction in this application.

Mr. Zeleny stated he needs to make sure they have not put the City in the position that the provisions are enforceable when the City Council has not approved them as they cannot be in that position.

Vice Chair Jones reiterated that what he was told by the Regional Board staff that the construction schedule was considered and enforceable provision.

Chair Peasley requested the City under the Mayor's signature send a letter requesting a postponement of the hearing until these issues are all worked out.

Ms. Razak stated she will ensure the right language is included and it is interpreted properly. That the off ramp is included as previously and the City Council is not committed to construction.

Mr. Zeleny stated he could not commit the City Council to building something. It cannot happen.

Vice Chair Jones stated that regardless of interpretation and outcome of discussions with the Regional Board, the minute we put 30 mgd in, we open ourselves up to lawsuits. The same thing happened back in the 1990's when we ended up building No. City and all of the distribution system in the South Bay. We got sued over all of those things and they became enforceable provisions whether the City Council of the City of San Diego liked it or not. We are still susceptible to those same procedures today. I think we should go back to the original 15 mgd. and we can always talk about and negotiate the 30 mgd. and where we go from there and Lemon Grove staff is even talking about ways to bring down the costs of Secondary upgrades. There are a lot of things to be discussed, but our biggest safeguard is to go back to the permit as it was originally negotiated at 15 mgd.

Chair Peasley concurred.

Commissioner Spriggs inquired as to the difference between 15 and 30 mgd in design and construction costs. MetroTAC Chair Humora stated that the estimates provided looked at constructing 15 mgd first. To go to 30 mgd was minimal, almost $0. The $400 million construction is at 30 mgd. The 15 mgd is 0 as it is already there.

Commissioner Robak stated the PA's need to be financially responsible for the rate payers. Further that he did not support indirect potable reuse. They are taking the pure water and putting it in a raw water reservoir and taking it out and treating it all over again which is not in the best interest of our rate payers. He will support the 15 mgd maybe 30 mgd of direct potable reuse.

6. <u>ACTION</u>: CONSIDERATION AND POSSIBLE ACTION TO APPROVE SPONSORCHIP OF THE ANNUAL WRC (WATER RELIABILITY COALITION) SPRING RECEPTION ON APRIL 20, 2017 FROM 4:30 TO 7:30 PM AT TOM HAMS LIGHTHOUSE

Chair Peasley introduced the item and spoke in support of a $1,000 sponsorship as in past years.

Commissioner Robak stated that the JPA is one of the best kept secrets which is a problem when advocating positions on things and suggested that in addition to being involved in events like this, social media needs to be better utilized to raise our profile.

ACTION: Motion by Vice Chair Jones, seconded by Alternate Commissioner Minicilli, to approve the sponsorship at $1,000. Motion carried by unanimous vote.

7. <u>ACTION</u>: CONSIDERATION AND POSSIBLE ACTION TO APPROVE ELECTION OF OFFICERS

Ad Hoc Nomination Chair Robak stated the committee of Commissioner's Kalasho, Mullin and himself had met. Going into the meeting he had heard that the two interested commissioners had an understanding but later found out they did not. So they decided not to make a recommendation but requested each candidate provide their background on who they were and why they wanted the position.

Both Vice Chair Jones and Chair Peasley provided brief backgrounds on their history with wastewater.

ACTION: Motion by Commissioner Baber, seconded by Commissioner Padilla, to appoint Vice Chair Jones as Chairperson.

Commissioner Padilla spoke to his second addressing the current Chair, that his second does not in any way reflect a lack of confidence or appreciation for the job he was doing or has done. As the new guy coming in he had heard how Mr. Jones had served as Vice Chair for three separate Chairs and felt that the Commission could benefit in the coming near term from someone who has equally valuable but different experience in regional leadership, maybe a little stronger relationships with some of the policy makers in the region, clearly listening to our prior discussion he felt this to be called for and wanted to put this on the record. Motion carried with Commissioners Mullin, Peasley and Spriggs voting no.

Motion by Commissioner Baber, seconded by Kalasho, to appoint Commissioner Peasley as Vice Chair. Motion carried by unanimous vote.

8. ACTION: CONSIDERATION AND POSSIBLE ACTION TO APPOINT MEMBERS TO SERVE AS APPPOINTEE AND ALTERNATE TO IROC

Chair Jones stated he had served on this last year and several Commissioners had expressed interest in serving. Our representative covers three meeting now and reports out on each meeting.

ACTION: Motion by Vice Chair Peasley to appoint Commissioner Spriggs as Primary and himself as Alternate. The motion was seconded by Commissioner Mendivil and carried unanimously.

9. METROTAC UPDATE/REPORT

MetroTAC Chair Humora stated that the Social Media policy was approved and is on the website. They are waiting on the Finance Committee to meet and review the budget cost and role. He also reported that the City of San Diego had reported that they were looking at financing for the Pure Water Program and will provide updates moving forward; with respect to the design contracts for the Morena Pump Station and North City Water Reclamation Plant expansion, the City of San Diego provided some technical information and memorandums back in November. TAC has provided comments back to San Diego staff and they have advised that they are going to respond back. TAC is still trying to understand the engineering made the decisions that were made and where we are with respects to the Pure Water Program facilities.

10. POINT LOMA PERMIT RENEWAL UPDATE

MetroTAC Chairman Humora stated that he, Karyn and Scott had held a small cost allocation meeting with San Diego staff yesterday. They are looking to roll that out with respect to what costs should be paid for by water and wastewater rate payers. This will be vetted again back to TAC and then be brought to the JPA. They are working on capital projects that have been approved 1st and are trying to vet some of the engineering projects at the same time. The draft schedule will be added to the milestones provided on each agenda.

Vice Chair Peasley requested MetroTAC bring back costs to rate payers and Chair Jones suggested the PA's watch Lemon Grove as they are seeing the 1st effects on their rate study which will be back within the next six months.

11. IROC UPDATE

Commissioner Spriggs stated he had attended the meeting for Chair Jones which was postponed from Monday which was a holiday to Tuesday. However, there was not a quorum present so it was cancelled.

12. FINANCE COMMITTEE

Finance Committee Chair Mullin stated that they too had not had a meeting but that he was looking forward to holding one at the end of the month where the new members would be brought up to date and the Social Media budget will be discussed.

13. REPORT OF GENERAL COUNSEL

General Counsel de Sousa Mills stated that the California Supreme Court issued a ruling on the City of San Jose case that government employees work related e-mails and text messages sent or received on personal devices and private accounts were subject to disclosure under the public record.

Her firm will be issuing a guidance memo for the PA's.

14. PROPOSED AGENDA ITEMS FOR THE NEXT REGULAR METRO COMMISSION/METRO WASTEWATER JPA MEETING OF APRIL 6, 2017

Appointment of Ad Hoc Committee to amend JPA By-Laws to create a Nomination Committee and establish their role.
Summary reports from MetroTAC on future City of San Diego bid packages.

15. METRO COMMISIONERS' AND JPA BOARD MEMBERS' COMMENTS

Commissioner Mendivil thanked the outgoing Chair and Vice Chair for their service and welcomed the incoming Chair and Vice Chair.

16. CONFERENCE WITH LEGAL COUNSEL – ANTICIPATED LITIGATION INITIATION OF LITIGATION PURSUANT TO PARAGRAPH (4) OF SUBDIVISION (D) SECTION 54956.9
NUMBER OF POTENTIAL CASES: 1

At 1:04 p.m. General Counsel de Sousa Mills announced and the Commission convened Closed Session.
At 2:37 p.m. the Commission reconvened and General Counsel de Sousa Mills stated that no reportable action was taken on this item.

17. ADJOURNMENT

At 2:38 p.m., there being no further business, Commissioner Jones declared the meeting adjourned.

____
Recording Secretary

Attachment 7

Pump Station 2 Power Reliability & Serge Protection

Public Works

Pump Station 2
Power Reliability and Surge Protection

The City of SAN DIEGO

Existing Facility Background

Pump Station 2

- Owned/operated by the City of San Diego
- Critical Facility/Main Sewer Pump Station for Region
- Pumps all wastewater to the Point Loma Wastewater Treatment Plant

Existing Facility:

- Dual 87" Force Mains
- 160 MGD Average Daily flow/432 MGD Maximum Capacity
- 8 pumps
  - 6 driven by 2,250 HP Electric motors
  - 2 driven by 2,400 HP Natural gas engines
- All 8 pumps must be available during rainy season

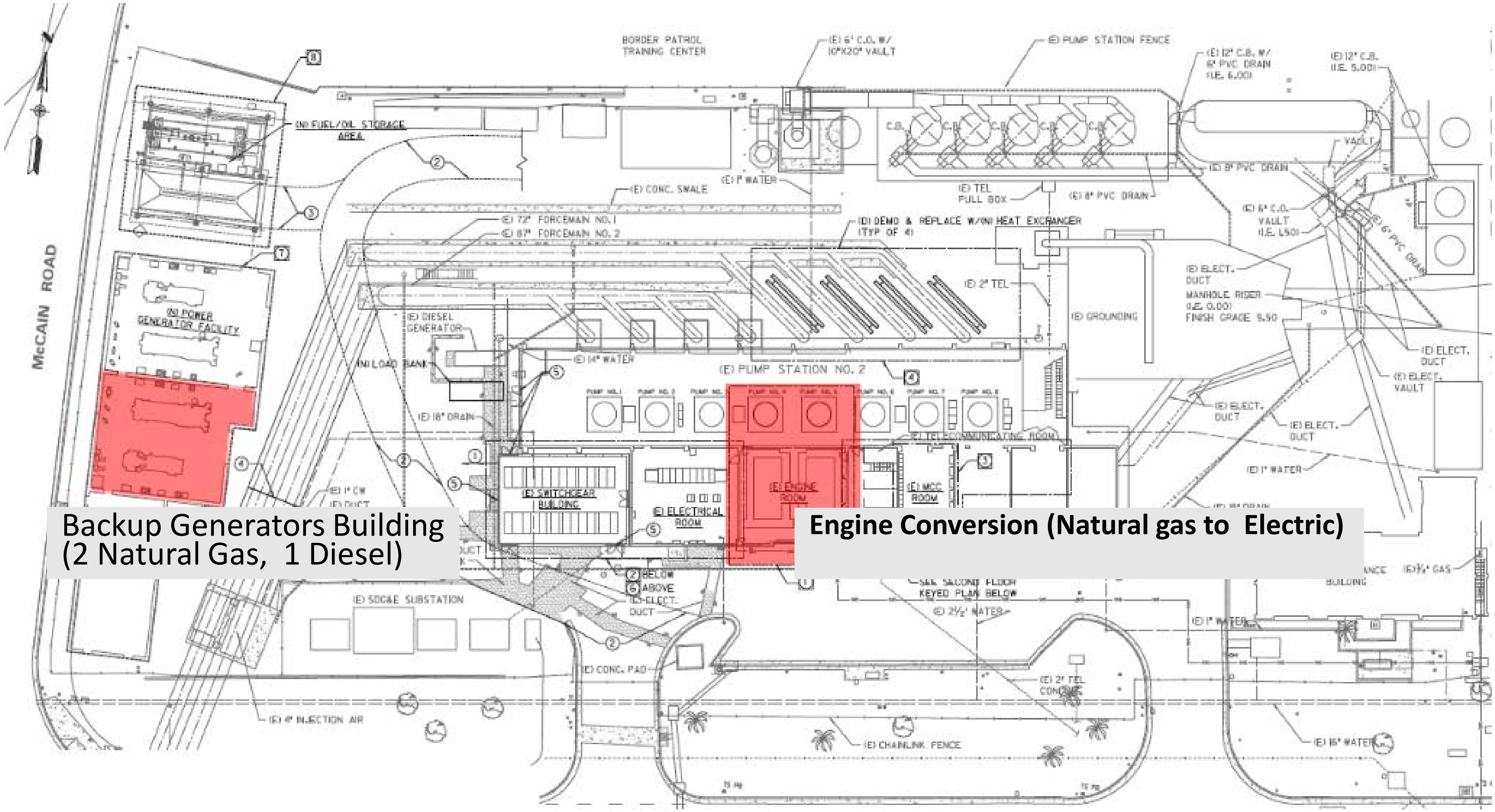
Project Scope

- Needs
  - Backup power
  - Surge Protection
  - Upgrade to Electrical Motors
  - Relocation of staff from trailers to existing building

- Triggers
  - Upgrades to existing Natural Gas Lines
  - Relocation of fiber optic lines
  - Fire Protection System upgrades
  - Noise Ordinances/EPA Exhaust Ordinances
  - Instrumentation & Controls systems upgrades
  - Electrical System upgrades
  - ADA upgrades for office spaces

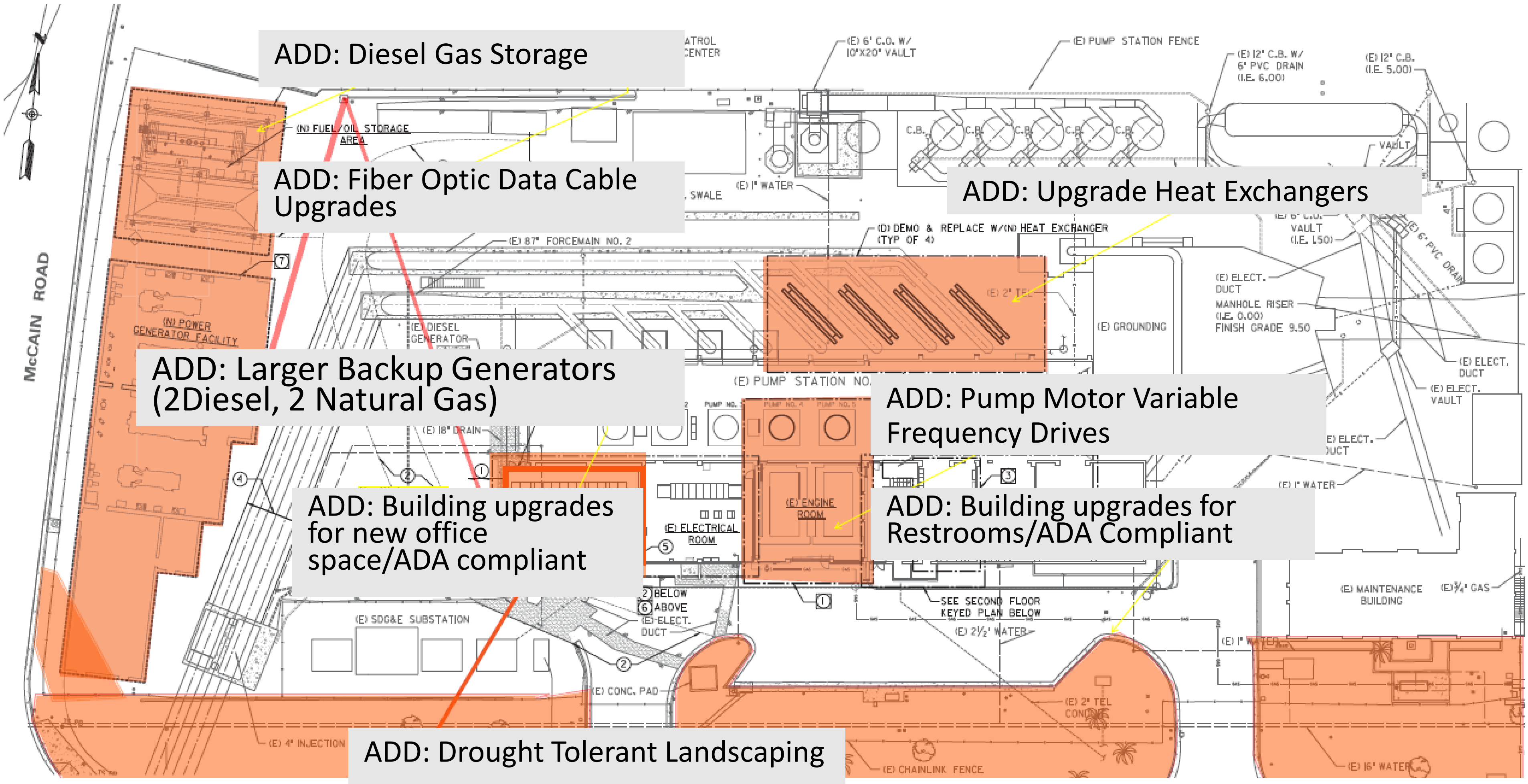
Existing Facility

Initial Scope (2011)



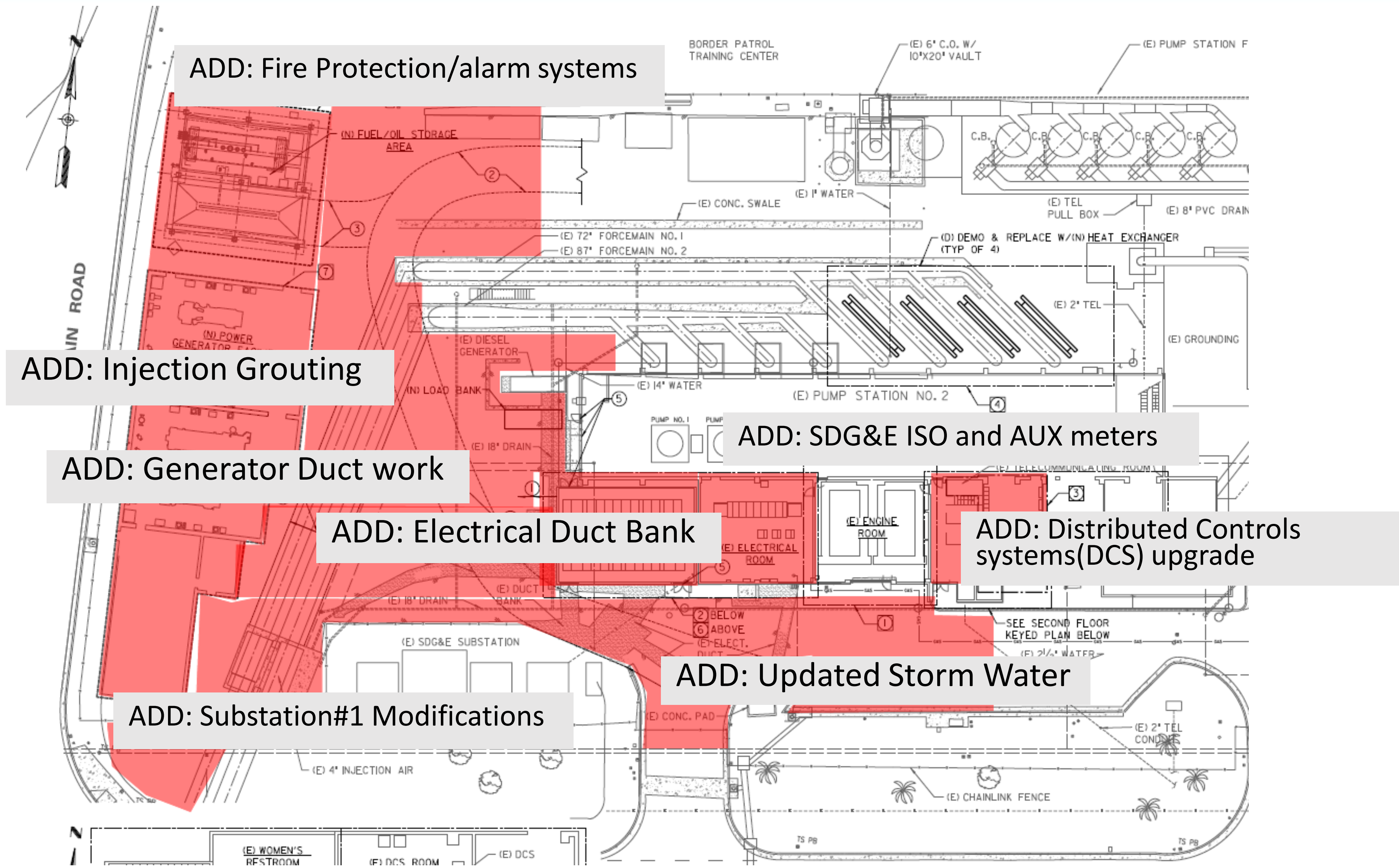
Total Cost: $31M

Approved Scope Increase (2014)



- Total Cost: $43M

Final Scope (Current)

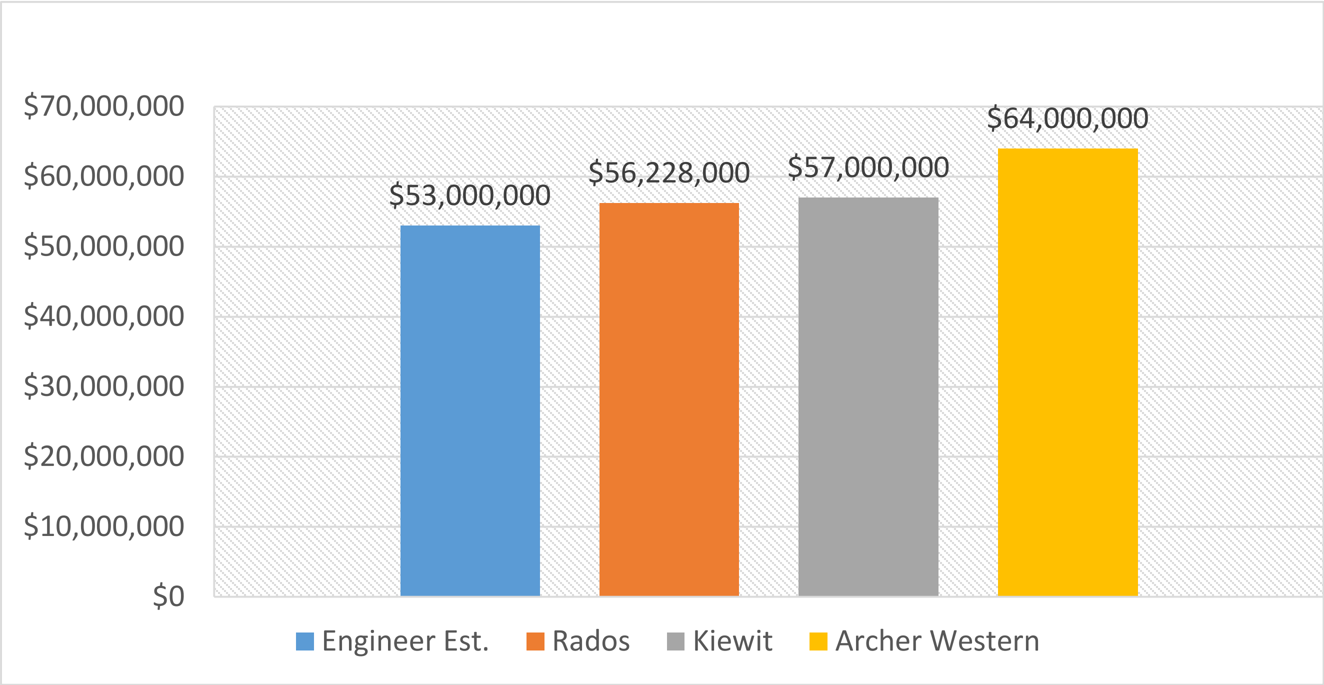


- Tot Cost $72.2M

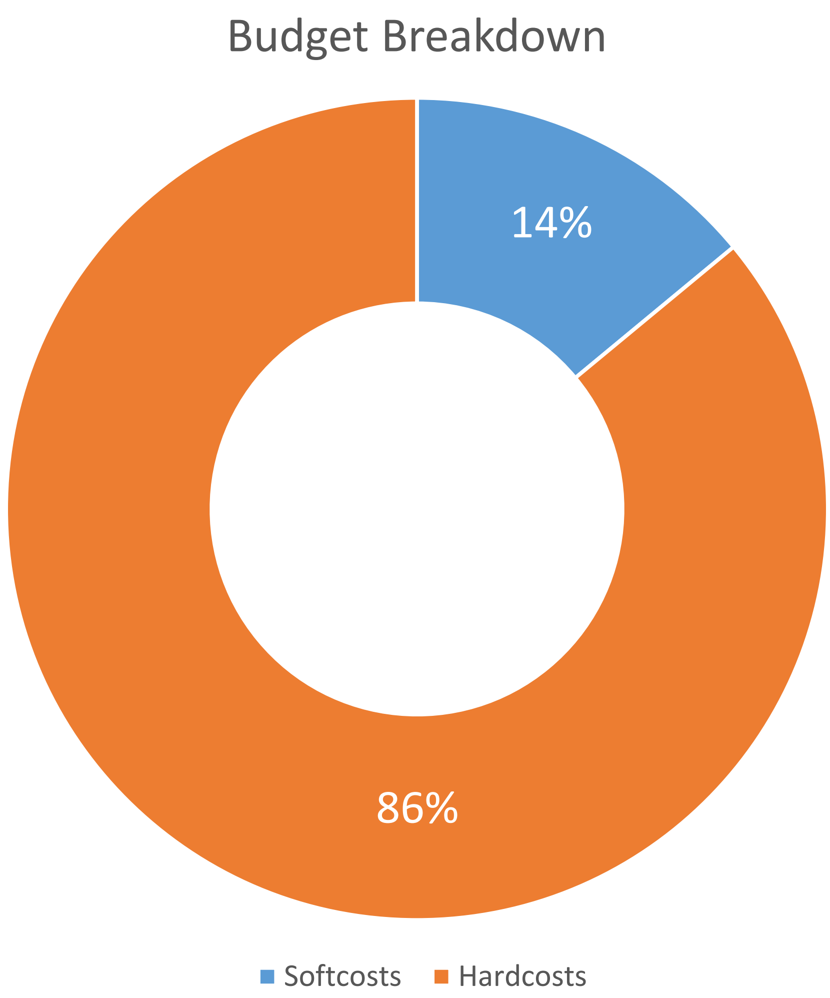
Bid Outcome

- **Engineer's estimate - $53 million**

- **Bid Results**
  - Steve P. Rados Inc.- **$56,228,000**
  - Kiewit Infrastructure West Co. - **$57,000,000**
  - Archer Western Construction LLC - **$64,000,000** (Disqualified)



Final Scope Cost Breakdown



Total Cost is $72.2M

- Design & Administration 14%
  - Includes Design Consultant
  - Construction Management Team
- Construction 86%
  - Includes contingency

Project Time Line

- Construction Schedule:
  - **NTP -** Summer 2017
  - **NOC -** Summer 2021 (Construction Duration 48 Months)

- Challenges Ahead:
  - Facility must remain operational 24 hours/day – 7/days a week
  - No work-minimal work during rain season
  - Must mitigate risks of hazards, i.e. spills
  - Complex design/fabrication of large equipment requiring long lead time
  - Site constraints – limited space for construction activities (space for materials/equipment)
  - Air pollution control district (APCD) permitting requirements(noise/emissions)

Q&A

Attachment 8

Agmt. w/CH2M Hill Engineers - Design Eng. for No. Cities MBC Improvements

Public Utilities Department
Pure Water Division

Agreement with CH2M Hill Engineers, Inc. for Design Engineering Services for the North City Metropolitan Biosolids Center (MBC) Improvements Project

Presentation to Metro Commission/ JPA
John Helminski, Assistant Director
Amy Dorman, Program Manager

April 6, 2017

The City of SAN DIEGO

Project Objective/ Purpose

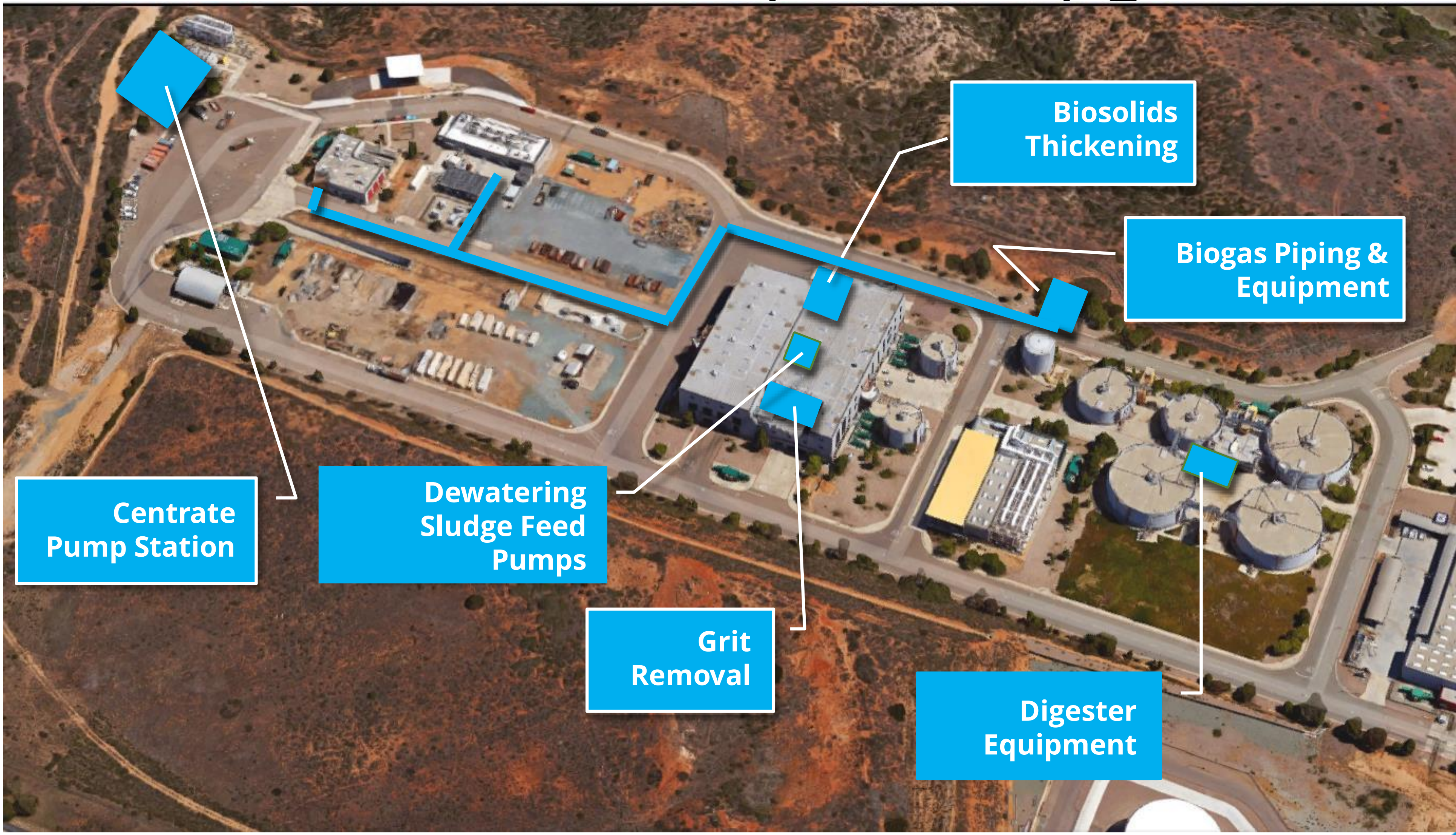
- Component of North City Phase - Pure Water
- NCWRP will undergo an expansion to process additional wastewater flows
- MBC will experience higher biosolids flows
- To accommodate additional flows, upgrades and improvements at MBC will be required
- Project scope includes other recommended improvements not driven by the Pure Water Program

Project Scope

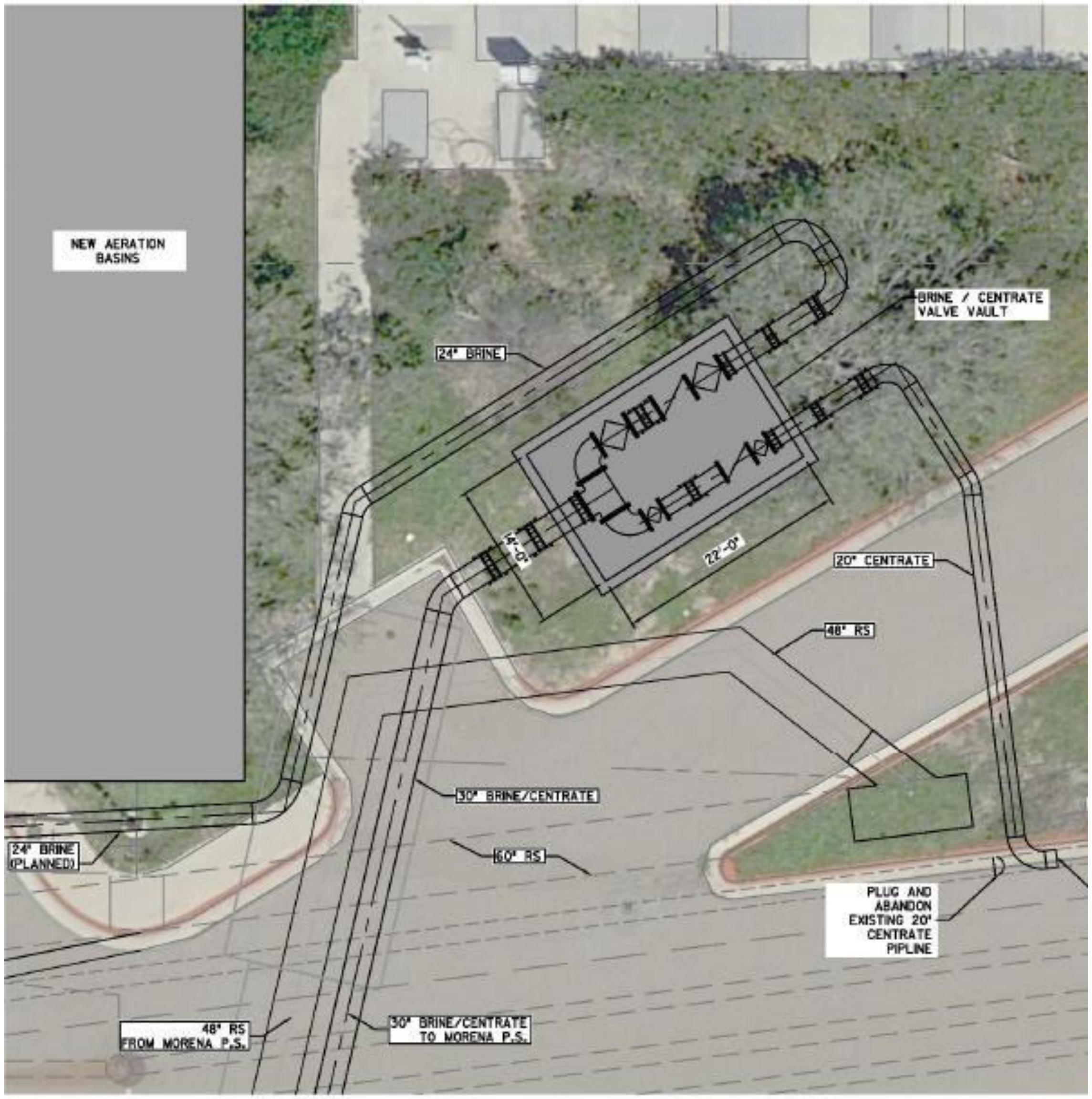
Unit Process	Description of Improvements (Pure Water Related)	Other Recommended Improvements (Other facility Improvements)
Grit Removal	▪ Install two grit separators for a total of five ▪ Expand Area 76 Building, if required, to accommodate expanded grit system ▪ Other related equipment: raw solids feed pumps, VFD's, grit dewatering units and screw conveyors	
Biosolids Thickening	▪ Install six new larger centrifuges to replace the existing ▪ Other related equipment: digester feed pumps, thickening centrifuge feed pumps, and polymer feed pumps	
Anaerobic Digestion	▪ Construct new biogas laterals and upgrade digester gas-handling equipment ▪ Install one new flare for a total of three	▪ Replace recirculation pumps, mixing pumps, and axial mixing pumps
Sludge Dewatering	▪ None	▪ Install eight new sludge feed pumps and polymer feed pumps
Centrate Pump Station	▪ Install three new 250-hp centrate pumps to replace existing pumps	

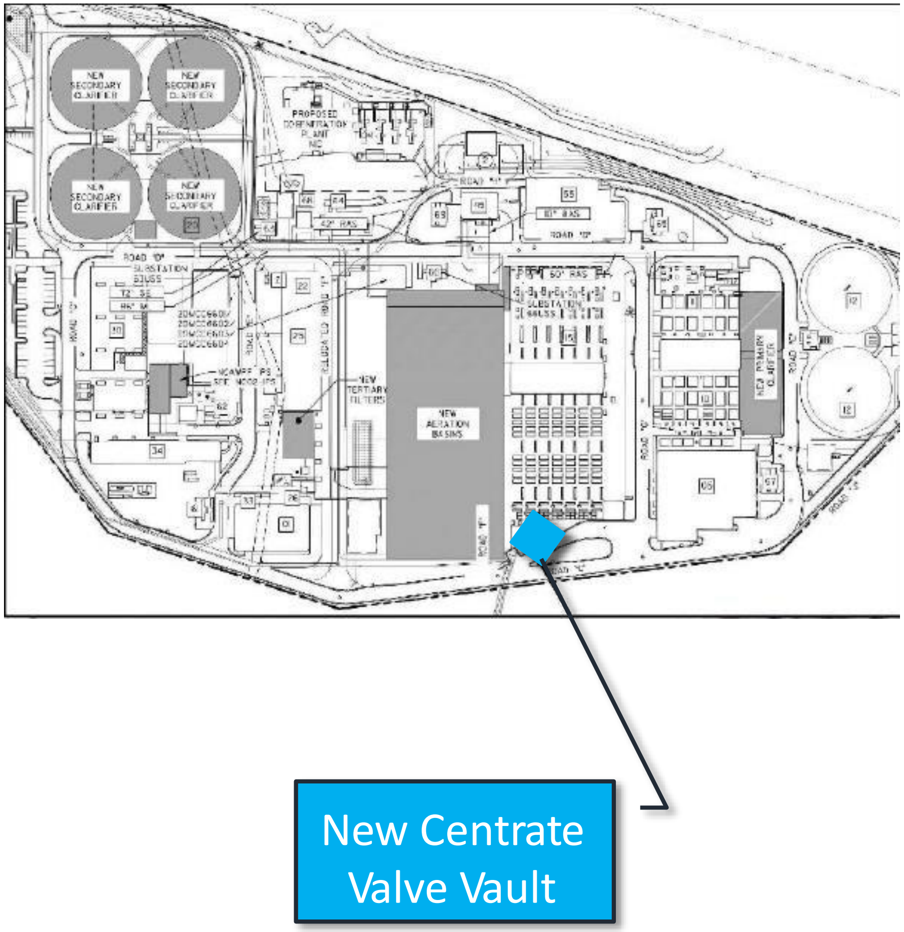
Note:
1. The table does not include other miscellaneous equipment (ex. pumps, valves, PRV's, flame arrestors, etc.) which will be installed as part of the MBC improvements project.
2. Drivers behind "Other Recommended Improvements"-increased O&M costs, equipment age, and redundancy.

MBC Aerial View - Proposed Upgrades



MBC Centrate





Proposed Contract

- In September 2016, PUD advertised a Request for Proposal for design engineering services in support of the MBC Improvements project
- Three firms submitted proposals; all were interviewed
- Interview Panel: 4 City, 1 Metro TAC and 1 IROC members
- CH2M Hill Engineers, Inc. was selected as the most highly qualified firm
- Total contract amount: $5,051,090
  - Fiscal Impact to Metro JPA: $1,700,000 (33.5% of Metro Cost)
- Contract duration: 5 years

Q & A

FINAL DRAFT

Task 018

Impacts of North City Water Reclamation Plant Expansion on the Metropolitan Biosolids Center

Prepared For:

City of San Diego

Public Utilities Department

San Diego, California

August 12, 2016

Prepared By:

MWH Americas, Inc.

Brown and Caldwell

BLP Engineers, Inc.

DHK Engineers, Inc.

CityWorks

Prepared for: City of San Diego Public Utilities Department

Project Title: Impacts of North City Water Reclamation Plant Expansion on the Metropolitan Biosolids Center

Project No.: 11122014, DO/TO No. 18, T10508605-1043450OM

Subject: Final Technical Memorandum

Date: August 12, 2016

To: Monika Smoczynski, City of San Diego Public Utilities Department

From: Boris Pastushenko, BLP Engineers, Inc.

Copy to: Amer Barhoumi, Raymond Ngo, City of San Diego Public Utilities Department

Christine Waters, Victor Occiano, Pure Water Program

Prepared by: BLP Engineers Inc., Brown and Caldwell, MWH Americas, Inc., DHK Engineers, Inc., CityWorks

Reviewed by: Keli Balo, Richard Pitchford, Raymond Ngo, Jesse Pagliaro, Monika Smoczynski, Greg Cross, Dwight Correia, City of San Diego Public Utilities Department

Christine Waters, Pure Water Program

William Hartnett, MWH Americas, Inc.

Victor Occiano, and Arthur Molseed, Brown and Caldwell

Table of Contents

List of Appendices

List of Figures

List of Tables

List of Acronyms & Abbreviations

ACRONYM	DEFINITION
°F	degree(s) Fahrenheit
A	amp(s)
AACEI	Advancement of Cost Engineering International
APCD	(San Diego County) Air Pollution Control District
AWPF	advanced water purification facility
BC	Brown and Caldwell
BG	biogas
BioP	biological phosphorus removal
BLP	BLP Engineers
BOD	biochemical oxygen demand
CAAWPF	Central Area Advanced Water Purification Facility
CEPT	chemically enhanced primary treatment
cfd	cubic foot/feet per day
cfm	cubic foot/feet per minute
cfs	cubic foot/feet per second
City	City of San Diego
CIP	Capital Improvement Program
CM	construction management
CN	Centrate
CTT	cell turnover time
d	day(s)
DCS	distributed control system
DSL	digested sludge
DWSL	dewatered sludge
EDR	Engineering Design Report
EDS	electrical distribution system
El.	elevation
EOF	Emergency Overflow
EOI	elevation of instrument
ESDC	engineering services during construction
FA	foul air
FC_2	ferric chloride solution
$Fe^{+2}Fe_2^{+2}(PO_4)2{\cdot}8H_2O$	vivianite
$FeCl_2$	ferrous chloride
FOG	fats, oils, and grease
fps	foot/feet per second
FRP	fiberglass-reinforced plastic
ft^2	square foot/feet
ft^3	cubic foot/feet
gpd	gallon(s) per day
gpm	gallon(s) per minute
H_2S	hydrogen sulfide

ACRONYM	DEFINITION
HEX	heat exchanger
hp	horsepower
hr	hour(s)
HRT	hydraulic residence time
HUWHP	Hot Utility Water High Pressure
HUWLP	Hot Utility Water Low Pressure
HWR	Hot Water Return
HWS	Hot Water Supply
I/O	input/output
IPS	influent pump station
kVA	kilovolt-ampere(s)
kW	kilowatt(s)
L	liter(s)
lb	pound(s)
MBC	Metropolitan Biosolids Center
MCAS	Marine Corps Air Station
MCC	motor control center
MER	mass emission rate
mg	milligram(s)
MG	million gallons
mgd	million gallons per day
mm	millimeter(s)
MMBtu	million British thermal unit(s)
MPS	Morena Pump Station
MR	Miramar Reservoir
mt/yr	metric ton(s) per year
MW	megawatt(s)
MWH	MWH Americas, Inc.
NCWPF	North City Pure Water Facility
NCWRP	North City Water Reclamation Plant
NDMA	N-Nitrosodimethylamine
NH_3-N	ammonia-nitrogen
$NH_4Mg_4PO_4 \cdot 6H_2O$	struvite
NSPF	North Solids Processing Facility
OCS	odor control system
OF	overflow
O&M	operations and maintenance
OPC	opinion of probable cost
P	phosphorus
PCM	process control module
PDMWD	Padre Dam Municipal Water District
PEA	anionic polymer
PLC	programmable logic controller
PLWTP	Point Loma Wastewater Treatment Plant

ACRONYM	DEFINITION
PM	project management
POL	polymer solution
ppmv	part(s) per million by volume
PRV	pressure-relief valve
PRW	process water
psi	pound(s) per square inch
psig	pound(s) per square inch gauge
PUD	Public Utilities Department
Pure Water	Pure Water San Diego Program
RAS	return activated sludge
RCTS	Rose Canyon Trunk Sewer
rpm	revolution(s) per minute
RSL	raw sludge
SAM	sample line
SBWRP	South Bay Water Reclamation Plant
scfd	standard cubic foot/feet per day
scfm	standard cubic foot/feet per minute
SDG&E	San Diego Gas & Electric
SHC	sodium hypochlorite
SVR	San Vicente Reservoir
TDH	total dynamic head
TDS	total dissolved solids
TKN	total Kjeldahl nitrogen
TM	technical memorandum
TP	total phosphorus
TS	total solids
TSS	total suspended solids
TSSL	Thickened Raw Sludge
UGR	unit generation rate
USS	unit substation
UWHP	utility water high-pressure
UWLD	Utility Water Low Pressure
V	volt(s)
WWPS	Wastewater Pump Station
VFD	variable-frequency drive
VSS	volatile suspended solids
yd^3	cubic yard(s)
yr	year(s)

1 Memo Information

Task Order/Number: TO18, Task 18

Author: BLP Engineers, Inc., Brown and Caldwell, MWH Americas, Inc., DHK Engineers, Inc, CityWorks.

Date Prepared: August 12, 2016

2 Introduction

2.1 Background

In 2015, the City of San Diego (City) initiated the San Diego Pure Water Program (Pure Water), a comprehensive water and wastewater capital improvement program (CIP) to develop infrastructure for reservoir augmentation (37). Pure Water is leading the effort to plan for the construction of new advanced water purification facilities (AWPFs), wastewater treatment facilities, pump stations, transmission lines, and pipelines. As part of Pure Water, the City plans to construct the North City Pure Water Facility (NCPWF) adjacent to the existing North City Water Reclamation Plant (NCWRP); this in turn requires upgrade and expansion of NCWRP to supply NCPWF with required flow of unchlorinated filtered effluent. Purified water from NCPWF will be conveyed to the Miramar Reservoir (MR) or San Vicente Reservoir (SVR) to augment existing potable water supplies.

Diverting additional flows to NCWRP to support NCPWF ultimately changes the relative contribution of biosolids received at the Metro Biosolids Center (MBC) from NCWRP and the Point Loma Wastewater Treatment Plant (PLWTP). As the City's regional solids-processing facility, MBC receives and processes biosolids from both facilities, and has been in operation since February 1998. NCWRP pumps unthickened primary solids from primary sedimentation tanks and waste solids from its activated sludge treatment process to MBC. The combined raw solids from NCWRP are treated at MBC via the following principal unit processes: grit removal, centrifuge thickening, anaerobic digestion, and centrifuge dewatering.

PLWTP operates its own anaerobic digesters, but pumps digested sludge to MBC where it is blended with digested sludge from the MBC anaerobic digesters at either the biosolids storage tank or biosolids emergency storage tank. The combined flow of digested sludge is then dewatered using centrifuges. The dewatered biosolids cake is transported to silos at the truck-loading area for land application, alternative daily cover at landfills, or landfill disposal. Centrate from dewatering and thickening operations is returned to a drop structure at NCWRP, and is subsequently conveyed by gravity to the Rose Canyon Trunk Sewer (RCTS). Other wastewater generated at MBC is pumped to a nearby sewer.

This technical memorandum (TM) evaluates the impact of the changes in biosolids flows and loadings proposed under Pure Water that will be conveyed to the existing facilities at MBC. In general, projected flows of raw solids from NCWRP will increase while projected flows of digested solids from PLWTP will remain roughly constant such that MBC will be required to provide onsite anaerobic digestion for a greater percentage of the system's biosolids output. In addition to changes in quantity, changes in treatment processes at NCWRP and PLWTP may change the quality, and hence treatability, of the two biosolids streams.

From a planning perspective, Pure Water envisions the startup of the NCWRP Expansion in two phases in conjunction with the startup of NCPWF. In Phase I, NCWRP will provide sufficient unchlorinated filtered effluent to NCPWF to produce 15 million gallons per day (mgd) of purified water for augmentation of MR or SVR; in Phase II, NCWRP and NCPWF will be operated to produce 30 mgd of purified water for augmentation at MR or SVR. Whether the project will be implemented in two phases is not addressed in this TM.

Since commissioning, City staff have done much to streamline and optimize the unit processes at MBC. The overview presented above describes only the unit processes that are in operation at the time of this writing. A general process schematic for the streamlined operations at MBC is shown below in Figure 2-1.

In addition to plans for NCPWF, the City is planning to receive and process fats, oils, and grease (FOG) (39) at a new facility onsite at MBC prior to anaerobic digestion. The FOG facility will increase the organic loading on the anaerobic digesters and all subsequent downstream solids-processing facilities. The resulting increase in digester gas production will increase electricity production at the cogeneration facilities onsite at MBC and available waste heat for use at MBC. The City is also evaluating an emerging biosolids treatment technology, Lystek[1], that has the potential to substantially increase digester gas production in the anaerobic digesters and reduce organic loading on downstream facilities (39). In addition to the impacts of Pure Water, this TM examines the impacts of FOG and Lystek in terms of increased biogas production and the capacity of the existing biogas-handling systems. The costs of implementing Lystek technology are not included in this TM. Potential impacts of offloading other organics from the landfill are also contemplated by the City under a separate cover.

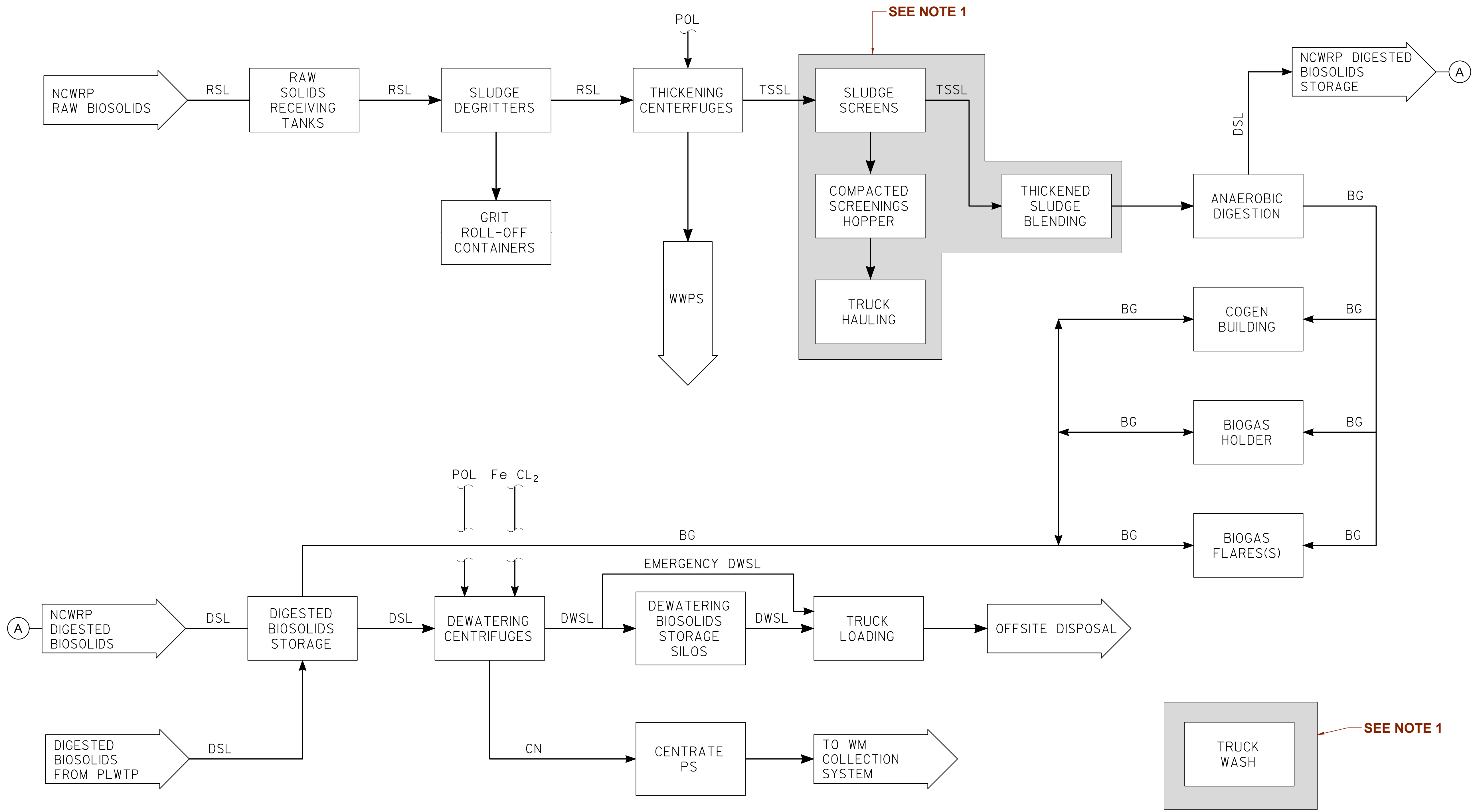
This TM conservatively assumes the wasting of mixed liquor together with primary sludge such that the solids concentration of the combined sludge being sent to MBC does not exceed 0.5%. This mode of operation requires MBC to operate at a higher hydraulic loading rate compared to the option described in the 10% Engineering Design Report (EDR) for the NCWRP Expansion (32). The mode of operation previously described in the EDR involves wasting primary sludge at a solids concentration of 1% and surface wasting of return activated sludge (RAS) using a classifying selector, resulting in a higher net solids concentration of the combined sludge, between 0.85% and 1.00%. Both options produce the same mass and organic loading rates at MBC, but the second option has the lower hydraulic loading rate of the two.

The final design consultant for the NCWRP Expansion may select the option with the higher flow rate and lower solids concentration to establish a constant sludge wasting rate (e.g., mixed liquor wasting) as opposed to surface RAS wasting. Costs presented in this TM are based on the first, more conservative option. However, an approximate percent reduction in equipment costs that would result from choosing the second option (RAS surface wasting) is presented in Section 8. As agreed at the project workshop conducted on May 18, 2016, these savings are not developed to the same level of analysis as the more conservative, high biosolids flow-wasting scenario. The associated cost savings for the low-flow biosolids-wasting scenario are presented as a high-level, order-of-magnitude assessment of potential savings in Section 8. If the first option (mixed liquor wasting) is chosen, the percent reduction in equipment costs does not need to be evaluated.

2.2 MBC and Its Role in Managing Biosolids Inventory

The management of the City's biosolids inventory is a regional, system-wide operation requiring coordination among PLWTP, NCWRP, and MBC. All three facilities produce biosolids; two out of three anaerobically digest biosolids; and MBC alone dewaters and disposes of the anaerobically digested biosolids produced by all three. Although the capacity assessment focused on anaerobic digestion at MBC, the analysis considered aspects of anaerobic digestion at PLWTP because this TM assumes the option of partial bypass of raw solids to PLWTP under specific infrequent conditions discussed in Section 3.2.1. This TM does not evaluate available digester capacity at PLWTP or any future plans (35) for use of this available capacity.

[1] Lystek is a trademark of Lystek International, a subsidiary of R.W. Tomlinson Ltd.



NOTES:
1. CURRENTLY NOT USED

IMPACTS OF NCWRP EXPANSION ON MBC

FIGURE 2-1

MBC CURRENT OPERATING CONFIGURATION

PLWTP is able to recover and anaerobically digest solids from chemically enhanced primary treatment (CEPT) up to a certain limit. This limit is determined by the "equivalence threshold," which establishes an allowable mass emission rate (MER) of 9,942 metric tons/year (mt/yr) (46) based on operation of PLWTP at its rated capacity of 240 mgd, assuming an equivalent secondary treatment discharge limit of 30 milligrams per liter (mg/L) total suspended solids (TSS) (38).

As discussed in Section 5.3 of the TM, existing digester capacity at MBC limits MBC's ability to treat future Pure Water flows and loadings. The constraint raises the question of whether it is more cost-effective to exploit available unused digestion capacity at PLWTP in lieu of constructing a fourth anaerobic digester at MBC and, if so, when. The question is significant because MBC staff [2] have indicated that MBC could be exposed to peak flows and loadings up to twice those processed under average conditions because of construction or operations and maintenance (O&M) activities at PLWTP or NCWRP. The project team and plant staff estimate that the frequency of such events is approximately once every 5 years. The project team has proposed potential mitigating measures for these unusual and infrequent events instead of sizing the facilities based on the elevated 2:1 peaking factor that would incur substantial and unnecessary expenses. These mitigation measures and potential discharge of biosolids to PLWTP are further discussed in Section 3.2.1 of this TM.

As part of the mitigating measures, the project team used a firm capacity approach to assess the sustainable, long-term capacity of a system. See Section 2.3.3 for a more detailed discussion. For the projected biosolids flows and loadings under Phase I and Phase II, the same "firm capacity" approach was used to size any needed upgrades to that same system. Because this approach is system-specific, it allowed the project team to make engineering judgments about system capacity on a case-by-case basis that took into account specific attributes of the equipment and feedback from O&M staff.

2.3 TM Organization and Assessment Method

2.3.1 Objectives

This TM is a concept-level assessment of the proposed changes in solids throughput at MBC, their impact on existing unit processes, and MBC's ability to successfully treat the projected biosolids flows and loads. It also includes an estimate of required and recommended improvements. The objectives of the TM are as follows:

1. Project the changes in solids contributions, in terms of both quantity and quality, from PLWTP and NCWRP
2. Assess the status of selected existing principal unit processes in terms of their firm production capacity
3. Assess the impact of these changes in solids contributions on the selected principal unit processes at MBC
4. Identify any capacity deficiencies in the existing principal unit processes that may result under future conditions
5. Identify required or recommended equipment improvements for a given unit process based on engineering judgment
6. Develop a Class 5 opinion of probable cost (OPC) (36) for the required and recommended improvements
7. Present a concept-level construction schedule that coordinates the MBC upgrades and enhancements with the timeline for expansions and upgrades at NCWRP

[2] Meeting between Dwight Correia and Boris Pastushenko, February 18, 2016.

This TM is not a Facilities Plan in the sense that it does not present and develop multiple alternatives, examine the alternatives based on life-cycle costs and non-economic factors, and select a recommended alternative. The required (driven by Pure Water needs), FOG Program-related, or other recommended improvements oriented on increasing MBC reliability and efficiency represent a logical, conservative extension of what is already installed and operational at MBC. The main goal in identifying improvements is to establish a benchmark approach that is detailed enough to allow for development of a Class 5 OPC. The required/recommended improvements do not (1) rule out other engineering alternatives; (2) compromise the possibility for more innovative approaches; or (3) eliminate the need for a detailed examination of alternatives in the future.

2.3.2 Format

Section 3 of this TM consists of an executive summary covering major findings, projected costs, and construction schedule. Section 4 of this TM addresses Objective 1 and discusses the modeling assumptions that were used to project flows and loads under Phase I and Phase II conditions. Appendix A represents extensive reference to prior reports, studies, manuals, design documents, and broad literature sources. Appendices B and C tabulate the results of modeling for the different scenarios under Phase I and Phase II conditions, respectively.

Section 5 is divided into a number of sub-sections, each addressing a specific unit process at MBC and satisfying Objectives 2 through 5. Each subsection first describes existing operating conditions and establishes the firm capacity of each process relative to its current operating conditions. Once existing conditions are determined, each subsection compares the firm capacity of the existing process to the projected flows and loads to establish its ability to handle future projected flows and loads. Finally, Section 5 of the TM presents the main findings, conclusions, and recommendations related to system improvements.

Within each section is a series of tables designed to organize information so that the reader follows a logical progression. The tables allow for the reader to survey the impacts on MBC without necessarily reading the text in detail. The text and table notes provide additional commentary on the findings summarized in the tables. Although the specifics of each table vary according to the nature of the process, the overall pattern and objective of the tables remain the same. (In the summary below, “X-” is a placeholder to denote any given figure or table such as “Table 2-1.”)

- Table X-1: Summarizes the original design criteria for the process, summarizes the firm capacity (i.e., long-term sustainable capacity) of the existing system, and compares the firm capacity to the current operating conditions.
- Table X-2: Uses the same firm capacity information for the current system and compares the current firm capacity to the projected operating conditions under Phases 1 and 2. Based on the comparison, Table X-2 identifies whether an existing system has sufficient firm capacity to handle projected flows and loads.
- Table X-3: If needed, Table X-3 provides greater detail on the modifications needed to ensure that the firm capacity of the system is increased to meet the projected Phase I conditions.
- Table X-4: If needed, Table X-4 provides greater detail on the modifications needed to ensure that the firm capacity of the system is increased to meet the projected Phase I and Phase 2 conditions.

Additional tables beyond Table X-4 were needed in Section 5.3, Anaerobic Digestion System, to summarize the impacts of FOG, and FOG plus Lystek.

Analysis of utilities extension needs is based on a conceptual assessment of biosolids flows, flow drainage, and electrical and distributed control system (DCS) infrastructure with the load lists presented in Appendix D. Section 5 provides a Class 5 OPC meeting Objective 6 with the basis of estimate memorandum and the estimate summary shown in Appendix E. Section 7 presents a schedule for completion assuming that the required and recommended improvements are confirmed in later stages of the design process (Objective 7). Section 8 lists important assumptions and describes any special limitations of the work done in completing the TM. Section 9 briefly summarizes the impact of constraints on the design of upgrades to MBC imposed by the existing NCWRP raw solids pump station and the existing 16-inch-diameter raw solids force main.

The MBC design documents and O&M manuals include schematic diagrams that depict the configuration of the existing systems being evaluated. These documents are generally referenced throughout the TM. See References (1) through (11).

The draft TM released to the City on May 6, 2016, has gone through an extensive internal quality assurance/quality control review by William Hartnett, MWH Americas, Inc. (MWH); Victor Occiano and Arthur Molseed, Brown and Caldwell (BC); Christine Waters, Pure Water Program; and the City: Keli Balo, Richard Pitchford, Raymond Ngo, Jesse Pagliaro, Monika Smoczynski, Greg Cross, and Dwight Correia. The report findings and the above-referenced comments were discussed at the draft TM workshop on May 18, 2016. All review comments have been incorporated or responded to in the final TM. The workshop PowerPoint presentation slides outlining major TM findings and summary of the workshop discussions and decisions are presented in Appendix F, and a comment log with responses to the City review comments is presented in Appendix G.

2.3.3 Concepts and Terminology

This subsection introduces and develops key concepts and terminology that support the investigative work and the findings of the TM.

2.3.3.1 "Phase I" and "Phase II" Conditions

Future flows and loadings of raw and digested solids received by MBC are a function of projected operating conditions associated with other existing and proposed facilities in the system—primarily the proposed NCPWF, expanded NCWRP, and PLWTP. Section 3 presents, in detail, the projected conditions at the tributary facilities that are used to model the flows and quantities of solids conveyed to MBC. Appendices B and C summarize the results of the modeling.

These sets of projected operating conditions are too numerous to continuously repeat in this TM. As a result, the terms "Phase I" and "Phase II" have been adopted to collectively refer to those projected operating conditions established as future benchmarks for planning. Table 2-1 and Table 2-2, respectively, summarize the Phase I and Phase 2 operating conditions. Although the results in Appendices B and C include projected flows to either MR or SVR, the projected impacts on MBC were always higher for deliveries to MR compared to SVR. As a result, the MR case was used as the most conservative condition with respect to assessing capacity at MBC.

Table 2-1: Summary of Phase I Operating Conditions		
Item No.	**Parameter**	**Description**
1	NCPWF production output (mgd)	15
2	Receiving reservoir for purified water	MR
3	Plant flow conditions at NCWRP	Average daily or peak hourly (maximum) flow
4	Level of non-potable water production at NCWRP	Peak day (maximum) NPR demand

Table 2-2: Summary of Phase II Operating Conditions		
Item No.	**Parameter**	**Description**
1	NCPWF production output (mgd)	30
2	Receiving reservoir for purified water	MR
3	Plant flow conditions at NCWRP	Average daily or peak hourly (maximum)
4	Level of non-potable water production at NCWRP	Peak day (maximum) NPR demand

2.3.3.2 "Rated" Capacity versus "Firm" Capacity

This TM focuses on the capacity of existing process equipment and systems at MBC and their ability to accommodate increased flows and loadings. The rated capacity of an item of equipment is dictated by nameplate data and specifications. In contrast, the firm capacity of a system, or individual item of equipment, is subject to engineering judgment and operational experience. Although general guidance documents (45) outline different approaches to condition assessment, they do not recommend a specific approach, nor do they offer specific guidance on projecting the capacity of a system based on its condition. The project team has adopted an approach that includes a margin of safety to account for contingency events (see Section 3.2.1).

2.3.3.2.a Rated Capacity

"Rated capacity" can be applied to individual items of equipment or to systems including multiple items of equipment.

Applied to individual items of equipment, rated capacity is based on the equipment's specified duty point: a quantity of product delivered under particular process operating conditions. The duty point can be defined in a specification, listed on the nameplate for the equipment, or provided in equipment O&M manuals.

Applied to systems, the rated capacity of a system depends partly on the types of equipment within the system. For multiple centrifugal pumps in parallel, the capacity of the system is determined by the system curve. Because of non-linearities in system friction losses, the combined output of multiple pumps is less than the arithmetic sum of their individual capacities for a given total dynamic head (TDH).

For positive-displacement, progressive-cavity pumps, the capacity of a system of multiple pumps in parallel is assumed to be additive: the output of each pump is relatively insensitive to pressure assuming that the pump is operating within the torque and horsepower (hp) limitations of the pump and drive assembly.

2.3.3.2.b Firm Capacity

The term “firm capacity” can be applied both to individual items of equipment and to systems that include multiple items of equipment.

For individual items of equipment, the firm capacity is some value less than the rated capacity. This de-rating is the engineer’s assessment of what the equipment’s sustainable performance point is over its lifetime of service.

The de-rating factors applied to rated capacities in this TM are based on characteristics of the equipment and feedback from O&M staff, and based on the actual operating points established for existing equipment and systems at MBC. Table 2-3 below lists the de-rating factors applied throughout this TM to rated capacities to establish sustainable levels of production.

Table 2-3: Summary of Firm Capacity De-rating Multipliers for Items of Process Equipment

Equipment Type	De-rating Multiplier
Centrifugal pump	0.9
Progressive-cavity pump	0.8
Centrifuge	0.8

The multiplier for centrifugal pumps is based on assumed impeller wear and efficiency loss over time. For progressive-cavity pumps, stator wear increases exponentially with rotor speed and, as a result, their firm capacity is assumed to be a smaller percentage of their rated capacity. For centrifuges, the de-rating factor of 0.8 is assigned to provide additional available capacity to respond to contingency events, and to account for high levels of machine wear and attrition at maximum speed. Some items of process equipment, those with few or no moving parts, were not assigned a de-rating factor. “Teacup” degritters are one example of equipment with identical firm and rated capacities.

It is important to note that these de-rating factors may not necessarily have anything to do with the age of equipment. The same de-rating factors used in evaluating existing equipment have also been used in sizing new equipment. This approach is roughly equivalent to the “2:1” safety factor discussed in Section 2.2. It ensures that the equipment within a given system can still function with a margin of safety at the end of its useful life, and handle short-term operational peaks by temporarily running the available units and increasing the output of each unit.

In a system context, the definition of firm capacity refers to the number of items of process equipment out of the total number that are intended to run under maximum conditions. If a system consists of three pumps, and two are intended for continuous duty at maximum conditions, the system firm capacity is based on running the two pumps in parallel. The third pump is a standby pump that operates only if one of the two duty pumps fails.

2.3.3.2.c Redundancy

Redundancy is calculated in percent based on the number of items of standby equipment compared to the number of items of equipment running to deliver the firm capacity. If one backup unit and two units are running at firm system capacity, the redundancy is 50% (1/2).

2.3.3.2.d Duty Cycle

Duty cycle defines the percentage of the time that a system runs. System concepts of capacity (system capacity and firm capacity) are defined above assuming that the units of equipment run continuously. For systems where process flows are less than the system capacity, the system may run intermittently. If a set of process units run for 30 minutes out of any given hour, the system is operating on a 50% duty cycle. The duty cycle concept is frequently associated with constant-speed units that operate in response to high-level and low-level set points in a wetwell.

2.3.4 Acknowledgements

BLP Engineers Inc. (BLP) and BC wish to thank the following for their patience, goodwill, and support during the preparation of this TM: at the City, Dwight Correia, John Medina, Gerow Pitchford, Neil Tran, and the operations staff in Building 76; and at Fortistar, Robert Smith.

3 Executive Summary

3.1 Principal Findings

3.1.1 Phase II Conditions without Addition of FOG and Lystek

This Executive Summary focuses on the findings for Phase II conditions, assuming that the improvements needed at MBC to accommodate 30 mgd of pure water production are the main concern. For additional detail on the Phase I conditions, and their associated impacts on the MBC facilities, see the individual subsections in Section 5. While Phase I required improvements are substantially less extensive compared to Phase II required improvements, they are separated only by a short time span (as shown in Section 4.1). From a construction-scheduling and construction-efficiency standpoint, it would make sense to plan for and proceed straight to Phase II required improvements. This course of action should result in sizable savings for the City versus phasing Phase I and Phase II improvements.

The Phase II condition (see Table 2-2), without consideration of FOG and Lystek, corresponds to the base case. Table 3-1, which appears at the end of Section 3.1.1, summarizes the required and recommended improvements at MBC to accommodate this condition. Figure 3-1 is a site plan that shows the general location of different areas of work associated with the capacity assessment and includes the facilities for Phase II. It does not include the Lystek process.

3.1.1.1 Flows and Loadings

Increased flows and loadings of raw solids from NCWRP have the greatest impact on those unit processes that handle the raw solids flow. These processes are grit-handling facilities (Section 5.1), raw solids thickening (Section 5.2), anaerobic digestion (Section 5.3), and centrate return (Section 5.5). Raw solids flows are expected to increase by a factor of 7 from a current maximum operating flow of 0.89 mgd to a projected flow of 6.55 mgd at Phase II maximum conditions; solids in pounds per day (lb/d) are expected to increase by a factor of 5:1 from 56,000 lb/d (current) to 294,000 lb/d (Phase II maximum conditions). Tables 5-5 and 5-6 present this information.

TM 4, Evaluating Biosolids Management Options (34, 35) prepared by BC and Black & Veatch in May 2014, evaluated biosolids management options for the City on a system-wide basis for future scenarios including NCPWF. TM 4 recommended Solids Option 4. Although the findings of TM 4 serve as a general comparison, a number of recent developments have resulted in higher projected flows and loadings of raw solids at MBC since TM 4 was published.

- For Phase I, TM 4 is based on the assumption that 30 mgd of influent flow at NCWRP is required to produce 15 mgd of purified water. Further work since 2014 indicates that sidestream losses and non-potable reuse (NPR) demands (increased from 9.1 mgd to 11.8 mgd) are higher than initially assumed. To produce 15 mgd of purified water, an influent flow of 32.9 mgd is required.

- For Phase II, TM 4 is based on the assumption that 45 mgd of influent flow at NCWRP is required to produce 27 mgd of purified water. The required average daily influent flow corresponding to the currently proposed NCWRP Expansion, with 33.2 mgd production of pure water and ability to satisfy average NPR demand of 11.8 mgd, is approximately 51.8 mgd. To satisfy peak day NPR demand of 21.6 mgd the system is required to treat approximately 55.5 mgd of flow. These flow rates are based on an assumption that projected dry weather (July–October) NPR demand requirements may sustain peak day demands for several subsequent days exceeding currently anticipated average dry weather NPR demand of approximately 17 mgd.

- TM 4 did not include Pure Water's plan to intercept wastewater flows from trunk sewers near Morena Boulevard and pump them to NCWRP to augment wastewater supplies.

- TM 4 did not factor in the decision to use CEPT at NCWRP, which has an impact on flows and loadings to MBC (lower removal efficiencies were used based on historical data). This decision was made later as part of a process evaluation under development of the 10% EDR for the NCWRP Expansion (32).

3.1.1.2 Grit-Handling Facilities (Section 5.1)

The recommended approach includes continuing with, and expanding, the existing closed-loop grit removal system. The 14-inch-diameter line supplying raw solids to the grit separators and centrifuges will remain as-is, but will operate at higher flow rates. The significant increase in raw solids flows and loadings requires the following upgrades and improvements to the existing closed-loop grit processing system to meet Phase II maximum conditions:

- Installation of three new, higher-capacity, raw solids feed pumps with variable-frequency drives (VFDs)

- Installation of two grit separators

- Installation of two grit clarifiers with grit augers and shaftless screw conveyors

- Expansion of Building 76 to accommodate the additional facilities

3.1.1.3 Raw Solids Thickening Facilities (Section 5.2)

A seven-fold projected increase in raw solids flows from 0.89 mgd to a Phase II maximum of 6.55 mgd under peak day flow conditions requires replacement of the existing thickening centrifuges. See Section 3.1.1.1 and Section 4.1 for a discussion of the projected changes at NCWRP associated with the increased raw solids flows and loadings. It is more practical to completely replace the existing units with newer larger units because (1) this approach avoids increasing the size of the building and other support systems; and (2) newer centrifuges are significantly more energy-efficient than their existing counterparts. A total of six new centrifuges will be installed. In accordance with industry standard practice, the centrifuges were sized so that two units can be kept in reserve at all times, and four units can meet the Phase II maximum conditions. Sizing based on "n+2" for centrifuge installations under maximum conditions is an industry standard given the maintenance-intensive nature of centrifuges. In addition, the units were sized for individual firm capacity based on operating at 80% of output to address contingency events described in Section 3.2.1.

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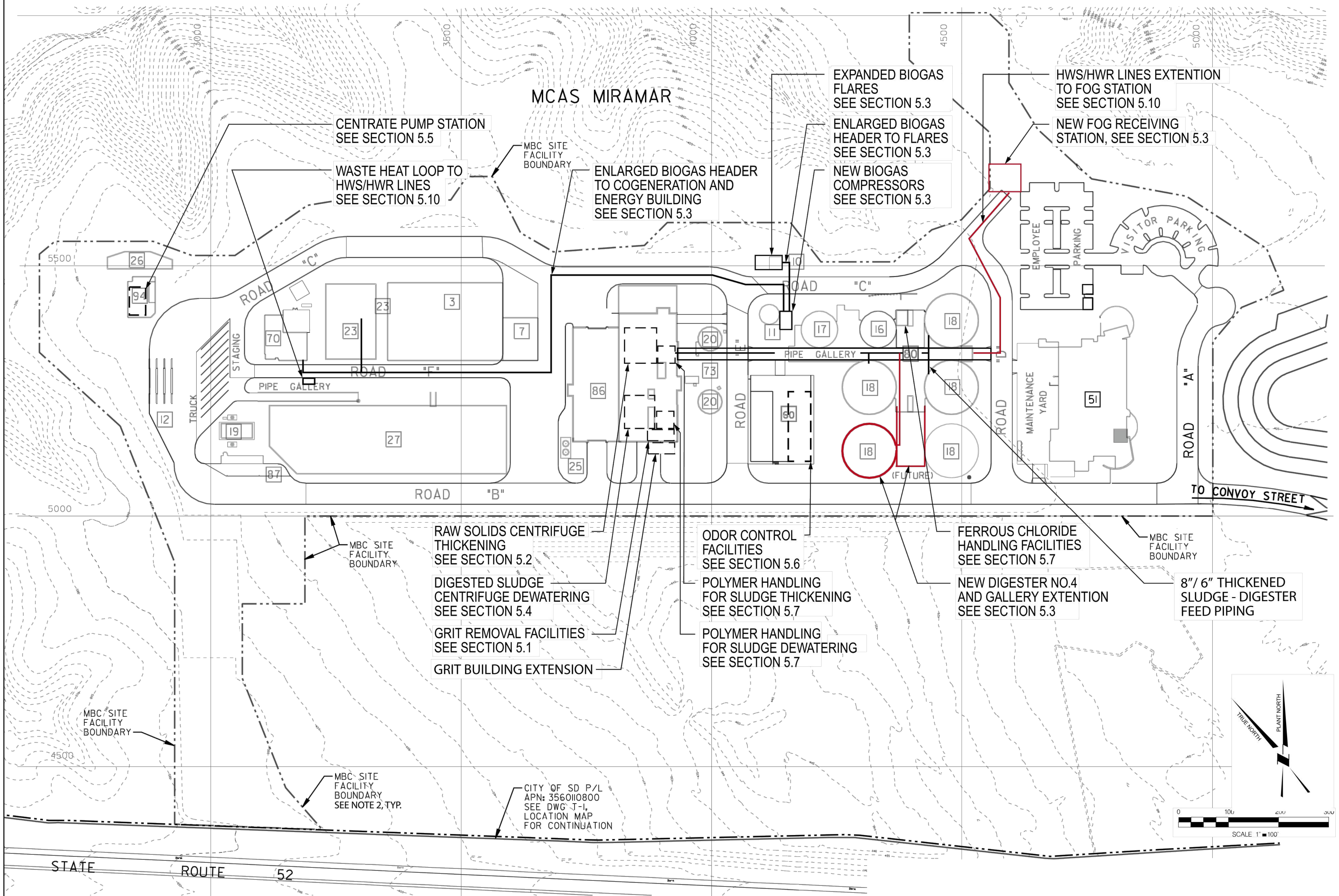


LEGEND:

— PROPOSED FACILITIES FOR FATS, OILS, AND GREASE.

— PROPOSED FACILITIES FOR PURE WATER AND OTHER REQUIREMENTS

MBC FACILITIES

3	FUTURE BIOSOLIDS HEAT DRYING BUILDING
7	FUTURE DRIED BIOSOLIDS STORAGE
10	BIOGAS FLARE FACILITY
11	BIOGAS HOLDING TANK AND COMPRESSORS
12	LIQUID WASTE RECEIVING STATION
16	DIGESTED BIOSOLIDS STORAGE TANK
17	EMERGENCY STORAGE TANK
18	DIGESTER
19	ELECTRIC YARD
20	RAW SOLIDS RECEIVING TANK
23	COGENERATION FACILITY
26	ODOR CONTROL SYSTEM FOR W.W.P.S.
27	FUTURE COMPOSTING BIOSOLIDS FACILITY
51	OPERATIONS BUILDING
60	CHEMICAL BUILDING
70	ENERGY BUILDING
73	RECEIVING TANK COMPLEX
76	CENTRIFUGE BUILDING
80	DIGESTER COMPLEX
86	DEWATERED BIOSOLIDS STORAGE BUILDING
87	TRUCK WASH FACILITY
94	WASTEWATER PUMP STATION (W.W.P.P.)

NOTES:

1. SITE LOCATION AND SPACE REQUIREMENTS FOR LYSTEK NOT SHOWN.
2. MBC SITE BOUNDARY IS SHOWN FOR GENERAL REFERENCE ONLY. FOR SITE BOUNDARY SURVEY INFORMATION, SEE DRAWINGS SF-CB-1 THROUGH SF-CB-3 (27319-0005-D THRU -0007-D)

MWH. Brown AND Caldwell
BLP Engineers, Inc.

IMPACTS OF NCWRP EXPANSION ON MBC

FIGURE 3-1

METRO BIOSOLIDS CENTER SITE PLAN SHOWING REQUIRED AND RECOMMENDED IMPROVEMENTS

Path: P:\Projects\San Diego, City of (CA)\Pure Water Program\T018 – Impact of NCWRP Expansion on MBC\CADD\10-FIGURES
Filename: 3-1 Plot date: Aug. 10, 2016 04:05PM CAD User: Eric Stiles

In conjunction with the thickening centrifuges, this TM recommends replacing the sludge feed pumps, and polymer feed pumps, complete with VFDs, as required upgrades.

Higher solids throughput will result in higher flows of thickened sludge feeding the digesters. The existing thickened sludge pumps will be replaced with larger pumps and, under maximum conditions, three out of four of the pumps will operate in parallel. The required upgrades also include a new 8-inch-diameter thickened sludge force main with 6-inch-diameter laterals supplying the mix pump suction manifolds for the digester mix pumps.

3.1.1.4 Anaerobic Digesters (Section 5.3)

It is possible to operate MBC under Phase II maximum conditions without construction of a fourth digester, but it requires that all three existing digesters perform well at the upper limit of acceptable volatile suspended solids (VSS) loading (29, 30, 31). See Section 3.2.1 for digester management safeguards. If one digester is out of service, a portion of the solids generated at NCWRP can be bypassed to PLWTP under Phase II maximum loading conditions to relieve the loadings on the digesters at MBC. Projections indicate that 13.8% of the NCWRP biosolids output will need to be diverted to PLWTP (at Phase II maximum loading calculated at 2-week peak conditions).

Diverting surplus solids flows from NCWRP to PLWTP under Phase II maximum conditions will increase the MER at PLWTP but the increase will not exceed the allowable limit under the existing discharge permit. The MER numbers were calculated using the Excel spreadsheet system mass balance model developed by BC, showing that the MER will increase from 7,790 mt/yr to 8,241 mt/yr, an increase that is still below the permit limit of 9,942 mt/yr (46). Infrequent diversion of biosolids to PLWTP from NCWRP is a safeguard built into MBC’s flow management philosophy that will be maintained by the Public Utilities District (PUD) and used in case one digester is taken out of service at maximum loading conditions. Future MBC predesign and final design consultants will be required to evaluate the NCWRP biosolids diversion infrastructure, PLWTP solids reserve capacity and ability to sustain additional soluble biochemical oxygen demand (BOD) loads, and means and methods of conveying biosolids from MBC to PLWTP without short-circuiting solids flows to the Morena Pump Station (MPS). This could potentially be accomplished via either (1) the existing 54-inch-diameter Rose Canyon sewer, Junction Box 1, 42-inch-diameter sewer down to 45-inch-diameter interceptor with diversion to 60-inch-diameter sewer leading to a 60-inch-diameter interceptor straight to the North Metro Interceptor bypassing the MBS; or (2) pumping flow through the brine line. For all practical purposes, all three digesters will be in constant service during Phase II average and maximum conditions. It is highly doubtful that operations staff will commission and decommission the third digester just to handle peak conditions in a given year. As such, it will not be possible to consider available, unused MBC digesters for storage of off-spec water (42).

Phase II requires upgrades to the digesters include the following: (1) replace the existing digester gas laterals with larger lines and larger gas-handling appurtenances (flame arresters, etc.); (2) replace the existing biogas booster blowers with three new blowers and increase the size of the biogas feed line from the blowers to the cogeneration facility or construct a new biogas header to a new cogeneration facility; and (3) install an additional biogas flare. Table 5-13 presents this information. As indicated in Section 5.3, the enlargement of the biogas laterals and upsizing of the biogas blowers will be required to be implemented at Phase I loading conditions.

3.1.1.5 Digested Sludge Dewatering System (Section 5.4)

There is no substantial difference between current total output of digested sludge and the projected total output of digested sludge under Phase II maximum conditions (peak day assumed). Tables 5-18 and 5-19 present this projected output. Although the City is currently replacing the existing dewatering centrifuges with larger centrifuges, the existing original sludge feed pumps limit the capacity of the system overall. Aging control system components will ultimately limit the availability of the new centrifuges currently being installed. While upgrading the sludge feed pumps and polymer feed pumps is not required, it is recommended to maximize the system capacity and operational flexibility of the system to handle contingency situations regarding digested sludge flows from PLWTP (see Section 3.2.1).

3.1.1.6 Centrate Return System (Section 5.5)

Grit accumulation or precipitate buildup in the existing centrate force main is the likely explanation for high dynamic losses in the system and higher-than-anticipated pump discharge pressures. It is not possible to expand and upgrade the existing pumps for higher return flows of centrate to NCWRP unless the problems associated with maintaining the existing line are addressed first. See Section 3.2.2 for further discussion.

This TM requires installing four new centrate pumps, complete with VFDs, for returning centrate to NCWRP. One pump will occupy the space available, and the other three pumps will replace the existing pumps. Sizing information assumes that full-pipe flow conditions are restored prior to pump replacement.

3.1.1.7 Odor Control Systems (Section 5.6)

No odor control system (OCS) modifications are required.

3.1.1.8 Chemical Feed Systems (Section 5.7)

A fourth off-the-shelf replacement peristaltic pump is recommended.

3.1.1.9 Electric Utilities Extension Needs (Section 5.8)

All electrical upgrades can generally be accommodated within the configuration of the existing power distribution system with required modifications as discussed in Section 5.8.2**.**

The Fortistar cogeneration system has sufficient capacity to accommodate the new maximum demand of approximately 5.6 megawatts (MW).

If the Fortistar cogeneration system is not to be relied upon to supply the entire power to the facility, San Diego Gas & Electric (SDG&E) shall make provisions if necessary to meet the new maximum demand.

3.1.1.10 Additional Siting Considerations (Section 5.9)

Figure 3-1 is a general site plan showing the existing facilities and the areas of the existing site that will be affected by the recommended and required work. Currently, the area allocated for FOG facilities is shown adjacent to the parking area north of the maintenance yard. No provisions for Lystek are shown on the site plan.

3.1.1.11 Waste Heat Utilization (Section 5.10)

The hot water requirements for Phase I and Phase II are estimated to remain within the current hot water heat requirements and well below the hot water design capabilities. Minor reconfigurations of the existing hot water supply (HWS) and hot water return (HWR) piping systems are recommended. See Section 5.10 for the summary of required and recommended improvements.

3.1.1.12 Phase II Summary of Required and Recommended Improvements

Table 3-1 below presents the proposed required and recommended improvements, outlined in Items 3.1.1.1 through 3.1.1.11.

Table 3-1: Phase II Improvements - Base Case without FOG and Lystek

TM Section	Unit Process/ System	Description of Improvements	Designation of Improvements		
			NCWRP Expansion (Pure Water)	FOG Addition	Other
5.1	Grit removal	1) Install three larger raw solids feed pumps with VFDs to supply grit teacups and thickening centrifuges at higher rate.	✓		
		2) Expand Building 76 to facilitate expanded grit system.	✓		
		3) Install two grit separators for a total of five. Install two grit clarifiers with grit augers and shaftless screw conveyors for a total of four.	✓		
5.2	Sludge thickening	1) Install five new larger centrifuges to replace the five existing.	✓		
		2) Install sixth centrifuge in the space available.	✓		
		3) Install six new sludge feed pumps and six polymer feed pumps.	✓		
		4) Install three new larger thickened sludge digester feed pumps to replace existing. Install fourth pump in the space available.	✓		
		5) Install new 8-inch thickened sludge supply line.	✓		

Table 3-1: Phase II Improvements - Base Case without FOG and Lystek					
TM Section	**Unit Process/ System**	**Description of Improvements**	**Designation of Improvements**		
			NCWRP Expansion (Pure Water)	**FOG Addition**	**Other**
5.3	Anaerobic digestion	1) Consider replacing recirculation pumps, mixing pumps, and axial mixing pumps with chopper-style pumps to improve mixing reliability.			✓
		2) Consider replacing HEXs for digesters 1 and 2.			✓
		3) Consider implementing digester management safeguards (3.2.1).			✓
		4) Construct new biogas laterals and upgrade digester gas-handling equipment (flame arresters, PRVs, etc.).	✓		
		5) Install three larger biogas blowers to replace existing and upsize blower discharge laterals.	✓		
		6) Install one new flare for a total of three.	✓		
		7) Increase the size of the gas line to supply cogeneration or provide header to new cogeneration facility.	✓		
		8) Increase size of the gas header to the flares.	✓		
5.4	Sludge dewatering	1) Install eight new sludge feed pumps and polymer feed pumps to replace existing.			✓
		2) Install two new centrifuges to replace existing centrifuges 1 and 8.			✓

Table 3-1: Phase II Improvements - Base Case without FOG and Lystek					
TM Section	**Unit Process/ System**	**Description of Improvements**	**Designation of Improvements**		
			NCWRP Expansion (Pure Water)	**FOG Addition**	**Other**
5.5	Centrate	Install four new centrate pumps with VFDs.	✓		
5.6	Odor control	No planned improvements.			
5.7	Chemical handling	1) Furnish fourth $FeCl_2$ feed pump either as an installed backup, or an off-the-shelf spare pump. 2) Increase tubing size for higher delivery at lower rpm.	✓ (1)		✓ (2)
5.8	Utilities extension	1) Biogas piping covered under 4.3. 2) Thickened Sludge piping covered under 5.2.	✓ ✓		
5.9	Additional siting considerations	No planned improvements.			
5.10	Waste heat utilization	Modify existing HWS and HWR piping.			✓

Note: Most of the improvements listed in Table 3-1 will require engineering design and preparation of construction documents including design drawings and specifications with exception of recommended replacement of existing (digesters 1, 2, and 3) digester recirculation, mixing, and axial mixing pumps with chopper-style pumps; replacing of existing HEXs for digesters 1 and 2; and providing of the off-the-shelf spare $FeCl_2$ feed pump.

3.1.2 Phase II Conditions with Addition of FOG

Table 3-2 summarizes the required and recommended improvements in addition to those already listed in Table 3-1, assuming that the FOG Program is implemented.

Implementation of the FOG Program (39) will produce additional biogas and provide additional power cogeneration by the City (the City is contemplating to evaluate utilization of other waste streams under a separate project). Although FOG addition to digesters will increase waste heat utilization at MBC, the available waste heat sources are more than sufficient to match demand. Potential future uses of waste heat are generally outlined in this TM based on prior studies performed by the City. It is recommended that these uses be further explored in the future.

Table 3-2: Phase II Improvements - Base Case with FOG					
TM Section	**Unit Process/ System**	**Description of Improvements**	**Designation of Improvements**		
			NCWRP Expansion (Pure Water)	**FOG Addition**	**Other**
5.1	Grit removal	See Table 3-1			
5.2	Sludge thickening	See Table 3-1			
5.3	Anaerobic digestion	1) Construct fourth digester		✓	
		2) Construct new biogas laterals and upgrade digester gas-handling equipment (flame arresters, PRVs, etc.)		✓	
		3) Install three new biogas blowers (680 scfm) to replace existing		✓	
		4) Install two new flares (550 scfm) to match existing for a total of four		✓	
		5) See Table 3-1			
5.4	Sludge dewatering	See Table 3-1			
5.5	Centrate	See Table 3-1			
5.6	Odor control	No planned improvements			
5.7	Chemical handling	1) Install fourth $FeCl_2$ feed pump with associated piping to feed digester 4		✓	
		2) Consider fifth off-the-shelf replacement pump			✓
		3) Increase tubing size for higher delivery at lower rpm			✓

Table 3-2: Phase II Improvements - Base Case with FOG					
TM Section	Unit Process/ System	Description of Improvements	Designation of Improvements		
			NCWRP Expansion (Pure Water)	FOG Addition	Other
5.8	Utilities extension	1) See Table 3-1 for biogas and thickened sludge utilities			
		2) Utilities extended to digester 4 in conjunction with gallery construction: UWHP, chemical lines, drain lines		✓	
		3) Utilities extended to FOG including HWS and HWR lines		✓	
5.9	Additional siting considerations	No planned improvements			
5.10	Waste heat utilization	1) Modify existing HWS and HWR piping			✓
		2) Extend HWS and HWR piping to digester 4		✓	
		3) Extend HWS and HWR piping to FOG station		✓	

Note: Most of the improvements listed in Table 3-2 will require engineering design and preparation of construction documents including design drawings and specifications with exception of recommended replacement of existing (digesters 1, 2, and 3) digester recirculation, mixing, and axial mixing pumps with chopper-style pumps; replacing of existing HEXs for digesters 1 and 2; and providing of the off-the-shelf spare $FeCl_2$ feed pump.

3.1.3 Phase II Conditions with Addition of FOG and Lystek

Assuming FOG addition to digesters and Lystek process are implemented, Table 3-3 summarizes the required and recommended improvements in addition to those already listed in Table 3-1. Lystek will increase the output of biogas on site.

Table 3-3: Phase II Improvements - Base Case with FOG and Lystek					
TM Section	**Unit Process/ System**	**Description of Improvements**	**Designation of Improvements**		
			NCWRP Expansion (Pure Water)	**FOG Addition**	**Other**
5.1	Grit removal	See Table 3-1			
5.2	Sludge thickening	See Table 3-1			
5.3	Anaerobic digestion	1) Construct fourth digester 2) Construct new biogas laterals and upgrade digester gas-handling equipment (flame arresters, PRVs, etc.) 3) Install three new biogas blowers (850 scfm) to replace existing 4) Install two new larger flares (800 scfm) to supplement existing for a total of four 5) See Table 3-1		✓ ✓ ✓ ✓	
5.4	Sludge dewatering	See Table 3-1			
5.5	Centrate	See Table 3-1			
5.6	Odor control	No planned improvements			
5.7	Chemical handling	1) Install fourth $FeCl_2$ feed pump with associated piping to feed digester 4 2) Increase tubing size for higher delivery at lower rpm		✓ ✓	
5.8	Utilities extension	1) See Table 3-1 for biogas and thickened sludge utilities 2) Utilities extended to digester 4 in conjunction with gallery construction: UWHP, chemical lines, drain lines 3) Utilities extended to FOG including HWS and HWR lines		✓ ✓	
5.9	Additional siting considerations	No planned improvements			

Table 3-3: Phase II Improvements - Base Case with FOG and Lystek					
TM Section	Unit Process/ System	Description of Improvements	Designation of Improvements		
			NCWRP Expansion (Pure Water)	FOG Addition	Other
5.10	Waste heat utilization	1) Modify existing HWS and HWR piping			✓
		2) Extend HWS and HWR piping to digester 4		✓	
		3) Extend HWS and HWR piping to FOG station		✓	

Note: Most of the improvements listed in Table 2.1-3 will require engineering design and preparation of construction documents including design drawings and specifications with exception of recommended replacement of existing (digesters 1, 2, and 3) digester recirculation, mixing, and axial mixing pumps with chopper-style pumps; replacing of existing HEXs for digesters 1 and 2; and providing of the off-the-shelf spare $FeCl_2$ feed pump.

3.1.4 Cost and Schedule (Sections 5 and 6)

Table 3-4 and Table 3-5, respectively, summarize the construction costs and total project delivery costs for Phase I and Phase II improvements. The OPC Report, with takeoffs, is included in Appendix E. The costs in Section 6 and Appendix E supersede the OPC presented at the workshop based on the draft submittal (see Appendix F). The construction costs are as follows:

- Construction subtotal of $19.9 million, and total project cost, including contingencies and project delivery costs, of $35.8 million for Phase II improvements for NCWRP Expansion related to Pure Water
- Construction subtotal of $14.8 million, and total project cost, including contingencies and project delivery costs, of $26.7 million for Phase II improvements related to implementation of FOG Program (FOG addition)
- Construction subtotal of $6.2 million, and total project cost, including contingencies and project delivery costs, of $11.1 million for Phase II improvements related to other recommended improvements oriented on improvement MBC reliability and efficiency

Table 3-4: Cost Summary for Upgrades Required for Phase I Conditions (1)				
Construction Cost Breakdown	**NCWRP Expansion (Pure Water)**	**FOG Addition**	**Other Recommended Improvements**	**See Note (3)**
Grit removal	$0	$0	$0	
Thickening centrifuges	$9,119,000	$0	$0	
Digester system (2)	$1,165,000	$4,189,000	$2,206,000	
Dewatering centrifuges	$0	$0	$0	
Centrate system	$0	$0	$0	
Odor control	$0	$0	$0	
Chemical storage	$0	$0	$0	
Evaluation of utilities	$0	$0	$0	
Additional facilities siting	$0	$0	$0	
Waste heat utilization	$0	$73,000	$628,000	
Subtotal construction cost	$10,284,000	$4,262,000	$2,834,000	
Contingency (40%)	$4,114,000	$1,705,000	$1,134,000	
Total construction cost	**$14,398,000**	$5,967,000	$3,968,000	**See Note (4)**
Delivery Costs (5),(6)				
Predesign (2.1%)	$302,000	$125,000	$83,000	
Detailed design (7.1%)	$1,022,000	$424,000	$282,000	
ESDC (1.4%)	$202,000	$84,000	$56,000	
CM: bid phase (0.4%)	$58,000	$24,000	$16,000	
CM: construction phase (6.8%)	$979,000	$406,000	$270,000	
Environmental: review and permitting (1.4%)	$202,000	$84,000	$56,000	
Environmental: construction compliance (2.1%)	$302,000	$125,000	$83,000	
PM: City project management (3.6%)	$518,000	$215,000	$143,000	
PM: other City departments (1.4%)	$202,000	$84,000	$56,000	
Subtotal delivery costs	**$3,787,000**	**$1,571,000**	**$1,045,000**	
Other Costs (6)				
Land acquisition	$0	$0	$0	
Environmental mitigation (2.1%)	$302,000	$125,000	$83,000	
Subtotal other costs	**$302,000**	**$125,000**	**$83,000**	
Total project cost	**$18,487,000**	**$7,663,000**	**$5,096,000**	**Grand Total**

Table 3-4: Cost Summary for Upgrades Required for Phase I Conditions [1]				
Construction Cost Breakdown	**NCWRP Expansion (Pure Water)**	**FOG Addition**	**Other Recommended Improvements**	**See Note [3]**
Without FOG addition, other upgrades included	**$18,487,000**	**$0**	**$5,096,000**	**$23,583,000**
With FOG addition and other upgrades [7]	**$14,896,000**	**$7,663,000**	**$5,096,000**	**$27,655,000**

(1) All numbers presented in the table are construction OPCs without the 40% contingency.

(2) Cost for FOG-receiving station derived from CH2M Hill report, contingency deducted from reported cost.

(3) The total depends on whether FOG addition is selected.

(4) The project construction subtotal depends on whether FOG addition is selected.

(5) Fixed costs are per baseline budget or current Pure Water directive.

(6) Delivery and other costs based on the total construction cost.

(7) The total project cost excludes digester system costs related to NCWRP Expansion because the upgrades associated with FOG addition cover these operating conditions.

Table 3-5: Cost Summary for Upgrades Required for Phase II Conditions [1]				
Construction Cost Breakdown	**NCWRP Expansion (Pure Water)**	**FOG Addition**	**Other Recommended Improvements**	**See Note [3]**
Grit removal	$2,721,000	$0	$0	
Thickening centrifuges	$15,199,000	$0	$0	
Digester system [2]	$1,026,000	$14,764,000	$2,206,000	
Dewatering centrifuges	$0	$0	$3,337,000	
Centrate system	$956,000	$0	$0	
Odor control	$0	$0	$0	
Chemical storage	$0	$0	$0	
Evaluation of utilities	$0	$0	$0	
Additional facilities siting	$0	$0	$0	
Waste heat utilization	$0	$73,000	$628,000	
Subtotal construction cost	$19,902,000	$14,837,000	$6,171,000	
Contingency (40%)	$7,961,000	$5,935,000	$2,469,000	
Total construction cost	**$27,863,000**	**$20,772,000**	**$8,640,000**	**See Note [4]**
Delivery Costs [5],[6]				
Predesign (2.1%)	$585,000	$436,000	$181,000	
Detailed design (7.1%)	$1,978,000	$1,475,000	$613,000	
ESDC (1.4%)	$390,000	$291,000	$121,000	

Table 3-5: Cost Summary for Upgrades Required for Phase II Conditions (1)				
Construction Cost Breakdown	**NCWRP Expansion (Pure Water)**	**FOG Addition**	**Other Recommended Improvements**	**See Note (3)**
CM: bid phase (0.4%)	$111,000	$83,000	$35,000	
CM: construction phase (6.8%)	$1,895,000	$1,412,000	$588,000	
Environmental: review and permitting (1.4%)	$390,000	$291,000	$121,000	
Environmental: construction compliance (2.1%)	$585,000	$436,000	$181,000	
PM: City project management (3.6%)	$1,003,000	$748,000	$311,000	
PM: other City departments (1.4%)	$390,000	$291,000	$121,000	
Subtotal delivery costs	**$7,327,000**	**$5,463,000**	**$2,272,000**	
Other Costs 6				
Land acquisition	$0	$0	$0	
Environmental mitigation (2.1%)	$585,000	$436,000	$181,000	
Subtotal other costs	**$585,000**	**$436,000**	**$181,000**	
Total project cost	**$35,775,000**	**$26,671,000**	**$11,093,000**	**Grand Total**
Without FOG addition, other upgrades included	**$35,775,000**	**$0**	**$11,093,000**	**$46,868,000**
With FOG addition and other upgrades (7)	**$32,184,000**	**$26,671,000**	**$11,093,000**	**$69,948,000**

(1) All numbers presented in the table are construction OPCs without the 40% contingency.

(2) Cost for FOG-receiving station derived from CH2M Hill report, contingency deducted from reported cost.

(3) The digester system total depends on whether FOG addition is selected.

(4) The project construction subtotal depends on whether FOG addition is selected.

(5) Fixed costs are per baseline budget or current Pure Water directive.

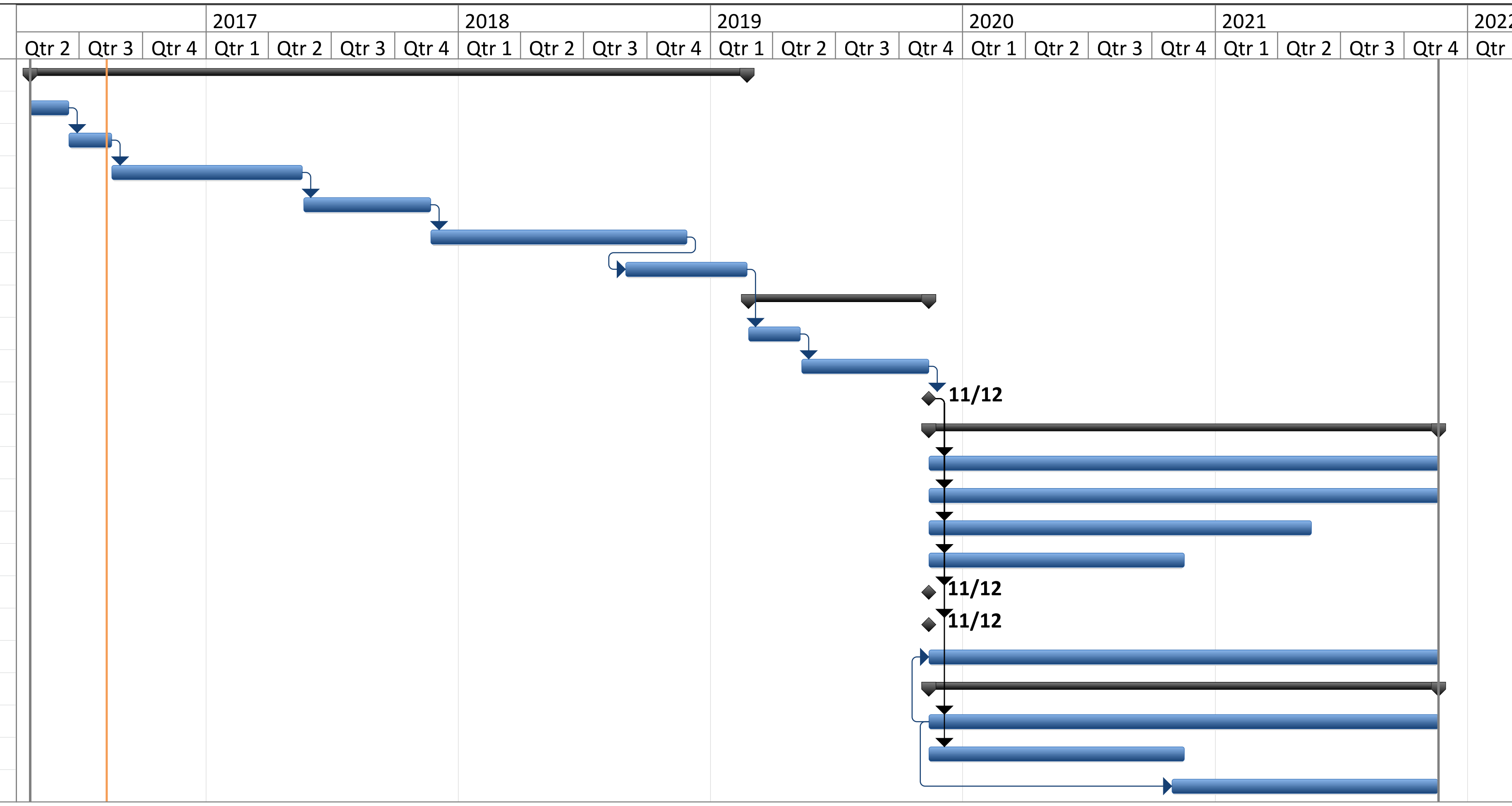
(6) Delivery and other costs based on the total construction cost.

(7) The total project cost excludes digester system costs related to NCWRP Expansion because the upgrades associated with FOG addition cover these operating conditions.

Section 9 describes the potential savings of $6.7 million associated with the adoption of a low-flow solids wasting strategy during peak day conditions with maximum NPR. Table 3-2 is a proposed schedule designed to ensure that the upgrades at MBC are operational prior to the commissioning of the NCWRP Expansion in November 2021. The schedule prepared during the development of the draft TM issued on May 6, 2016, showed that commissioning at MBC would lag the NCWRP construction by approximately 9 months. Based on decisions made at the project workshop on May 18, 2016 (refer to Appendices F and G), the project team was able to shorten the original timeline for completion at MBC by planning for pre-purchasing equipment with a long lead time and streamlining the procurement process for predesign and final design services. Proposed project schedule is presented in Figure 3-2.

PROPOSED PROJECT SCHEDULE FOR IMPROVEMENTS AT MBC REQUIRED DUE TO NCWRP EXPANSION
FIGURE 3-2

ID	Task Name	Duration	Start	Finish
1	**Design**	**742 days**	**Thu 4/21/16**	**Fri 2/22/19**
2	Complete PDR(Study)	40 days	Thu 4/21/16	Wed 6/15/16
3	Procure 10% Designer	44 days	Thu 6/16/16	Tue 8/16/16
4	10% Design Development	198 days	Wed 8/17/16	Fri 5/19/17
5	Procure Final Designer	132 days	Mon 5/22/17	Tue 11/21/17
6	Final Design Development	265 days	Wed 11/22/17	Tue 11/27/18
7	Permitting	126 days	Fri 8/31/18	Fri 2/22/19
8	**Construction Bid and Award**	**187 days**	**Mon 2/25/19**	**Tue 11/12/19**
9	Advertise and Bid	55 days	Mon 2/25/19	Fri 5/10/19
10	Award Construction Contract	132 days	Mon 5/13/19	Tue 11/12/19
11	Contractor NTP	0 days	Tue 11/12/19	Tue 11/12/19
12	**Procure/Construct/Commissioning**	**528 days**	**Tue 11/12/19**	**Fri 11/19/21**
13	Grit Removal	528 days	Wed 11/13/19	Fri 11/19/21
14	Thickening Centrifuges	528 days	Wed 11/13/19	Fri 11/19/21
15	Digester Improvements without FOG	396 days	Wed 11/13/19	Wed 5/19/21
16	Centrate System	264 days	Wed 11/13/19	Mon 11/16/20
17	Odor Control (No Improvements)	0 days	Tue 11/12/19	Tue 11/12/19
18	Chemical Systems (No Improvements)	0 days	Tue 11/12/19	Tue 11/12/19
19	Extension of Utilities	528 days	Wed 11/13/19	Fri 11/19/21
20	**FOG Related & Other Improvements**	**528 days**	**Wed 11/13/19**	**Fri 11/19/21**
21	Digester Improvements with FOG	528 days	Wed 11/13/19	Fri 11/19/21
22	Dewatering Centrifuges	264 days	Wed 11/13/19	Mon 11/16/20
23	Waste Heat Utilization	275 days	Fri 10/30/20	Thu 11/18/21



3.2 General Recommendations

3.2.1 Digester Management Safeguards

As discussed in Section 2.2, MBC staff has indicated that MBC can experience short-term operational conditions when the facility must operate at production rates up to twice those experienced under average conditions. These short-term conditions occur because of construction or O&M activities at PLWTP or NCWRP. MBC must accelerate production in the short term to make facilities available for a shutdown, or accelerate production after a shutdown to reduce biosolids inventory. The frequency of such events is estimated collectively by the project team and plant staff as approximately once every 5 years. Given the susceptibility of digester operations to process upsets under high VSS loading conditions, and the cost of constructing an additional digester, City staff should first consider a broad suite of management safeguards to minimize the risk of high loadings on the MBC digesters under Phase I and Phase II scenarios. Risk management practices should include the following:

- All potential maintenance or construction activities that could result in higher than normal flow or solids peaking factors will need to be conducted under NCWRP minimum biosolids production conditions associated with low NPR demands that coincide with the winter (November through March) season.
- A contractor responsible for construction or maintenance activities that may result in producing excessive flows and loads to digesters should be required to develop, in conjunction with City operations staff, a fail-safe plan to mitigate such impacts and to keep all facilities in safe and steady-state operation. This plan will need to be reviewed and approved by the City prior to commencing any such activities. Such plan should include the following provisions:
    - Means of minimizing peaking condition duration
    - Means of safe biosolids bypass provisions to PLWTP with consideration of potential impacts on the NCWRP biosolids diversion infrastructure, PLWTP solids reserve capacity and ability to sustain additional soluble BOD loads, and means and methods of conveyance biosolids from MBC to PLWTP without shorting flows to MPS
    - Means of equalizing digester diurnal loadings
    - Assurance of proper and efficient digester heating and mixing in accordance with the design criteria
    - Potential means of minimizing load to individual processes, if necessary
    - Continuous process sampling, monitoring, and analyzing peaking factors and digester health and performance characteristics during said construction or maintenance activities
    - Continuous monitoring of mass emission rates for PLWTP to make sure that they do not exceed limits established by the existing permit
- Regardless of any planned outage or contingency event every 5 years, there is still the chance of even rarer events that are unplanned that would fall under the category of emergency response planning. Given that each facility has its own inherent solids-handling restrictions and limitations, the City should examine solids inventory management practices on a system-wide basis, devise strategies that allow the facilities to more effectively support one another, and determine what infrastructure, if any, is needed to improve interdependence and redundancy among the three.

If the project team applies a more conservative approach in assessing the “firm capacity” of MBC, the cost of expanding and upgrading MBC predictably increases in response to the higher flows and loadings under maximum conditions. But as the cost of expanding MBC increases, the value of unused capacity at PLWTP also increases. It raises the question whether it is less costly to rely periodically on available capacity at PLWTP instead of constructing a fourth digester. The cost impacts of modeling assumptions are not linear, which results in the following: higher peaking factors can be absorbed up to a point, but once a process loading threshold is crossed, the cost increases by increments. A 25% increase in peaking factor from 1.6:1 to 2:1 increases the cost of expanding MBC by more than 25% if it entails constructing a fourth digester.

The project team evaluated and confirmed with City staff the surplus available MER at PLWTP based on its system model. For short durations, it appears that the City has the available capacity to bypass a portion of the solids generated by NCWRP to PLWTP during infrequent events. This assumption needs to be further evaluated by predesign and design consultants. It is important to emphasize that this TM does not evaluate this option in detail. It does not evaluate the configuration or capacity of facilities at NCWRP to confirm if the infrastructure is in place to bypass the required solids flows to sewer. This TM does not provide any estimate of costs associated with improvements ultimately determined to be necessary at NCWRP. Similarly, this TM does not assess the digested sludge infrastructure at PLWTP or its capacity (please note that future stages of Pure Water will include biosolids conveyance from the planned Central Area Advanced Water Purification Facility [CAAWPF] to PLWTP). Future predesign and final design consultants will need to confirm that digester capacity is available at PLWTP under projected loading conditions during bypass operations.

3.2.2 Solids Transmission Force Mains

The three existing solids transmission force mains play a critical role in managing the biosolids inventory. These force mains interconnect the three facilities and are summarized below:

- A 12- to 14-inch-diameter digested sludge line delivering unthickened digested sludge from PLWTP to one of the biosolids storage tanks at MBC
- A 16-inch-diameter raw sludge line delivering unthickened raw biosolids from NCWRP to the raw-solids-receiving tanks at MBC
- A 20-inch-diameter force main returning centrate from the centrate pump station at MBC to the drop structure in the influent pump station at NCWRP that directs flow to PLWTP

Although beyond the scope of this TM, it must be noted that these lines are especially important for several reasons. First, the degree of redundancy in the lines is probably less than the degree of redundancy within the facilities themselves. Second, there are already physical limitations and operational problems with the lines—most notably, the 20-inch-diameter centrate force main.

Any condition that results in the shutdown of any one of these lines means that the facilities must either store biosolids on site or divert biosolids to a facility that can store biosolids. In terms of redundancy, the 20-inch-diameter centrate force main appears to be the most critical of the three lines: if it fails, no solids dewatering can take place and therefore the entire system must temporarily shut down[3]:

- NCWRP must divert all raw solids to PLWTP

[3] MBC staff has modified the piping to allow centrate to be circulated through the 16-inch-diameter blended sludge pipeline. This allowed staff to operate it at a higher line velocity in an effort to resuspend settled solids in the sludge line.

- PLWTP must not only handle the increased solids load from NCWRP; it must also temporarily store the resulting increased production of digested sludge until the issues with the force main are addressed
- Once the biosolids storage tank and emergency biosolids storage tanks are full at MBC, all operating MBC digesters will have to discontinue sludge feed because it will not be possible to dewater digested sludge

MBC is already experiencing operational problems with the 20-inch-diameter centrate force main, a concern that is discussed in Section 5.5. Historically low velocities in the force main have resulted in deposition of solids, mineralization (scale deposition), or both. Restrictions in the line have resulted in increased dynamic losses. The same, or similar, problems may exist in the PLWTP digested sludge force main and the NCWRP raw solids force main to varying degrees.

The conclusions and recommendations presented in this TM are based on the assumption that the centrate pump station force main is restored to full-pipe flow conditions before any improvements are made to MBC to handle the increased demands imposed by NCWRP and NCPWF. The proposed centrate pumps are sized to meet the projected head conditions as if the centrate force main were functioning correctly. This TM does not address the means and methods of restoring and maintaining the maximum flow conditions of the centrate piping.

The project team recommends that the City consider the following as a separate effort beyond the scope of this TM; this list of recommendations assumes that none of the items below are already being completed by others:

- Initiate a field investigation and condition assessment to evaluate the centrate force main, raw solids force main, and digested sludge feed line from PLWTP, and assign priorities to problem areas.
- Develop failure scenarios and contingency response plans to mitigate any shortfall in physical redundancy in the system. Identify materials and equipment, if any, that need to be stored in-house as part of a rapid response plan.
- Identify alternatives for restoring the pipes to full flow conditions. These alternatives may include rehabilitation of existing lines, installation of new lines, or both.
- Identify alternative approaches to maintaining the lines, including but not limited to chemical addition facilities and flushing facilities.
- Initiate design and construction of any facilities needed to ensure that MBC can reliably support solids transfer operations from other facilities.

4 Projected Changes in Quantity and Quality of Solids

4.1 Solids and Flow Loadings Associated with NCWRP Expansion

4.1.1 Existing Conditions

NCWRP, located approximately 4 miles northwest of MBC, does not have any solids-processing facilities. Combined unthickened solids from the primary clarifiers and secondary clarifiers are sent to MBC via a 16-inch-diameter pipeline. The raw solids are stored in two raw-solids-receiving tanks (73-T-01 and 73-T-02) before being conveyed by the raw solids feed pumps to the thickening centrifuges feed loop.

NCWRP is slated for expansion as part of Pure Water; in addition, some wastewater treatment process changes are also anticipated. These changes, together with the expansion, will result in an increase of raw solids flows and loadings to MBC, and will also ultimately impact digested solids flows and loadings from PLWTP. These changes need to be analyzed and understood to properly evaluate the capacity of treatment processes and equipment at the MBC.

4.1.1.1 BioWin Modeling

An *Alternatives Analysis* TM for the NCWRP Expansion was prepared by MWH and BC as part of Task 6, Task Order 2 of Pure Water (40). The TM describes various treatment process alternatives for the plant expansion. As part of this effort, the team studied historical data pertaining to influent flows, solids loads, and wastewater quality from mid-2011 through December 2014.

These data were analyzed to establish trends and were used as inputs for setting up the proprietary biological treatment process model (BioWin). The model was then calibrated for field conditions by using both the historical data and field data obtained during stress testing conducted at NCWRP. The key inputs for the analysis included average influent flows, suspended solids and BOD, and peaking factors for these parameters.

4.1.1.2 Flow and Mass Balance Modeling

A Microsoft Excel, spreadsheet-based, flow and mass balance model was also prepared to simulate various scenarios for this work, and was based on an earlier model prepared for the City in 1999. The spreadsheet, which includes several worksheets linked together, uses iterative calculations to predict wastewater characteristics, flows, and loads at each treatment plant. Each treatment plant in the system is represented in a separate worksheet and additional worksheets are provided for inputting data and assumptions. Table 4-1 presents the key input parameter assumptions used in the model.

Several scenarios were modeled, each using a separate spreadsheet. The primary difference between the scenarios was the NPR water demand, which varies based on weather conditions. Three scenarios were modeled: a minimum NPR demand, base-case, and maximum peak day NPR demand. Two other scenarios, named A.1 and A.2, were interposed upon the prior three; the first considered a typical rate of 52% for VSS reduction in the digesters and the second considered a lower VSS reduction of 46% in the digesters.

The current VSS reduction rate of 62.7% at MBC is abnormally high because of long hydraulic residence times (HRTs) in the in-service digester, and do not reflect typical digester performance. In contrast, the VSS reduction rate for the PLWTP digesters is approximately 50% (30), a percent reduction that is consistent with the typical industry average of 52%. Our judgment is that the projected substantial reduction in HRT and increased organic loading will reduce the VSS reduction rate to match the industry average (29, 30, 31). If digester performance is impacted by feed sludge toxicities, sub-optimal digester mixing or process control, the project team estimates that VSS reduction would decline by about 12% down to 46% (39). Both 52% and 46% VSS reduction were used in modeling to project the impact of reduction efficiency on gas production and digested sludge production.

Additionally, each of the previously described scenarios was repeated for three alternatives: no FOG addition, with FOG addition (39), and FOG addition with implementation of the Lystek process (see (39) and Section 4.3). The alternative with FOG and implementation of Lystek assumed an increased the volatile solids destruction of 25% over the base value. FOG addition to digesters at a rate of 60,000 gallons per day (gpd) has been proposed for increasing biogas production in the future as developed in (39).

Table 4-1: Key Assumptions Used in Flow and Mass Balance Modeling		
Parameter	**Value**	**Comments**
Primary Sedimentation		
TSS Removal Efficiency at PLWTP	88%	
TSS Removal Efficiency at NCWRP	78%	
BOD Removal Efficiency	35%	Typical values presented here are used
Chemical Addition (Ferric Chloride)	15 mg/L	Unless a particular plant has different
Chemical Sludge Production	1.10 LB/LB CHEM	Values based on historical sampling data
Solids Concentration in Sludge	0.50%	
VSS:TSS of Sludge	75%	
VSS:TSS of Effluent	78%	
Secondary Sedimentation		
Effluent TSS Concentration	9 mg/L	Typical values presented here are used
Effluent BOD Concentration	9 mg/L	Unless a particular plant has different
VSS:TSS of Sludge	80%	Values based on historical sampling data
Solids Processing		
Thickening Centrifuge Solids Recovery	90%	Typical values presented here are used
Thickened Sludge Solids Concentration	5%	Unless a particular plant has different
Dewatering Centrifuge Solids Recovery	95%	Values based on historical sampling data
Dewatered Sludge Solids Concentration	28%	
VSS Destruction in Digester	VARIES	46% - 65% depending on scenario modeled
Microfiltration/Ultrafiltration		
Backwash Rate	5%	Of feed flow
Backwash Solids Concentration	40-60 mg/L	Varies based on influent concentration
Reverse Osmosis		
Purified Water Output	85%	Of feed flow
Purified Water TDS Concentration	8%	Concentration of feed flow
Flow Loss Due to Clean-In-Place	1%	Of feed flow

All of the scenarios were modeled for Phase I conditions and also Phase II conditions using various parameters as described. Section 2.3 summarizes Phase I and Phase II definitions. In addition, all modeled scenarios represent conveyance of purified water from NCPWF to MR. The scenarios can be summarized as follows:

- **Scenario A.1:** no FOG addition at MBC, volatile solids destruction of 52%, at minimum, base, and maximum NPR demand
- **Scenario A.2:** no FOG addition at the MBC, volatile solids destruction of 46%, at minimum, base, and maximum NPR demand
- **Scenario B.1:** with FOG addition at the MBC, volatile solids destruction of 52%, at minimum, base, and maximum NPR demand
- **Scenario B.2:** with FOG addition at the MBC, volatile solids destruction of 46%, at minimum, base, and maximum NPR demand
- **Scenario C.1:** with FOG addition at the MBC together with the Lystek process, increased volatile solids destruction of 65%, at minimum, base, and maximum NPR demand
- **Scenario C.2:** with FOG addition at the MBC together with the Lystek process, increased volatile solids destruction of 57.5%, at minimum, base, and maximum NPR demand

Because the primary goal of this work is to evaluate the impact of the NCWRP Expansion on MBC, all models were set up to exclude the proposed CAAWPF. This was done to prevent solids from CAAWPF, which would have been conveyed to MBC, from interfering with the analysis. The Padre Dam Municipal Water District (PDMWD) plant was assumed to be in operation (3 mgd influent flow) and returning solids to sewer for processing at PLWTP. This assumption is based on current available information but it is possible that PDMWD could consider a larger water reclamation facility in the future.

If the Padre Dam facility increases capacity from 3 mgd to 15 mgd, this would reduce the overall flow reaching PLWTP. However, it is anticipated that the Padre Dam facility would not include solids treatment and would therefore return solids to the sewer. The net impact at PLWTP is a negligible reduction of about 1% in the total solids (TS) load. If the Padre Dam facility is constructed with solids treatment processes, the TS influent to PLWTP would be reduced by approximately 8%. In both cases, the net impact to MBC is insignificant; improvements required at MBC will not change based on this minor reduction in solids.

Although of no impact to MBC, the increase in capacity of the Padre Dam facility has the potential to divert flow away from MPS, which is one of the primary sources supplying wastewater to NCWRP and NCPWF. The MPS predesign team investigated this scenario during preparation of the 10% EDR for MPS, but the final designer would need to conduct a more detailed analysis of wastewater flows available at MPS. The largest impact to MBC's capacity remains the NCWRP Expansion. The South Bay Water Reclamation Plant (SBWRP) was also assumed to remain operational (approximately 12.8 mgd influent flow) with its solids returned to sewer, but without expansion or addition of NCPWF.

The project team understands that there are differences between the maximum-day flows developed during modeling (see Appendices B and C) and the proposed biosolids-wasting strategy described in the 10% EDR for NCWRP (32). The strategy limits the flow of biosolids from NCWRP back to MBC based on the capacity of the existing pumps and assumes that the pipeline, which is currently displaying high head loss, will be restored to original conditions and reduced head loss. However, the average daily flow estimated by the model is only 2% higher than the maximum flow in the EDR. To be conservative in assessing impacts to MBC, and recognizing that the 16-inch-diameter biosolids conveyance pipeline could be returned to normal operating condition, the model assumes constant solids concentration of 0.5% returning to MBC. If the intent is to cap the flow of biosolids, the selected design consultant for the 10% predesign for MBC should reassess the impacts of lower flows and higher solids concentrations, which results in the same mass-loading rate (refer to Section 9).

Inputs to the model included flow and wastewater quality data. Table 4-2 presents the influent flows at NCWRP based on the results of prior analysis conducted for Pure Water. The wastewater quality data used were the same as those used in the *Alternatives Analysis*, and are based on review of historical data and field sampling data. The input parameters were BOD, TSS, and plant influent flow (average daily flow). All models were run to simulate average daily flow conditions and peaking factors developed during the *Alternatives Analysis*.
Table 4-3 summarizes these peaking factors.

Table 4-2: Wastewater Quality and Flows Used as Modeling Input

Parameter	Phase I	Phase II	Comments
Point Loma Wastewater Treatment Plant			
Flow	179.9 MGD	186 MGD	
TSS Concentration	297 mg/L	297 mg/L	
BOD Concentration	297 mg/L	297 mg/L	
VSS Concentration	223 mg/L	223 mg/L	
North City Water Reclamation Plant			
Flow	32.9 MGD	51.9 MGD	Conditions presented represent base NPR
TSS Concentration	330 mg/L	330 mg/L	Demand. flows are lower at minimum NPR
BOD Concentration	275 mg/L	275 mg/L	Demand and higher at maximum NPR demand
VSS Concentration	271 mg/L	271 mg/L	
Padre Dam Municipal Water District Facility			
Flow	3 MGD	3 MGD	Facility returns solids to sewer for
TSS Concentration	244 mg/L	244 mg/L	Processing at Point Loma Wastewater
BOD Concentration	324 mg/L	324 mg/L	Treatment Plant
VSS Concentration	183 mg/L	183 mg/L	
South Bay Water Reclamation Facility			
Flow	12.4 MGD	12.8 MGD	Facility returns solids to sewer for
TSS Concentration	306 mg/L	306 mg/L	Processing at Point Loma Wastewater
BOD Concentration	354 mg/L	354 mg/L	Treatment plant
VSS Concentration	230 mg/L	230 mg/L	

Table 4-3: Future MBC Hydraulic and Solids Loading Peaking Factors			
Peak Duration	**Hydraulic Peaking Factor**	**Total Solids Loading Peaking Factor**	**Volatile Solids Loading Peaking Factor (1)**
Peak day	1.53	1.57	1.61
Peak 7-day	1.19	1.21	1.22
Peak 14-day	1.11	1.12	1.13
Peak 30-day	1.08	1.08	1.09

(1) No peaking factor; either hydraulic or solids loading is applied to FOG addition.

4.1.2 Projected Conditions: Phase I (15 mgd production at NCPWF)

The City is considering several alternatives for expansion of NCWRP. One of the alternatives is phased expansion. In this approach, Phase I expansion would target production of an average of approximately 16.6 mgd purified water at NCPWF. This includes the target purified water production rate of 15 mgd together with in-plant demands and system-wide losses of 1%. The purified water sent to the reservoir for augmentation would vary seasonally between 13.4 and 19.7 mgd, depending on the NPR demand.

Increased flows following Phase I upgrades at NCWRP would result in a nearly three-fold increase in the solids stream hydraulic load to the thickening and digestion processes at MBC at maximum NPR demand conditions. The total and volatile solids would increase accordingly. The digested biosolids from PLWTP conveyed to MBC would increase moderately by 15% as a result of increased influent flow to the PLWTP.

As stated earlier, the volatile solids loading in the NCWRP raw solids will increase in proportion to the increase in hydraulic loading for all scenarios. However, for scenarios involving FOG addition, the increase will be even greater. It is anticipated that 60,000 gpd of FOG addition will introduce approximately 30,000 lb/d of volatile solids to the digesters (39). This coupled with the increased loading due to NCWRP results in an increase of 350% in volatile solids loading. Results of the modeling for all Phase I conditions are presented in Appendix B. Figure 4-1 presents projected flows and loads under average flow conditions for scenarios A.1 through C.1. Figure 4-2 presents scenarios A.2 through C.2. See Appendix B for values at peak day flows.

Table 4-4 presents selected results of modeling from the *Alternatives Analysis* that show that total phosphorus (TP) in the solids stream is expected to be 112 mg/L during average conditions and 164 mg/L during peak conditions. The phosphorus will be bound to iron because of ferrous chloride ($FeCl_2$) addition in the collection system and ferric chloride addition at the primary clarifiers' and tertiary filters' influent. Struvite ($NH_4Mg_4PO_4 \cdot 6H_2O$) precipitation has not been an issue historically at MBC and is not expected to be issue in the future either.

OUTPUT FROM TEACUPS

	FLOW	TSS	VSS
A.1	2.90	124,600	94,800
B.1	2.90	124,600	94,800
C.1	2.90	124,600	94,800

THICKENING CENTRATE

	FLOW	TSS	VSS
A.1	2.64	12,500	9,500
B.1	2.64	12,500	9,500
C.1	2.64	12,500	9,500

PLWTP DIGESTED SOLIDS

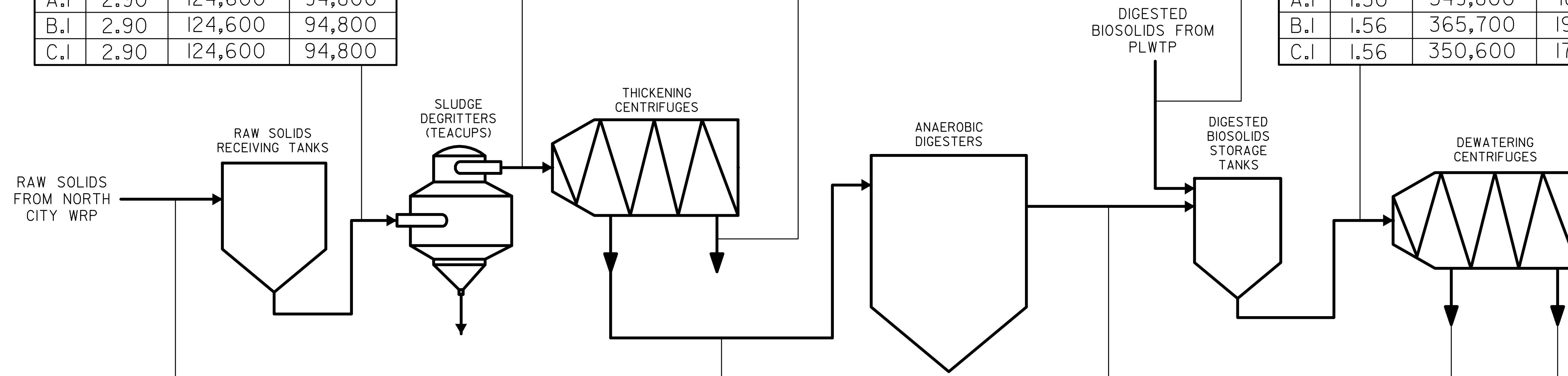
	FLOW	TSS	VSS
A.1	1.24	282,000	139,100
B.1	1.24	282,500	139,400
C.1	1.24	282,100	139,100

RAW SOLIDS TO TEACUPS

	FLOW	TSS	VSS
A.1	2.90	124,600	94,800
B.1	2.90	124,600	94,800
C.1	2.90	124,600	94,800

TO DEWATERING CENTRIFUGES

	FLOW	TSS	VSS
A.1	1.50	349,800	180,100
B.1	1.56	365,700	193,700
C.1	1.56	350,600	178,800



RAW SOLIDS

	FLOW	TSS	VSS
A.1	2.90	124,600	94,800
B.1	2.90	124,600	94,800
C.1	2.90	124,600	94,800

THICKENED SOLIDS

	FLOW	TSS	VSS
A.1	0.26	112,100	85,300
B.1	0.26	112,100	85,300
C.1	0.26	112,100	85,300

NCWRP DIGESTED SOLIDS

	FLOW	TSS	VSS
A.1	0.26	67,800	41,000
B.1	0.32	83,300	54,400
C.1	0.32	68,500	39,600

DEWATERED CAKE TO DISPOSAL

	FLOW	TSS	VSS
A.1	0.13	332,300	171,100
B.1	0.14	347,500	184,100
C.1	0.13	333,100	169,800

DEWATERING CENTRATE

	FLOW	TSS	VSS
A.1	1.36	17,500	9,000
B.1	1.42	18,300	9,700
C.1	1.42	17,500	8,900

NOTES:

1. SCENARIOS A, B, AND C REPRESENT NO FOG ADDITION, FOG ADDITION, AND FOG ADDITION WITH LYSTEK PROCESS RESPECTIVELY.
2. SCENARIO 1 (AS IN A.1 AND B.1) REPRESENTS A MODELING ASSUMPTION OF 52% VSS REDUCTION IN THE DIGESTERS.
3. SCENARIO C.1 REPRESENTS A MODELING ASSUMPTION OF 65% VSS REDUCTION IN THE DIGESTERS. THE RATE IS HIGHER THAN SCENARIOS A AND B ON ACCOUNT OF THE LYSTEK PROCESS.
4. HYDRAULIC LOADING REPRESENTS AN NCPWF PRODUCTION OF 15 MGD. REFER TO SECTION 9 OF THIS MEMORANDUM FOR FURTHER DETAILS.
5. HYDRAULIC LOADING REPRESENTS AN NCPWF PRODUCTION OF 30 MGD. REFER TO SECTION 9 OF THIS MEMORANDUM FOR FURTHER DETAILS.

KEY:

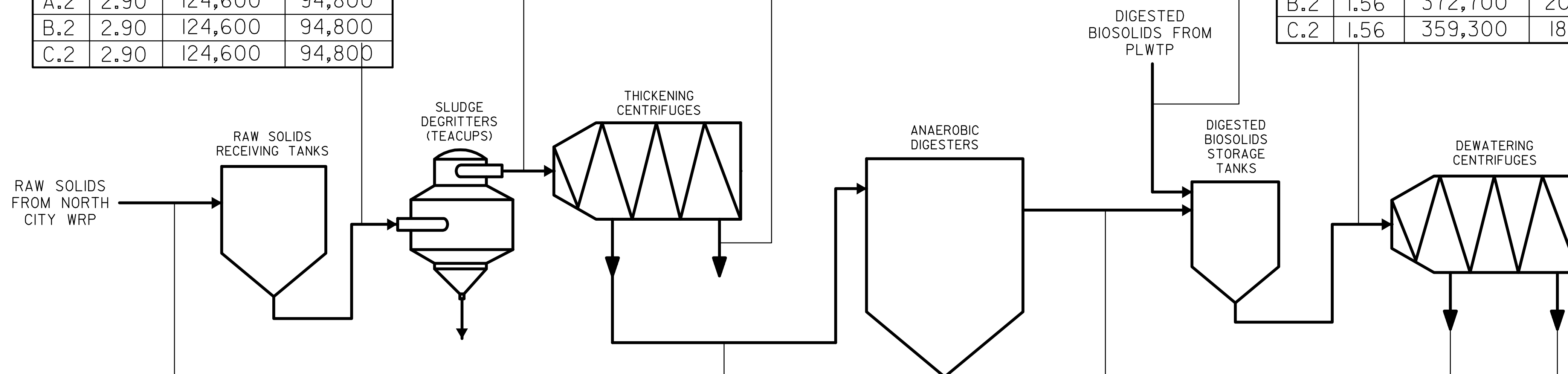
PROCESS STREAM			
	FLOW	TSS	VSS
SCENARIO	IN MGD	IN LB/DAY	IN LB/DAY

Brown AND Caldwell

DATE: AUG 12, 2016

SIMPLIFIED PROCESS FLOW DIAGRAM OF MBC WITH PHASE I, SCENARIO 1 FLOWS AND LOADS AT MAXIMUM NON-POTABLE REUSE, AVERAGE ANNUAL DAILY FLOW
MIRAMAR LAKE ALTERNATIVE

FIGURE 4-1



OUTPUT FROM TEACUPS

	Flow	TSS	VSS
A.2	2.90	124,600	94,800
B.2	2.90	124,600	94,800
C.2	2.90	124,600	94,800

THICKENING CENTRATE

	Flow	TSS	VSS
A.2	2.64	12,500	9,500
B.2	2.64	12,500	9,500
C.2	2.64	12,500	9,500

PLWTP DIGESTED SOLIDS

	Flow	TSS	VSS
A.2	1.24	282,200	139,200
B.2	1.24	282,700	139,500
C.2	1.24	282,300	139,300

RAW SOLIDS TO TEACUPS

	Flow	TSS	VSS
A.2	2.90	124,600	94,800
B.2	2.90	124,600	94,800
C.2	2.90	124,600	94,800

TO DEWATERING CENTRIFUGES

	Flow	TSS	VSS
A.2	1.50	355,000	185,300
B.2	1.56	372,700	200,600
C.2	1.56	359,300	187,400

RAW SOLIDS

	Flow	TSS	VSS
A.2	2.90	124,600	94,800
B.2	2.90	124,600	94,800
C.2	2.90	124,600	94,800

THICKENED SOLIDS

	Flow	TSS	VSS
A.2	0.26	112,100	85,300
B.2	0.26	112,100	85,300
C.2	0.26	112,100	85,300

NCWRP DIGESTED SOLIDS

	Flow	TSS	VSS
A.2	0.26	72,900	46,100
B.2	0.32	90,100	61,200
C.2	0.32	77,000	48,100

DEWATERED CAKE TO DISPOSAL

	Flow	TSS	VSS
A.2	0.13	337,300	176,000
B.2	0.14	354,100	190,600
C.2	0.14	341,400	178,000

DEWATERING CENTRATE

	Flow	TSS	VSS
A.2	1.36	17,800	9,300
B.2	1.42	18,600	10,000
C.2	1.42	18,000	9,400

NOTES:

1. SCENARIOS A, B, AND C REPRESENT NO FOG ADDITION, FOG ADDITION, AND FOG ADDITION WITH LYSTEK PROCESS RESPECTIVELY.
2. SCENARIO 2 (AS IN A.2 AND B.2) REPRESENTS A MODELING ASSUMPTION OF 46% VSS REDUCTION IN THE DIGESTERS.
3. SCENARIO C.2 REPRESENTS A MODELING ASSUMPTION OF 65% VSS REDUCTION IN THE DIGESTERS. THE RATE IS HIGHER THAN SCENARIOS A AND B ON ACCOUNT OF THE LYSTEK PROCESS.
4. HYDRAULIC LOADING REPRESENTS AN NCPWF PRODUCTION OF 15 MGD. REFER TO SECTION 9 OF THIS MEMORANDUM FOR FURTHER DETAILS.
5. HYDRAULIC LOADING REPRESENTS AN NCPWF PRODUCTION OF 30 MGD. REFER TO SECTION 9 OF THIS MEMORANDUM FOR FURTHER DETAILS.

KEY:

PROCESS STREAM			
	FLOW	TSS	VSS
SCENARIO	IN MGD	IN LB/DAY	IN LB/DAY

Brown AND Caldwell

DATE: AUG 12, 2016

SIMPLIFIED PROCESS FLOW DIAGRAM OF MBC WITH PHASE I, SCENARIO 2 FLOWS AND LOADS AT MAXIMUM NON-POTABLE REUSE, AVERAGE ANNUAL DAILY FLOW
MIRAMAR LAKE ALTERNATIVE

FIGURE 4-2

Table 4-4: MBC Influent Nutrient Concentrations		
Parameter	**Annual Avg. (mg/L)**	**Peak Day (mg/L)**
Total phosphorus	112	164
Total Kjeldahl nitrogen (TKN)	183	135
Ammonia-nitrogen (NH_3-N)	24	28

All soluble phosphorus in excess of 0.8 mg-P/L is expected to be iron-bound. Struvite is more prevalent with plants that perform enhanced biological phosphorus removal (BioP) because of the higher concentration of phosphorus in the sludge. In addition, BioP sludges will contain higher concentrations of magnesium. However, iron-bound phosphorus is capable of producing vivianite ($Fe^{+2}Fe_2^{+2}(PO_4)2 \cdot 8H_2O$), which might be a potential concern at MBC in the future. When vivianite forms in heat exchangers (HEXs), it is difficult to clean and degrades performance.

The method of iron salts addition is particularly important as it relates to vivianite formation. For instance, if addition occurs in the digester heating recirculation piping, excessive formation in the HEX can result. In contrast, addition of iron salts at the primary clarifier inlet is less likely to result in excessive HEX vivianite formation and is therefore a preferred addition point. Regardless, digester recirculation lines and HEXs should be inspected routinely at any facility where iron salts are employed to determine if excessive vivianite accumulation is occurring.

Modeling results indicate that the TKN in the solids stream will average 183 mg/L, and drop to 135 mg/L during peak hydraulic flow. The ammonia concentration in the solids stream is anticipated to be 24 mg/L during average hydraulic conditions, and will increase to 28 mg/L during peak hydraulic flow conditions. Both these parameters compare favorably with current conditions and do not represent any significant increases in concentration. However, the total load would increase corresponding to the increase in hydraulic loading.

4.1.3 Projected Conditions: Phase II (30 mgd production at NCPWF)

Phase II expansion of NCWRP will target production of an average of approximately 33.2 mgd purified water at NCPWF. This includes the target purified water production rate of 30 mgd together with in-plant demands and system-wide losses of 1%. The purified water sent to the reservoir for augmentation will vary seasonally between 23.4 and 32.8 mgd, depending on the NPR demand.

Increased flows following Phase II upgrades at NCWRP would result in a 50% increase compared to Phase I flows at maximum NPR demand conditions. This represents a five-fold increase in the solids stream hydraulic load at projected peak day flows compared to current conditions. The total and volatile solids would correspondingly increase. The digested biosolids from PLWTP conveyed to MBC would increase slightly from Phase I to about 116% of current values because of increased influent flow to PLWTP. In general, the dewatering process is impacted more by NCWRP flow streams compared to PLWTP streams.

For scenarios involving FOG addition, the volatile solids content of the FOG in addition to higher solids from NCWRP results in an increase of more than 5 times the current value. Results of the modeling for Phase II conditions are presented in Appendix A2. The total phosphorus, TKN, and ammonia concentrations are not anticipated to change during Phase II. Table 4-4 shows that they will remain similar to Phase I values; however, the loading will increase corresponding to the increased hydraulic load.

Results of the modeling for all Phase II conditions are presented in Appendix C. Figure 4-3 shows projected flows and loads under average flow conditions for scenarios A.1 through C.1. Figure 4-4 shows projected flows and loads under average flow conditions for scenarios A.2 through C.2. See Appendix C for values at peak day flows.

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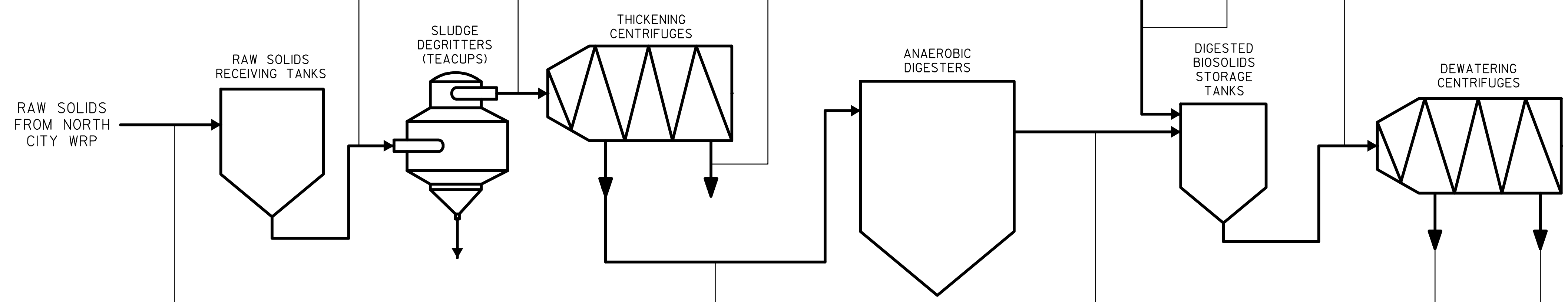
OUTPUT FROM TEACUPS			
	FLOW	TSS	VSS
A.I	4.28	183,900	140,000
B.I	4.28	183,900	140,000
C.I	4.28	183,900	140,000

THICKENING CENTRATE			
	FLOW	TSS	VSS
A.I	3.89	18,400	14,000
B.I	3.89	18,400	14,000
C.I	3.89	18,400	14,000

PLWTP DIGESTED SOLIDS			
	FLOW	TSS	VSS
A.I	1.15	262,300	129,300
B.I	1.15	262,800	129,500
C.I	1.15	262,200	129,200

RAW SOLIDS TO TEACUPS			
	FLOW	TSS	VSS
A.I	4.28	183,900	140,000
B.I	4.28	183,900	140,000
C.I	4.28	183,900	140,000

TO DEWATERING CENTRIFUGES			
	FLOW	TSS	VSS
A.I	1.53	362,400	189,800
B.I	1.59	378,300	203,400
C.I	1.59	357,800	183,100



RAW SOLIDS			
	FLOW	TSS	VSS
A.I	4.28	183,900	140,000
B.I	4.28	183,900	140,000
C.I	4.28	183,900	140,000

THICKENED SOLIDS			
	FLOW	TSS	VSS
A.I	0.39	165,500	126,000
B.I	0.39	165,500	126,000
C.I	0.39	165,500	126,000

NCWRP DIGESTED SOLIDS			
	FLOW	TSS	VSS
A.I	0.38	100,000	60,500
B.I	0.44	115,500	73,900
C.I	0.44	95,500	53,900

DEWATERED CAKE TO DISPOSAL			
	FLOW	TSS	VSS
A.I	0.14	344,300	180,300
B.I	0.14	359,400	193,200
C.I	0.14	339,900	173,900

DEWATERING CENTRATE			
	FLOW	TSS	VSS
A.I	1.39	18,100	9,500
B.I	1.45	18,900	10,200
C.I	1.46	17,900	9,200

NOTES:

1. SCENARIOS A, B, AND C REPRESENT NO FOG ADDITION, FOG ADDITION, AND FOG ADDITION WITH LYSTEK PROCESS RESPECTIVELY.
2. SCENARIO 1 (AS IN A.1 AND B.1) REPRESENTS A MODELING ASSUMPTION OF 52% VSS REDUCTION IN THE DIGESTERS.
3. SCENARIO C.1 REPRESENTS A MODELING ASSUMPTION OF 65% VSS REDUCTION IN THE DIGESTERS. THE RATE IS HIGHER THAN SCENARIOS A AND B ON ACCOUNT OF THE LYSTEK PROCESS.
4. HYDRAULIC LOADING REPRESENTS AN NCPWF PRODUCTION OF 15 MGD. REFER TO SECTION 9 OF THIS MEMORANDUM FOR FURTHER DETAILS.
5. HYDRAULIC LOADING REPRESENTS AN NCPWF PRODUCTION OF 30 MGD. REFER TO SECTION 9 OF THIS MEMORANDUM FOR FURTHER DETAILS.

KEY:

PROCESS STREAM			
	FLOW	TSS	VSS
SCENARIO	IN MGD	IN LB/DAY	IN LB/DAY

Brown AND Caldwell

DATE: AUG 12, 2016

SIMPLIFIED PROCESS FLOW DIAGRAM OF MBC WITH PHASE II, SCENARIO 1 FLOWS AND LOADS AT MAXIMUM NON-POTABLE REUSE, AVERAGE ANNUAL DAILY FLOW MIRAMAR LAKE ALTERNATIVE

FIGURE 4-3

OUTPUT FROM TEACUPS

	Flow	TSS	VSS
A.2	4.28	183,900	140,000
B.2	4.28	183,900	140,000
C.2	4.28	183,900	140,000

THICKENING CENTRATE

	Flow	TSS	VSS
A.2	3.89	18,400	14,000
B.2	3.89	18,400	14,000
C.2	3.89	18,400	14,000

PLWTP DIGESTED SOLIDS

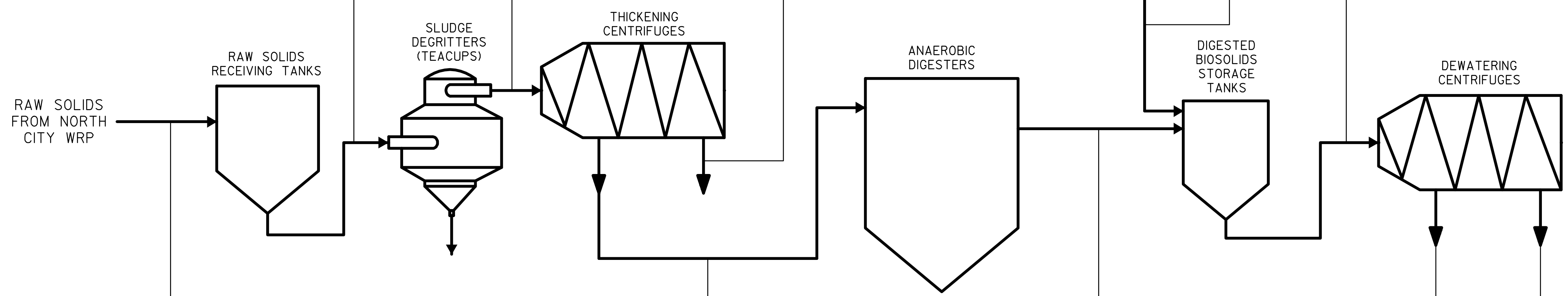
	Flow	TSS	VSS
A.2	1.15	262,600	129,400
B.2	1.15	263,100	129,700
C.2	1.15	262,600	129,400

RAW SOLIDS TO TEACUPS

	Flow	TSS	VSS
A.2	4.28	183,900	140,000
B.2	4.28	183,900	140,000
C.2	4.28	183,900	140,000

TO DEWATERING CENTRIFUGES

	Flow	TSS	VSS
A.2	1.53	370,100	197,400
B.2	1.60	387,800	212,800
C.2	1.59	369,600	194,800



RAW SOLIDS

	Flow	TSS	VSS
A.2	4.28	183,900	140,000
B.2	4.28	183,900	140,000
C.2	4.28	183,900	140,000

THICKENED SOLIDS

	Flow	TSS	VSS
A.2	0.39	165,500	126,000
B.2	0.39	165,500	126,000
C.2	0.39	165,500	126,000

NCWRP DIGESTED SOLIDS

	Flow	TSS	VSS
A.2	0.38	107,600	68,000
B.2	0.44	124,800	83,100
C.2	0.44	107,100	65,400

DEWATERED CAKE TO DISPOSAL

	Flow	TSS	VSS
A.2	0.14	351,600	187,600
B.2	0.15	368,400	202,200
C.2	0.14	351,200	185,100

DEWATERING CENTRATE

	Flow	TSS	VSS
A.2	1.39	18,500	9,900
B.2	1.45	19,400	10,600
C.2	1.45	18,500	9,700

NOTES:

1. SCENARIOS A, B, AND C REPRESENT NO FOG ADDITION, FOG ADDITION, AND FOG ADDITION WITH LYSTEK PROCESS RESPECTIVELY.
2. SCENARIO 2 (AS IN A.2 AND B.2I) REPRESENTS A MODELING ASSUMPTION OF 46% VSS REDUCTION IN THE DIGESTERS.
3. SCENARIO C.2 REPRESENTS A MODELING ASSUMPTION OF 65% VSS REDUCTION IN THE DIGESTERS. THE RATE IS HIGHER THAN SCENARIOS A AND B ON ACCOUNT OF THE LYSTEK PROCESS.
4. HYDRAULIC LOADING REPRESENTS AN NCPWF PRODUCTION OF 15 MGD. REFER TO SECTION 9 OF THIS MEMORANDUM FOR FURTHER DETAILS.
5. HYDRAULIC LOADING REPRESENTS AN NCPWF PRODUCTION OF 30 MGD. REFER TO SECTION 9 OF THIS MEMORANDUM FOR FURTHER DETAILS.

KEY:

PROCESS STREAM			
	FLOW	TSS	VSS
SCENARIO	IN MGD	IN LB/DAY	IN LB/DAY

Brown AND Caldwell

DATE: AUG 12, 2016

SIMPLIFIED PROCESS FLOW DIAGRAM OF MBC WITH PHASE II, SCENARIO 2 FLOWS AND LOADS AT MAXIMUM NON-POTABLE REUSE, AVERAGE ANNUAL DAILY FLOW MIRAMAR LAKE ALTERNATIVE

FIGURE 4-4

5 Projected Impacts on Selected Unit Processes

5.1 Grit Removal System

5.1.1 Existing Conditions

5.1.1.1 Existing Facilities

The Grit Removal Facility is located in Area 76, adjacent to the centrifugation process. The facility receives raw solids from the receiving tanks and separates grit from this stream. The process is important because grit carried over to the centrifuges located downstream can result in excessive wear and tear, requiring expensive replacement parts and excessive time out of service.

In addition, excessive grit accumulation can reduce the effectiveness of the existing anaerobic digesters. Historically, this accumulation has not been a significant concern because surplus available digester capacity has allowed the City to take digesters off line for extended periods for cleaning with minimal impact on plant operations. However, the proposed increases in flows and loads to the digesters will require that all three digesters be in service. If there are no plans for construction of a fourth digester, this constraint will increase the importance of grit removal to maximize digester performance and minimize the frequency of digester cleaning operations.

5.1.1.1.a Raw Solids Feed Pumps

The Receiving Tanks Complex is equipped with three raw solids feed pumps (73-P-21 through 73-P-23) that draw from the tanks and supply a feed loop serving the thickening centrifuges. The custom-engineered horizontal non-clog centrifugal pumps are capable of being operated at variable speeds because they are equipped with VFDs. Each pump has a rated output of 1,563 gallons per minute (gpm) (2.25 mgd) at 91 feet of head when operating at the maximum speed of 1,750 revolutions per minute (rpm). The grit removal process is located at the upstream end of this loop, which eventually discharges back to the receiving tanks. The thickening centrifuge feed pumps draw from this loop and convey solids to the thickening centrifuges.

The piping for the loop consists of a 14-inch-diameter supply pipeline to the teacup grit separators and thickening centrifuges, and an 8-inch-diameter return pipeline from the downstream side of the thickening centrifuges to the raw-solids-receiving tank. Maximum supply velocity to the grit separators with two pumps in service at the rated duty point is approximately 6 feet per second (fps).

5.1.1.1.b Cyclone Grit Separators (Teacups)

Grit removal is accomplished by three Eutek cyclone grit separators (76-GSR-01 through 76-GSR-03), also known as “teacups.” Each unit is 76 inches in diameter, operates at approximately 25 pounds per square inch (psi) pressure, and has a rated capacity of 1.5 mgd. The raw solids stream enters the unit tangentially and the degritted stream exits at the top of the unit. The tangential entry creates a cyclonic flow path within the teacup, causing grit to separate and drop to the conical bottom. The collected grit is then discharged from the cone via an underflow drain. With two duty pumps supplying two duty separators, the maximum return flow to the solids storage tanks is 1.5 mgd. The corresponding velocity in the 8-inch-diameter return line is 6 fps for a return flow of 1.5 mgd.

5.1.1.1.c Grit Dewatering

The separated grit discharged from the cones of the grit separators is conveyed to the grit-dewatering process. This consists of a clarifier where grit is separated from organic material. The grit is moved upward on a conveyor system, also known as a snail, containing a slow-moving conveyor with horizontally oriented slats. As the conveyor moves, water drains from the washed grit and is returned to the clarifier.

The grit is discharged from the snails into a shaftless screw conveyor system. Two clarifiers and snails are installed and together serve the three teacups. Each clarifier and snail is sized to handle approximately 4,550 pounds per hour (lb/hr) of grit, which is the output of each teacup at rated capacity of 1.5 mgd raw solids flow.

5.1.1.1.d Grit Screw Conveyors

The grit discharged by the snails is conveyed by two shaftless screw conveyors (76-GO-01 and 76-GO-02) approximately 25 feet in length each, powered by a 1.5 hp motor with reducing gearbox. The conveyors contain a 16-inch-diameter spiral shaftless screw set for 5 rpm constant speed, inside a U-shaped trough. The trough is covered for controlling odors, but is equipped with inspection doors and removable covers. Each conveyor is capable of discharging to one of two roll-off bins, which have a capacity of 25 cubic yards (yd^3) each.

5.1.1.2 Current Operating Parameters and Performance

During normal operation, one raw solids feed pump is in operation, with the second available for use as a lag pump. The third pump remains in standby. Each pump motor also has a VFD and can thus be operated at different speeds. One grit separator is normally in operation with two units in standby. During peak conditions, two units are in operation with the third in standby mode.

City staff indicated that only one grit separator is currently in service because the second one is out of service for maintenance and the third one is in need of complete refurbishment. The system is also equipped with a means to bypass the grit separators completely; however, this mode is typically not used because of the possibility of damage to the centrifuges. Under normal conditions, the two roll-off bins reach their weight limit over 6 weeks and are then hauled off for disposal of grit. Table 5-1 provides a summary of existing conditions.

City staff has also noted that the grit separators worked very well when newly installed but have experienced a decline in performance over recent years. Inadequate technical support from the manufacturer has been an ongoing issue in properly maintaining the units and getting replacement parts. Another issue noted by staff is the impact of routine cleaning of the grit separators on the raw solids feed loop pressures. High-pressure water cleaning cycles cause spikes in the feed loop pressure, in turn affecting the thickening centrifuge feed pumps.

Table 5-1: Grit Removal Facilities - System Design Criteria and Current Operating Conditions for the Existing System							
Parameter	Unit of Measure	System Design Capacity		Estimated Firm	Current Operating Conditions		Comments
		Avg.	Max.	capacity	Avg.	Max.	
Raw solids feed pumps (1)	MGD	4.3	4.5	4.1	0.87	0.93	Ex. System adequate to handle current loads
	gpm	3,000	3,126	2,813	604	646	
Cyclone separators (Teacups)	MGD	N/A	3.0	3.0	0.87	0.93	Ex. System adequate to handle current loads
	gpm		2,084	2,084	604	646	
Grit dewatering	lb/hr		4,550	4,095	24	46	Ex. System adequate to handle current loads(1)

(1) Based on data from 2012 through April 2014.

5.1.2 Projected Conditions: Phase I (15 mgd production at AWTF) and Phase II (30 mgd production at AWTF)

5.1.2.1 Summary

The flow rate of raw solids from NCWRP is projected to increase significantly following plant expansion. Table 5-2 shows that although the existing raw solids feed pumps would be adequate for handling increased average flows following Phase I expansion, they would be unable to handle peak flows. The solids pumps would also be inadequate for handling average and peak Phase II flows, which are several times higher than current flows. Similarly, the existing grit separators would be adequate for handling Phase I average flows, but not peak flows.

Table 5-2: Grit Removal Facilities - System Design Criteria and Projected Operating Conditions									
Parameter	Unit of Measure	System Design Capacity		Estimated Firm Capacity	Phase I Operating Conditions (1)		Phase II Operating Conditions (1)		Comments
		Avg.	Max.		Avg.	Max.	Avg.	Max.	
Raw Solids Feed Pumps	MGD	4.3	4.5	4.1	2.90	4.43	4.28	6.55	System inadequate for Phase I and Phase II loads
	gpm	3,000	3,126	2,813	2,014	3,076	2,972	4,548	
Cyclone Separators (Teacups)	MGD	N/A	3.0	3.0	2.90	4.43	4.28	6.55	System inadequate for Phase I and Phase II loads
	gpm		2,084	2,084	2,014	3,076	2,972	4,548	

Table 5-2: Grit Removal Facilities - System Design Criteria and Projected Operating Conditions									
Parameter	**Unit of Measure**	**System Design Capacity**		**Estimated Firm Capacity**	**Phase I Operating Conditions (1)**		**Phase II Operating Conditions (1)**		**Comments**
		Avg.	**Max.**		**Avg.**	**Max.**	**Avg.**	**Max.**	
Grit Dewatering (2)	lb/hr		4,550	4,095	80	219	118	324	System inadequate for Phase I and Phase II loads (3)

(1) Flow values based on results of the flow and mass balance modeling. Refer to section 3.1.

(2) Phase i and phase ii operating conditions have been extrapolated from existing operating conditions data and are not based on modeling.

(3) Although system has capacity to handle additional loads, it is typical to have a dedicated grit dewatering system for each cyclone separator.

Auxiliary processes such as grit dewatering are limited by upstream processes such as grit separation. The existing dewatering equipment is capable of handling output from two grit separators but would require additional units in place for handling more flow. The screw conveyors would likewise require additional units to service the new clarifier and dewatering systems. The two new teacups should be provided with a new return pipeline to convey solids back to the receiving tanks, or the existing 8-inch-diameter return line would need to be upsized to handle the increased flows. The raw solids feed pipeline is adequate to handle future loads, but would operate at velocities close to 10 fps during peak events and at approximately 6 fps at average conditions.

5.1.2.2 Required Equipment Improvements

Process improvements will be required for handling future flows from NCWRP. These improvements will upsize existing equipment, or provide additional units to handle the increased flows. Construction of these improvements will require engineering design and preparation of construction documents including design drawings and specifications. Table 5-3 and Table 5-4, respectively, summarize the following improvements:

- Replace all three raw solids feed pumps with new ones of higher capacity during Phase I
- Expand Grit Removal Facility building during Phase I
- Install one new grit separator to handle Phase I flows
- Install one new clarifier, snail, and screw conveyor during Phase I
- Install a second new grit separator during Phase II
- Install a second clarifier, snail, and screw conveyor during Phase II

Because of the requirement to replace all three raw solids feed pumps during Phase I, it would be more efficient to also install both grit separators and their auxiliary equipment during Phase I. The required improvements are shown schematically in Figure 5-1.

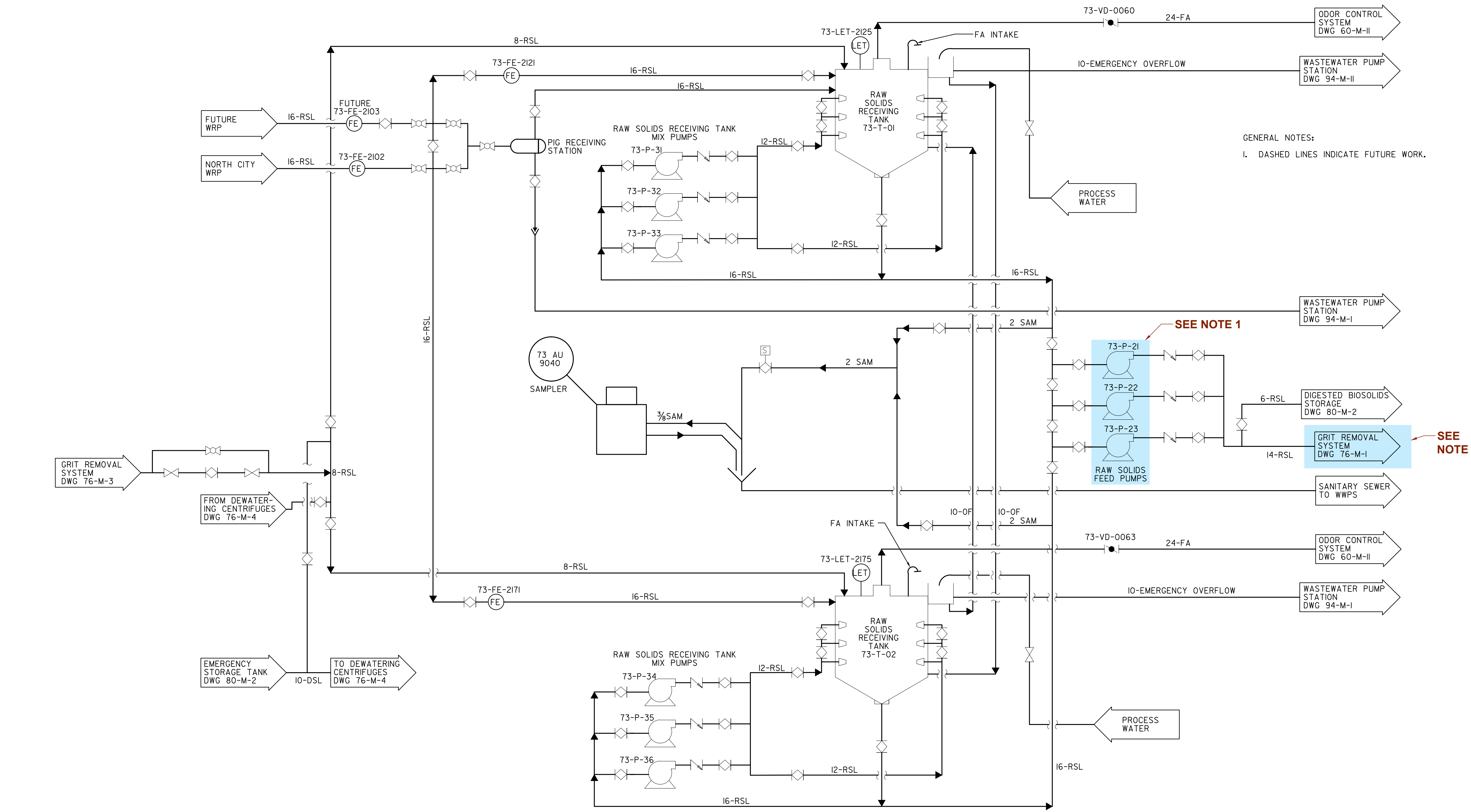
Table 5-3: Grit Removal Facilities - Phase I Projected Equipment Improvements and Phase I Operating Conditions												
Equipment Subsystem	Unit of Measure	Phase I Improvements								Phase I Operating Conditions		Capacity Assessment
		No. Of units under max conditions				Capacity			Summary of Improvements			
		Status	Total	Duty	Standby	Unit Capacity	Rated Capacity	Firm Capacity		Avg.	Max.	
Raw Solids Feed Pumps	gpm	Existing	3	2	1	1563	3,126	2,813				
	gpm	**New**	**3**	**2**	**1**	**2500**	**5,000**	**4,500**	Remove all existing pumps and			
TOTAL	**gpm**		**3**	**2**	**1**			**4,500**	Replace with larger pumps	2,014	3,076	Firm capacity > Phase I max
	MGD									2.90	4.43	
Cyclone Separators	gpm	Existing	3	2	1	1042	2,084	2,084	Expand grit removal facility			
	gpm	**New**	**1**	**1**	**0**	**1042**	**1,042**	**1,042**	Building and add one new			
TOTAL	**gpm**		**4**	**3**	**1**			**3,126**	Cyclone separator	2,014	3,076	Firm capacity > Phase I max
	MGD									2.90	4.43	
Grit Dewatering	lb/hr	Existing	2	2	0	4550	9,100	8,190	Add one clarifier, snail, and			
	lb/hr	**New**	**1**	**1**	**0**	**4550**	**4,550**	**4,095**	Screw conveyor			
TOTAL	**lb/hr**		**3**	**3**	**0**			**12,285**		80	219	Firm capacity > Phase I max (1)

(1) The need for a new grit dewatering system does not depend on capacity. rather, it is typical to provide each cyclone separator with a dedicated grit dewatering system.

Table 5-4: Grit Removal Facilities - Phase II Projected Equipment Improvements and Phase II Operating Conditions												
Equipment Subsystem	**Unit of Measure**	**Phase II Improvements**								**Phase II Operating Conditions**		**Capacity Assessment**
		No. Of units under max conditions				**Capacity**			**Summary of Improvements**			
		Status	**Total**	**Duty**	**Standby**	**Unit Capacity**	**Rated Capacity**	**Firm Capacity**		**Avg.**	**Max.**	
Raw Solids Feed Pumps	gpm	PH I	3	2	1	2500	5,000	4,500	No improvements needed			Subsystem
TOTAL	**gpm**		**3**	**2**	**1**			**4,500**		2,972	4,548	Firm capacity > Phase II max
	MGD									4.28	6.55	
Cyclone Separators	gpm	PH I, EXIST	4	3	1	1042	3,126	3,126	Expand grit removal facility			
	gpm	**NEW**	**1**	**1**	**0**	**1042**	**1,042**	**1,042**	Building and add one new			
TOTAL	**gpm**		**5**	**4**	**1**			**4,168**	Cyclone separator	2,972	4,548	Firm capacity < Phase II max (1)
	MGD									4.28	6.55	
Grit Dewatering	lb/hr	PH I, EXIST	3	3	0	4550	13,650	12,285	Add one clarifier, snail, and			
	lb/hr	**NEW**	**1**	**1**	**0**	**4550**	**4,550**	**4,095**	Screw conveyor			Firm capacity > Phase II max (2)
TOTAL	**lb/hr**		**4**	**4**	**0**			**16,380**		118	324	

(1) Although maximum flow is higher than firm capacity, cyclone separators can be operated at higher than rated flow for short durations.

(2) The need for a new grit dewatering system does not depend on capacity. rather, it is typical to provide each cyclone separator with a dedicated grit dewatering system.



LEGEND:

- NCWRP EXPANSION (PURE WATER PROGRAM) UPGRADES
- FOG ADDITION UPGRADES
- OTHER RECOMMENDED IMPROVEMENTS

NOTES:

1. REPLACE ALL THREE EXISTING RAW SOLIDS FEED PUMPS WITH HIGHER CAPACITY PUMPS.
2. INSTALL TWO NEW SLUDGE DEGRITTERS (TEACUPS).
3. HYDRAULIC LOADING REPRESENTS AN NCPWF PRODUCTION OF 30 MGD. REFER TO SECTION 9 OF THIS TECHNICAL MEMORANDUM FOR FURTHER DETAILS.

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IMPACTS OF NCWRP EXPANSION ON MBC

FIGURE 5-1

RAW SOLIDS FEED LOOP AND GRIT REMOVAL SYSTEM

5.2 Raw Solids Thickening System

5.2.1 Existing Conditions

5.2.1.1 Configuration and Firm Capacity of the Existing System

The raw solids thickening system concentrates (thickens) raw solids after grit removal (see Section 5.1). The system consists of sludge feed pumps, polymer feed pumps, thickening centrifuges, and thickened sludge (digester feed) pumps. Process schematics for the raw solids thickening system and its polymer system are included in Figure 5-2 and Figure 5-3, respectively.

The original design includes five progressive-cavity pumps (76-P-11 through 76-P-15)[4] that are configured to pump raw, degritted, un-thickened sludge to each of the five thickening centrifuges (76-TC-01 through 76-TC-05)[5] from the 14-inch-diameter raw solids distribution header. Each centrifuge is able to operate with its own dedicated sludge feed pump and its own dedicated polymer feed pump (76-P-21 through 76-P-25[6]). Raw un-thickened solids range from 0.50% to 0.75% by weight. Each of the five thickening centrifuges is able to discharge thickened sludge into a thickened solids wetwell at approximately 5% by weight. Centrate is combined with centrate from the dewatering centrifuges (Section 5.4), and the combined centrate flows by gravity to the centrate pump station (Section 5.5). Table 5-5 presents the firm capacities of the existing sludge thickening system.

Table 5-5: Sludge Thickening Facilities - System Design Criteria and Current Operating Conditions for the Existing System

Parameter	Unit of Measure	System Design Capacity		Estimated Firm System Capacity	Current Operating Conditions		Comments
		Avg.	Max.		Avg.	Max.	
Raw Sludge Feed Rate	MGD	N/A	3.24 (1)	2.59 (2)	0.81	0.89	Ex. System adequate to handle current loads.
Total Solids Loading	LB TSS/D	N/A	135,100 (3)	108,000	37,000 (6)	56,000 (6)	Ex. System adequate to handle current loads.
Polymer Feed Rate	gpm	N/A	60 (8)	48	5.03	13.1	Ex. System adequate to handle current loads.
Thickened Sludge Production	gpm	155 (4)	310 (5)	248	59 (6)	84 (6)	Ex. System adequate to handle current loads.
	% Solids	5.5	5.5	N/A	5.23 (6)	6.1 (6)	
	LB/D TSS	107,500	215,000	172,000	33,300 (7)	50,400 (7)	

(1) Raw sludge feed rate determined by thickening centrifuges as the limiting component at 750 gpm each. sludge feed pumps rated at 1000 gpm each
(2) Firm capacity based on running three units at 80% output with two units ready
(3) TSS loadings determined from the percent solids values listed in the operations student study guide: 0.33% to 0.5% max
(4) One pump in operation - lead pump
(5) Two pumps in operation - lead and lag pumps
(6) Based on operations data for 2013/2014
(7) Based on 90% removal efficiency at the centrifuge
(8) Based on running 3 polymer feed pumps at 20 gpm each max

[4] Seepex BN 300-6L, 300–1,000 gpm @ 28.1 psi, 50 hp, 1,780 rpm: gearbox ratio 6.7:1.
[5] Sharples PM-95000AD centrifuge, 750 gpm, main drive motor 300 hp, backdrive motor 60 hp.
[6] Seepex BN 10-6L, 5–20 gpm @ 50 psi, 5 hp, 1,760 rpm: gearbox ratio 7.99:1

Three progressive-cavity pumps (76-P-31 through 76-P-33) are able to take suction from the thickened solids wetwell and pump thickened raw sludge to the anaerobic digesters. The wetwell has an operating volume of 2,050 gallons per foot of depth. The wetwell air space is a Class I, Group D, Division 1 space, but plant operations typically keep the cover open to monitor the level in the wetwell. Wetwell level is a critical concern in operation of thickened sludge centrifuges. In addition, the original foul air connection to the wetwell has been capped to prevent high sludge level conditions from flooding the ductwork with thickened sludge.

One pump operates as a lead pump, one as a lag pump, and the third as a standby. The lead pump turns on at a wetwell depth of 5 feet and off at a depth of 3 feet; the lag pump is called if the depth reaches 10 feet and shuts off at a depth of 6 feet. In addition to the three thickened pumps, the wetwell was constructed with a 6-inch-diameter pipe spool to allow for connection of a fourth future pump.

The original thickened sludge pumps were replaced with units that have a higher pressure rating[7]. This replacement coincided with the City's decision to streamline the feed of thickened raw sludge to the digesters by directly pumping to the suction manifold of the digester mix pumps for each of the digesters. In the process of streamlining thickened sludge handling, the original sludge screens and screenings presses were decommissioned. For a more detailed discussion of this topic, see Section 5.3.

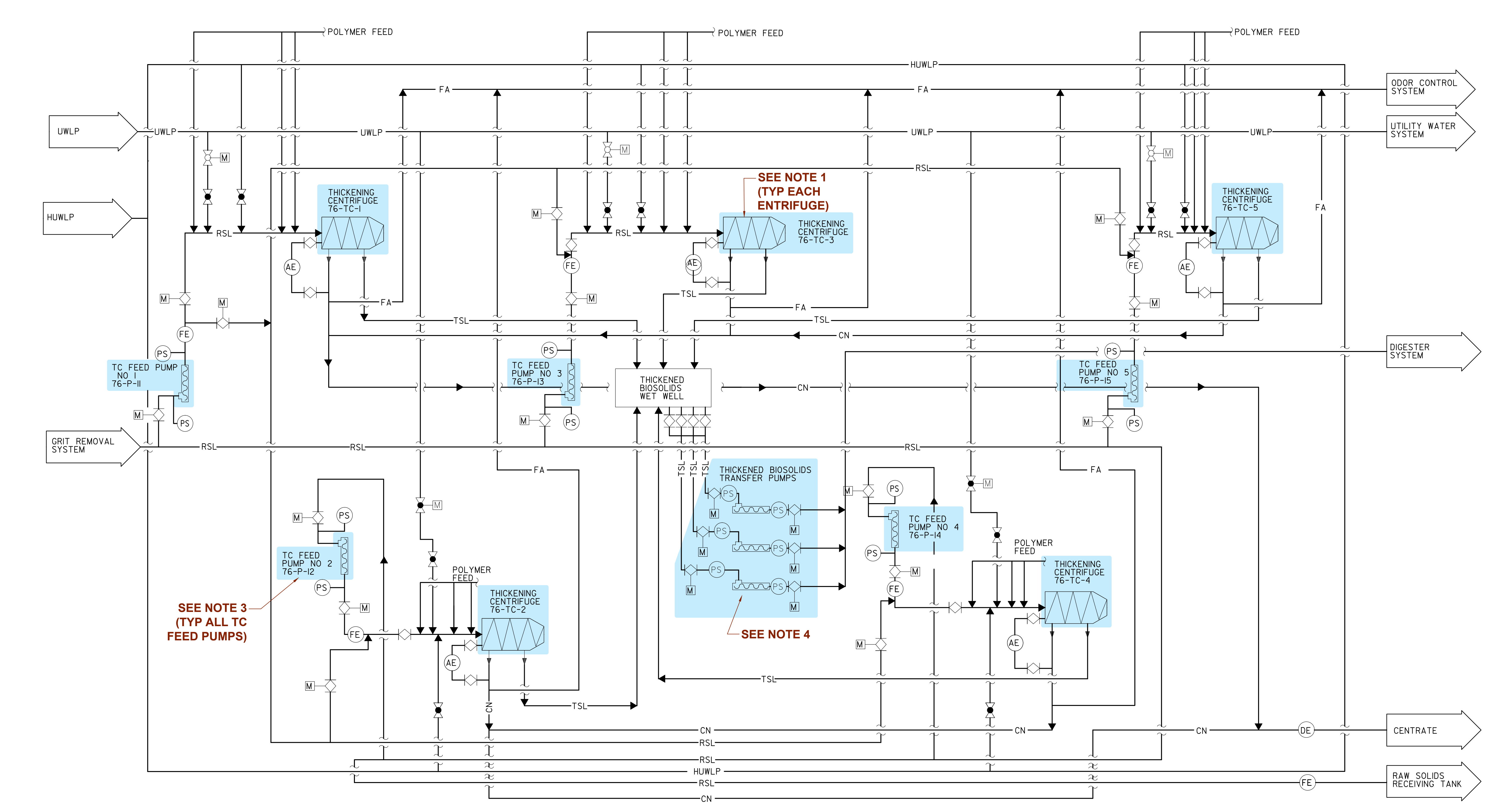
Sludge is fed to each of the three digesters via a combination of one 6-inch-diameter ductile iron line that branches into two parallel 4-inch-diameter lines. The existing piping system was not part of the original design, but was adapted from available piping once the decision was made to directly feed the digesters via the thickened sludge pumps. Each of the two 4-inch-diameter lines branches out to feed the three digesters. Each digester lateral has its own dedicated 4-inch magnetic flow meter for measuring the quantity of solids fed to each digester. Each magnetic flow meter has electrically actuated isolation valves and an electrically actuated bypass valve around the meter.

Each sludge feed pump has the ability to deliver up to 1,000 gpm of sludge, but the pump does not operate at this rate because of the capacity limitations of the centrifuge. Each polymer feed pump can deliver up to 20 gpm of dilute polymer solution to the centrifuge inlet.

5.2.1.2 Current Operating Conditions

The sludge-thickening system currently operates with unused available capacity. Out of the total of five thickening centrifuges available, only one thickening centrifuge is currently needed to process the raw solids pumped from NCWRP. The duty thickening centrifuge and feed pump run continuously (24 hours per day, 7 days per week). At times, one and sometimes two thickening centrifuges have been out of service at one time.

[7] Seepex BN 70-12, 155 gpm max @ 100 psi, 20 hp, 1,765 rpm: gearbox ratio 9.14:1.



LEGEND:

- NCWRP EXPANSION (PURE WATER PROGRAM) UPGRADES
- FOG ADDITION UPGRADES
- OTHER RECOMMENDED IMPROVEMENTS

NOTES:

1. INSTALL 5 NEW, LARGER CENTRIFUGES TO REPLACE EXISTING TO ACCOMMODATE PHASE II CONDITIONS.
2. INSTALL 6TH LARGER CENTRIFUGE IN THE SPACE AVAILABLE TO ACCOMMODATE PHASE II CONDITIONS.
3. INSTALL 5 LARGER TC FEED PUMPS (ONE FOR EACH CENTRIFUGE TO ACCOMMODATE PHASE II CONDITIONS.
4. INSTALL 3 NEW, LARGER THICKENED BIOSOLIDS TRANSFER PUMPS (DIGESTER FEED PUMPS) AND ADD 4TH PUMP IN THE SPACE AVAILABLE TO ACCOMMODATE PHASE II CONDITIONS.
5. HYDRAULIC LOADING REPRESENTS AN NCPWF PRODUCTION OF 30 MGD. REFER TO SECTION 9 OF THIS TECHNICAL MEMORANDUM FOR FURTHER DETAILS.

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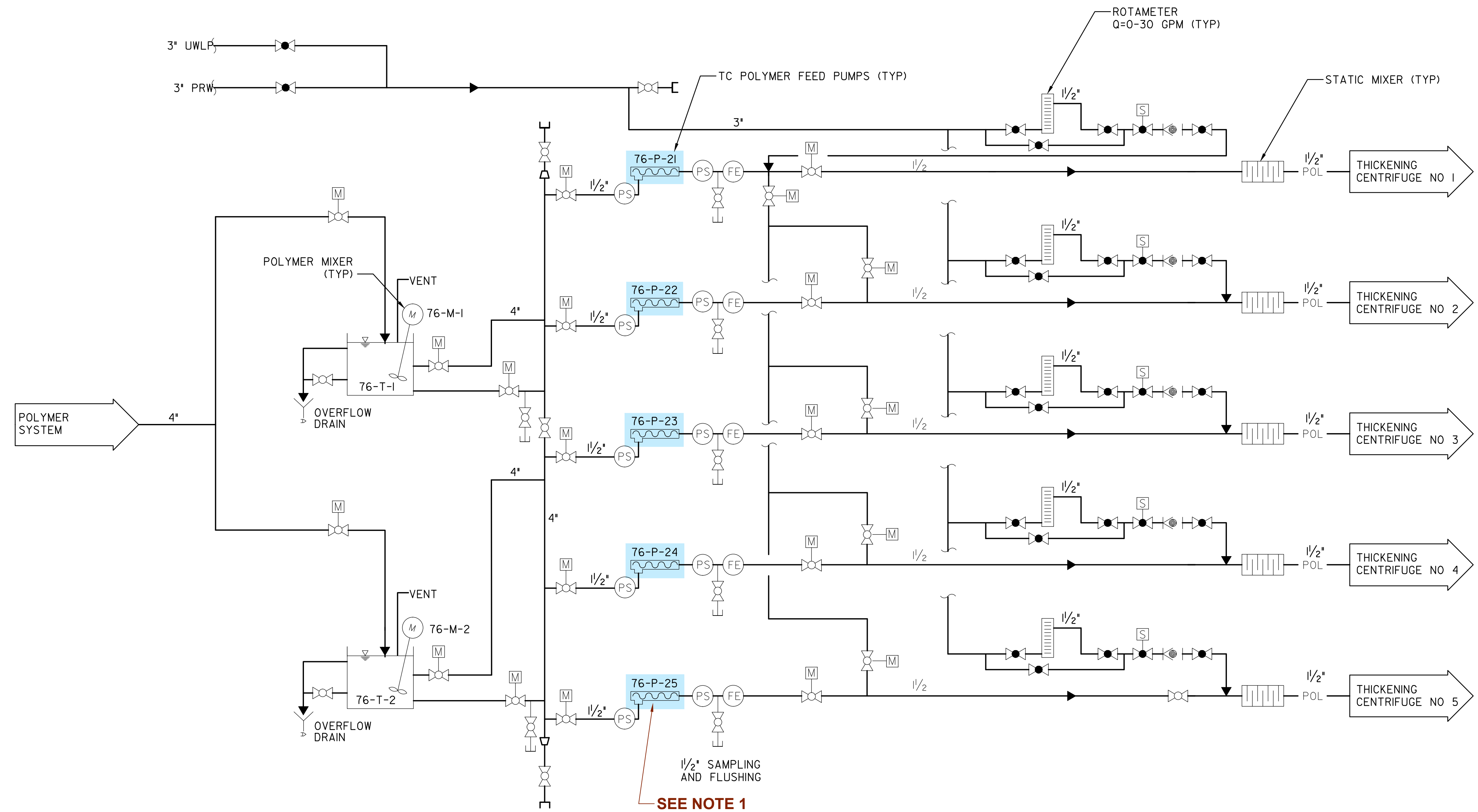
IMPACTS OF NCWRP EXPANSION ON MBC

FIGURE 5-2

RAW SOLIDS THICKENING SYSTEM PROCESS SCHEMATIC



LEGEND:

- NCWRP EXPANSION (PURE WATER PROGRAM) UPGRADES
- FOG ADDITION UPGRADES
- OTHER RECOMMENDED IMPROVEMENTS

NOTES:

1. INSTALL 5 LARGER TC POLYMER FEED PUMPS (ONE FOR EACH CENTRIFUGE) AND ADD 6TH PUMP TO ACCOMMODATE PHASE II CONDITIONS.
2. HYDRAULIC LOADING REPRESENTS AN NCPWF PRODUCTION OF 30 MGD. REFER TO SECTION 9 OF THIS TECHNICAL MEMORANDUM FOR FURTHER DETAILS.

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IMPACTS OF NCWRP EXPANSION ON MBC

FIGURE 5-3

RAW SOLIDS THICKENING POLYMER SYSTEM PROCESS SCHEMATIC

The operating sludge feed pump never exceeded 620 gpm during the 2013/2014 period for which operations data were available. One polymer feed pump operates in the range of 2 to 5 gpm to deliver dilute polymer solution (0.23% dry active ingredient by weight) from the day tank to the centrifuge.

One thickened sludge feed pump operating as lead delivers raw thickened sludge from the wetwell to digester 3, the only digester currently in operation (refer to Section 5.3). The lead pump shuts off at a level of 3 feet and turns on at 5 feet for an operating volume of 4,130 gallons. The lag pump turns on at 10 feet and shuts off at 6 feet. Based on the current level settings, the duty cycle on the lead thickened sludge feed pump is 34% (42 minutes on/80 minutes off) under average conditions; under maximum conditions the duty cycle is 52% (53 minutes on/57 minutes off).

It is important to note that maximum conditions defined in Table 5-5 are based on maximum flows and maximum loads. Although this coincidence of maximum conditions is usually deemed overly conservative (41), it represents a way to account for surcharge loads of solids that are created at NCWRP during the decommissioning and cleaning of primary sedimentation tanks. Decommissioning and dewatering events at NCWRP have been linked to the plugging and forced shutdown of the thickening centrifuge. No clear cause-and-effect relationship has been established at this time.

5.2.2 Constraints

5.2.2.1 Phase I Operating Conditions

Under the Phase I operating conditions, the projected average and maximum flows of raw sludge to thickening centrifuges are 2.9 mgd and 4.43 mgd, respectively; both exceed the firm capacity of 2.6 mgd for the existing system.

5.2.2.2 Phase II Operating Conditions

Although the firm capacity of the existing sludge-thickening system is nearly three times the current operating condition with one centrifuge currently in service, the projected flows and loads of raw sludge under the Phase II conditions exceed the available firm capacity. Table 5-6 shows a firm capacity of 2.6 mgd with three existing centrifuges running at a firm capacity of 600 gpm each compared to future raw solids flows as high as 6.55 mgd under Phase II maximum conditions. Projected TSS loads increase from 56,000 lb/d to 300,000 lb/d for an existing system with a firm capacity of only 108,000 lb/d.

Because of the substantial increases in hydraulic and solids loading under Phase I or Phase II conditions, it is not possible to operate the three existing centrifuges in parallel, with two as backups, and keep pace with projected loads. None of the existing sludge-thickening process equipment is able to handle Phase I or Phase II projected loads. Flows of raw solids from NCWRP to the thickening centrifuges are anticipated to vary diurnally to some degree. Although the flows of raw secondary solids are relatively constant because of equalization of primary effluent, flow through the primary sedimentation tanks is not constant. The thickening centrifuges capture 90% of the solids and thicken it by a factor of 10. As a result, there is relatively little diurnal fluctuation in flows of thickened sludge on the downstream side of the centrifuges because most of the diurnal variability is taken up by the return flow of centrate.

Table 5-6: Sludge Thickening Facilities – Existing System Design Criteria and Projected Operating Conditions for the Thickening System									
Parameter	Unit of Measure	System Design Capacity (1)		Estimated Firm	Phase I Operating Conditions		Phase II operating Conditions		Comments
		Avg.	Max.	Capacity (2)	Avg.	Max.	Avg.	Max.	
Raw Sludge Feed Rate	MGD	2.03	3.24	2.59	2.90	4.43	4.28	6.55	System inadequate for Phase I and Phase II loads
Total Solids Loading	LB TSS/D	60,000	135,000 (3)	108,000	125,000	199,000	184,000	294,000	System inadequate for Phase I and Phase II loads
Polymer Feed Rate	gpm	N/A	80	64	N/A	47.6 (5)	N/A	70 (6)	System inadequate for Phase II max loads
Thickened Sludge Production	gpm	155	310	248	181	278	271	410	System inadequate for all but Phase I avg loads
	% Solids	5.5	5.5	N/A					
	LB/D TSS	107,500	215,000	172,000 (4)	112,000	179,000	165,000	265,000	System inadequate for Phase I and Phase II max loads

(1) Existing thickening centrifuges are the limiting component at 750 gpm each.

(2) Firm capacity based on running three units at 80% output with two units ready.

(3) TSS loadings determined from the percent solids values listed in the Operations Student Study Guide: 0.33% TO 0.5% MAX

(4) Max capacity assumes that the pumps run continuously with no cycle time in the wetwell.

(5) Under Phase I, three new larger centrifuges are proposed to replace two of the existing centrifuges with a sixth larger centrifuge being installed in the available space. Two of the existing centrifuges will run with poly feed pumps running at 9.3 gpm each; two of the new centrifuges will run with poly feed pumps at 14.5 gpm each for a total of 47.6 gpm. It may be possible to run the existing polymer feed pumps with the new centrifuges at Phase I depending on the inlet pressure conditions and pressures at the polymer feed pumps.

(6) Under Phase II, the remaining three original centrifuges are replaced with three larger centrifuges so that all 6 centrifuges are upgraded. Four centrifuges run with 17.5 gpm of dilute polymer addition for a total of 70 gpm. This tm assumes that all polymer feed pumps are replaced at phase ii due to higher inlet pressures at the upper end of the operating range of each centrifuge.

5.2.3 Required Equipment Improvements

5.2.3.1 Sludge-Thickening Operations

Because the proposed modifications to the thickening centrifuge system are all ultimately geared to the Phase II maximum conditions, it makes the most sense to first discuss the required improvements to meet Phase II conditions. Once this alternative is established, the proposed modifications for Phase I conditions are simply an intermediate step toward the ultimate scheme proposed for Phase II. This approach does not imply that there will be no phasing; it indicates only that the Phase II conditions ultimately dictate individual centrifuge capacity under all other conditions. The improvements outlined herein are shown in Figures 5-2 and 5-3 and identify specific improvements related to the NCWRP expansion (Pure Water Program), FOG addition, and other recommended improvements focused on improving process reliability and performance.

Table 5-7 and Table 5-8, respectively, summarize the proposed equipment sizing for the Phase I operating conditions and Phase II operating conditions, respectively. Although the runtimes on the existing centrifuges are low, the approach recommended in this TM for the required improvements entails demolishing and replacing all of the existing centrifuges with newer, larger units. The main reasons for this approach are:

- Space within the building is limited and, as a result, it is important to maximize firm capacity within the available space. If the project team installed additional centrifuges with a firm capacity of 600 gpm each to supplement the existing units, a total of 8 centrifuges would need to be running and 2 additional backups for a total of 10. Implementing this alternative would incur significant additional cost in expanding the existing building or relocating existing equipment.

- The existing centrifuges are nearly 20 years old. Retaining the old centrifuges limits the City's ability to take advantage of improvements in the energy efficiency of centrifuge technology. Although availability of spare parts and long lead times would normally be a factor in aging equipment, MBC maintenance staff have largely mitigated this concern with a proactive in-house maintenance program and locally sourced repair services. MBC staff eliminated the cost of manufacturer-furnished maintenance and long lead times.

- Installing newer, larger centrifuges minimizes the cost of support systems that would otherwise be a factor if the existing centrifuges remain: an additional electrical room, building modifications, and electrical infrastructure plus additional sludge feed and polymer feed pumps.

To minimize the individual capacity of each of the proposed centrifuges for Phase II, the upgrade assumes that a total of six thickening centrifuges are installed to replace the existing five, and that the available space for a sixth centrifuge is used. The centrifuges are sized so that the firm capacity of four units is sufficient to meet Phase II conditions with two units available as standby units. The proposed thickening centrifuges are rated for 1,460 gpm each and, applying a firm capacity multiplier of 0.8, the resulting firm capacity of each proposed centrifuge is 1,168 gpm. Four thickening centrifuges running in parallel will have a firm capacity of 4,672 gpm (6.7 mgd approximately). See Section 8.8 for additional clarification. Each of the new sludge feed pumps will be similarly rated. Based on the current dosage range, the projected firm polymer feed rate is 16 gpm. It may be possible to fit new gearboxes and drive motors to the existing polymer feed pumps instead of installing an entirely new pump assembly. The selected design firm for subsequent phases of design may need to evaluate this alternative. Each proposed centrifuge has a rated capacity of 1,460 gpm[8] and a firm capacity of 1,168 gpm. With four online and two backups, the proposed

[8] Aldec G3-165. Main drive 350 hp, backdrive 40 hp. On a nominal, horsepower per 1,000 gpm basis, the Aldec G3-165 centrifuges are 44% more efficient than the existing centrifuges: 267 hp per 1,000 gpm versus 480 hp per 1,000 gpm.

system would provide the needed 6.55 mgd of firm capacity. The sludge and polymer pumps would also be replaced[9].

For the Phase I operating conditions, three of the proposed six centrifuges would be installed to provide the needed firm capacity. City staff would operate two out of three of the existing centrifuges in tandem with two out of three proposed centrifuges.

Construction of these improvements will require engineering design and preparation of construction documents including design drawings and specifications.

Several significant design issues with the replacement centrifuges may need to be addressed during subsequent stages of design:

- The Aldec G3-165 centrifuges are furnished with an in-line main drive motor configuration, which adds to the overall length of the installation. Alfa Laval Thermal Company (Alfa Laval) no longer provides side-mounted main drive motors as an option. The in-line motor configuration ensures that the main motor base is part of the centrifuge base that is better from the standpoint of vibration and rotational dynamics.
- The Aldec G3-165 will fit in the space available based on preliminary field measurements and layouts assuming that the positions of the thickened solids discharge connections remain the same. Approximately 30 inches of available floor space will be lost on the east and west sides of the building, but approximately 72 inches of room will be available between the ends of the backdrive motors and the face of the existing columns. It may not be possible to use the existing bridge crane to remove the backdrive motors. As a result, other provisions may be required to remove the backdrive motors. The east-west limits of hook travel at the thickened centrifuge area need to be confirmed by field tests.
- At 40,000 lb each, the Aldec G3 centrifuges are comparable to the existing Sharples PM-95000 AD, which have a total weight of 45,940 lb. As a result, any structural modifications needed to handle the new centrifuges will be primarily a function of current codes.
- The power conduits for the existing main drive motors are off to the side of each existing centrifuge because of the side-mount belt drive arrangement. These conduits will need to be reconfigured for the new motor arrangement.
- Section 8 discusses the potential for lower flows to the thickening centrifuges. Even if the flows are reduced, it appears likely that the Aldec G3 frame size would still apply. This issue needs to be addressed in subsequent stages of design by the predesign consultant.

[9] The larger sludge feed pumps will require the use of right-angle gear drive assemblies, and motors mounted in the vertical position, to fit in the space available. Suction and discharge piping for each pump will also need to be revised to match the pump inlet and discharge connections for the proposed pump.

Table 5-7: Sludge Thickening Facilities – Phase I Projected Equipment Improvements and Phase I Operating Conditions												
Equipment Subsystem	Unit of Measure	Phase I improvements								Phase I Operating Conditions		Capacity Assessment
		No. Of units under max conditions				Capacity			Summary of Improvements			
		Status	Total	Duty	Standby	Unit Capacity	Rated Capacity	Firm Capacity		Avg.	Max.	
Thickening Centrifuge Sludge Feed Pumps	gpm	Existing	3	2	1	1,000	2,000	1,600				Subsystem
	gpm	**New**	**3**	**2**	**1**	**1,460**	**2,920**	**2,336**	Remove three existing pumps and replace with three larger pumps			
TOTAL	**gpm**		**6**	**4**	**2**			**3,936**		2,014	3,076	Firm capacity > Phase I max
	MGD									2.90	4.43	
Thickening Centrifuges	gpm	Existing	3	2	1	750	1,500	1,200	Remove three ex. Centrifuges and Replace with three larger centrifuges Run two larger centrifuges and run two smaller units one backup of each			
	gpm	**New**	**3**	**2**	**1**	**1,460**	**2,920**	**2,336**				
TOTAL	**gpm**		**6**	**4**	**2**			**3,536**		2,014	3,076	Firm capacity > Phase I max
	MGD									2.90	4.43	
	LB TSS/D	Existing	3	2	1	49,500	99,000	79,200				
	LB TSS/D	**New (1)**	**3**	**2**	**1**	**122,700**	**245,400**	**196,320**				
	LB TSS/D		6	4	2			**275,520**		125,000	199,000	
Thickening Centrifuge Polymer Feed Pumps	gpm	Existing	6	4	2	20	80	64	Note – may be able to operate with existing polymer pumps in Phase I		47.6	Firm capacity > Phase I max operating condition
	gpm						**0**	**0**				See detailed discussion in memo for further clarification; see Note 5 in Table 5-6
TOTAL	**gpm**		**6**	**4**	**2**			**64**				
Thickened Sludge Feed Pumps	gpm	**New**	**4**	**3**	**1**	**270**	**810**	**648**	Remove existing three pumps and replace with larger pumps Add 4th pump in space available			Firm capacity > Phase I max operating condition
	gpm											See detailed discussion in memo for further clarification
TOTAL	**gpm**		**4**	**3**	**1**			**648**				

Table 5-8: Sludge Thickening Facilities – Phase II Projected Equipment Improvements and Phase II Operating Conditions												
Equipment Subsystem	Unit of Measure	Phase II Improvements								Phase Ii Operating Conditions		Capacity Assessment
		No. Of units under max. Conditions				Capacity			Summary of Improvements			
		Status	Total	Duty	Standby	Unit Capacity	Rated Capacity	Firm Capacity		Avg.	Max.	
Thickening Centrifuge Sludge Feed Pumps	gpm	**New-Ph2**	**6**	**4**	**2**	**1,460**	**5,840**	**4,672**	Replace 5 original sl. Feed pumps with larger sl. Feed pumps Install 6th additional pump.			Subsystem
TOTAL	**gpm**		**6**	**4**	**2**			**4,672**		2,972	4,548	Firm capacity > Phase II max operating condition
	MGD								to match larger pumps	**4.28**	**6.55**	
Thickening Centrifuges	gpm	**New-Ph2**	**6**	**4**	**2**	**1,460**	**5,840**	**4,672**	Replace 5 original centrifuges with larger centrifuges Add 6th larger centrifuge			
TOTAL	**gpm**		**6**	**4**	**2**			**4,672**		2,972	4,548	Firm capacity > Phase II max operating condition
	MGD									**4.28**	**6.55**	
	LB TSS/D	**New-Ph2**	**6**	**4**	**2**	**122,700**	**491,000**	**392,600**				
	LB TSS/D		**6**	**4**	**2**			**392,600**		**184,000**	**294,000**	
Thickening Centrifuge Polymer Feed Pumps	gpm	**New**	**6**	**4**	**2**	**22**	**88**	**70**	Replace all 5 poly feed pumps in Phase II Add 6th poly feed pump		70	Firm capacity > Phase II max operating condition See detailed discussion in memo for further clarification; see Note 5 in Table 5-6
TOTAL	**gpm**		**6**	**4**	**2**			**70**				
Thickened Sludge Feed Pumps	gpm	**New**	**4**	**3**	**1**	**270**	**810**	**648**	remove existing 3 pumps and replace with 3 larger pumps Add 4th pump in space available			Firm capacity > Phase II max operating condition See detailed discussion in memo for further clarification
TOTAL	**gpm**		**4**	**3**	**1**			**648**				

5.2.3.2 Thickened Sludge Transfer/Digester Feed Operations

For thickened sludge pumping, the required improvements entail (1) replacing the existing thickened sludge pumps with larger pumps; (2) installing a fourth pump in the space provided to match the capacity of the new pumps; and (3) installing a new 8-inch-diameter lined ductile iron force main with feed valves and new tie-ins to the suction side of the existing digester mix pumps.

Each new thickened sludge pump will be designed to deliver 217 gpm. This represents an increase of 40% over each of the existing pumps, which are rated for 155 gpm. The existing wall spool for each pump suction connection is a 6-inch-diameter pipe. Suction velocities will increase from 1.6 fps to 2.2 fps, which may be on the low side for 5% raw solids. It appears that suction manifold piping was installed when the original thickened sludge pumps were replaced. If one of the sludge inlets plugs at the wall spool, suction line velocities and suction losses will increase significantly and line losses may be unacceptable. This question will need to be evaluated in greater detail by the design consultant selected for 10% design effort.

A second issue that has been raised by City staff is whether the thickened solids in the wetwell from multiple centrifuges will require mixing to maintain a homogeneous feedstock to the digesters. Any form of mixing may increase the generation of odors and require that the air space above the solids be re-connected to the foul air ductwork. Once in continuous operation, the thickened solids produced by one centrifuge should be relatively comparable to the solids produced by others so that mixing may not be a priority. Any off-spec thickened solids generated during centrifuge startup will be diverted to the centrate system. If mixing is required, the challenge will be to mix the solids while minimizing surface turbulence and generation of odors. Submersible mixers will be difficult to access and will require opening up a classified space that will still be in operation while a mixer is being removed for maintenance. Chopper pumps could provide closed-loop mixing with safer access for maintenance, but space for pump installation is limited. The chopper pump carries the added benefit of macerating the raw solids, which may reduce clogging in the HEXs over time. This question will need to be evaluated in greater detail by the design consultant selected for the 10% design effort.

One of the primary challenges in pumping thickened sludge to the digesters is balancing two competing objectives: (1) keeping sludge pipeline velocities in an optimum range versus; and (2) maintaining a continuous digester feed to minimize fluctuations of the digester organic loading and their impact on digester performance resulting in fluctuations in digester gas production.

The velocity of thickened sludge at 5% solids should be between 3 and 5 fps to avoid high friction losses caused by the viscosity of the sludge due to non-Newtonian nature of concentrated undigested solids (15). The simplest way to provide this is to design the thickened sludge pumps to pump at a constant rate from the thickened sludge wetwell on a fill-and-draw basis. Under Phase II maximum conditions, three of the four digester feed pumps operate in parallel to deliver solids to the digesters at 650 gpm. An 8-inch-diameter line, or its equivalent[10], will be required to keep the pipeline velocity in the optimum range under these conditions. Under Phase II maximum conditions, three of the four thickened sludge pumps operate in parallel to pump sludge to the digesters. By adjusting the level set points for pump start/stop operations, the duty cycle for the pumping system is 63% with pumps off for 10 minutes followed by a runtime of 17 minutes. This corresponds to a cycle time of 27 minutes and 2.2 starts per hour.

[10] Two 6-inch-diameter ductile iron lines, running in parallel, provide a total equivalent cross-sectional area equal to one 8-inch-diameter ductile iron line. Specific pipeline routing options, and reuse/integration of existing piping into the digester-feeding scheme, are not addressed in this TM. Multiple parallel lines offer flexibility in maintaining acceptable pipe velocities under conditions when the thickened sludge flow is less than the Phase II maximum conditions.

But operation on a fill-and-draw basis necessarily causes pulses of solids loadings into each online digester and fluctuations in gas production. The best compromise entails feeding each online digester in small increments at any given time. Assuming that the digester feed pumps start on high level, the last digester feed valve open from the prior cycle will receive sludge first. By feeding the digesters 1-2-3 in one cycle, and digesters 3-2-1 in the second cycle, it is possible to cut the number of valve operations per pump cycle from three to two by leaving valve 3 open between pump cycles.

The rate at which each digester is fed also has an impact on the overflow system for each digester and the rate at which solids are displaced and conveyed by gravity to the emergency biosolids storage tanks. It seems that with the modification to the emergency overflow weir in each digester made by the plant staff, the two 6-inch-diameter lines (normal overflow and emergency overflow) at each digester are now available for conveyance of overflow from each digester via two 10-inch-diameter lines. This increased hydraulic capacity should be able to accommodate higher rates of overflow, but should be analyzed in detail by the predesign consultant. The budget pricing for the upgraded thickened sludge pumping system also includes 800 feet of new 8-inch-diameter ductile iron force main and three 6-inch-diameter laterals with 6-inch magnetic flow meters, to deliver thickened solids to the digesters. The goal of the new force main is to maintain optimum velocities for the maximum pumping rate needed while minimizing discharge pressures at the pump. An entirely new force main offers the greatest flexibility in maintaining current digester feed operations while new pumps are being installed and commissioned.

5.3 Anaerobic Digestion System

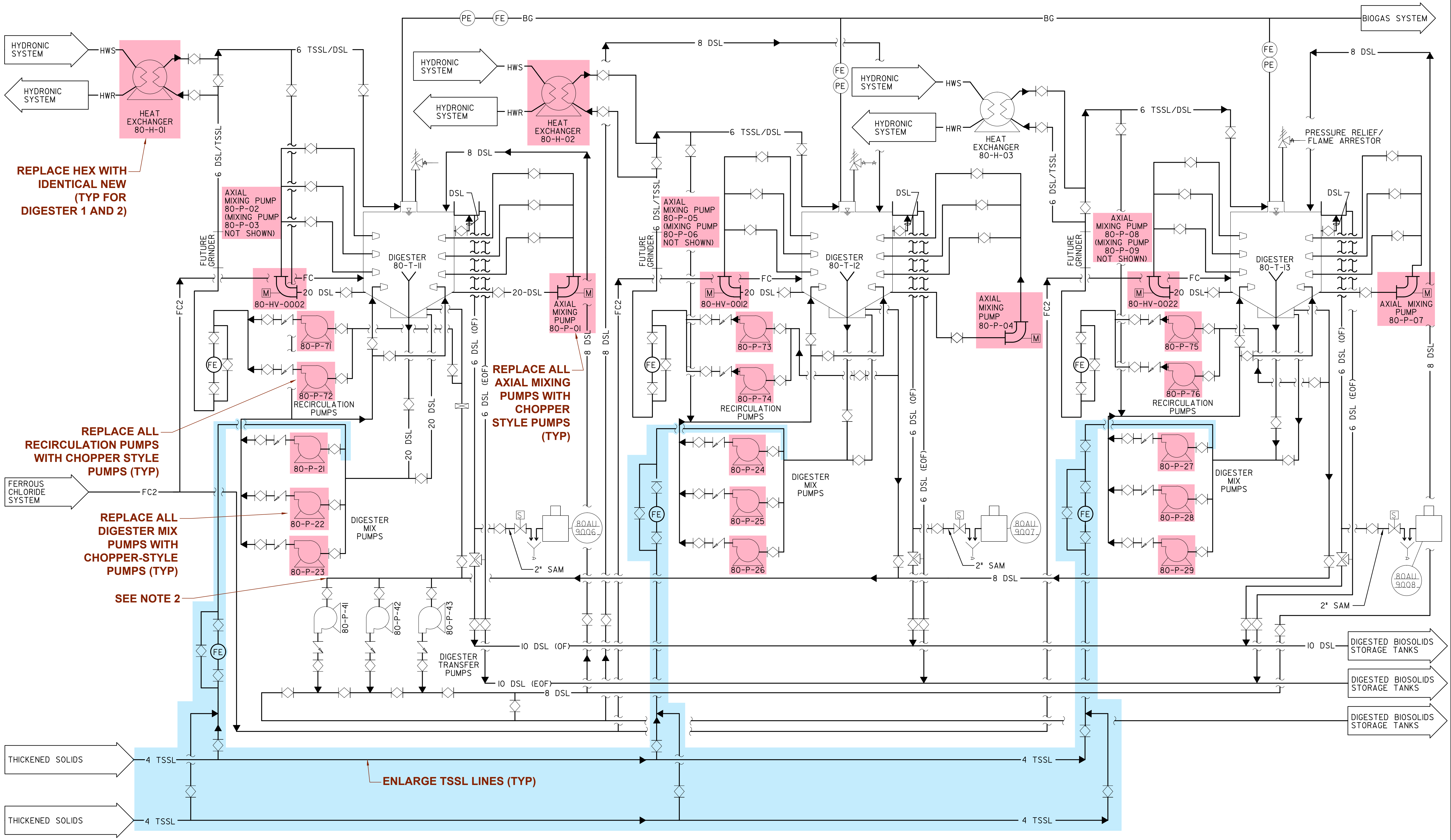
5.3.1 Existing Conditions

5.3.1.1 Existing Facilities

Process schematics for the anaerobic digester system, digester biosolids storage system and biogas system are shown in Figure 5-4, Figure 5-5, and Figure 5-6, respectively.

5.3.1.1.a Anaerobic Digesters

The anaerobic digestion system at MBC currently consists of three digesters (80T11–80T13). Each digester is a mesophilic, heated, primary, pump mixed circular, prestressed concrete digester, 105 feet in diameter with a normal operating level of 45 feet (level sensor reading shows 35-foot level, as the sensor has been installed 10 feet above the top of the cone level) and an operating capacity of 2.91 million gallons (MG). Currently MBC operates only one digester, digester 3, which has been in continuous operation for almost 8 years without cleaning. Previously digester 1 was operated continuously for 6 years. When digester 1 was cleaned after 6 years, it was found that grit deposition was reasonable and within limits of the cone, an indication of acceptable grit removal at NCWRP's grit chambers and at the MBC grit teacup removal.



LEGEND:

- NCWRP EXPANSION (PURE WATER PROGRAM) UPGRADES
- FOG ADDITION UPGRADES
- OTHER RECOMMENDED IMPROVEMENTS

NOTES:

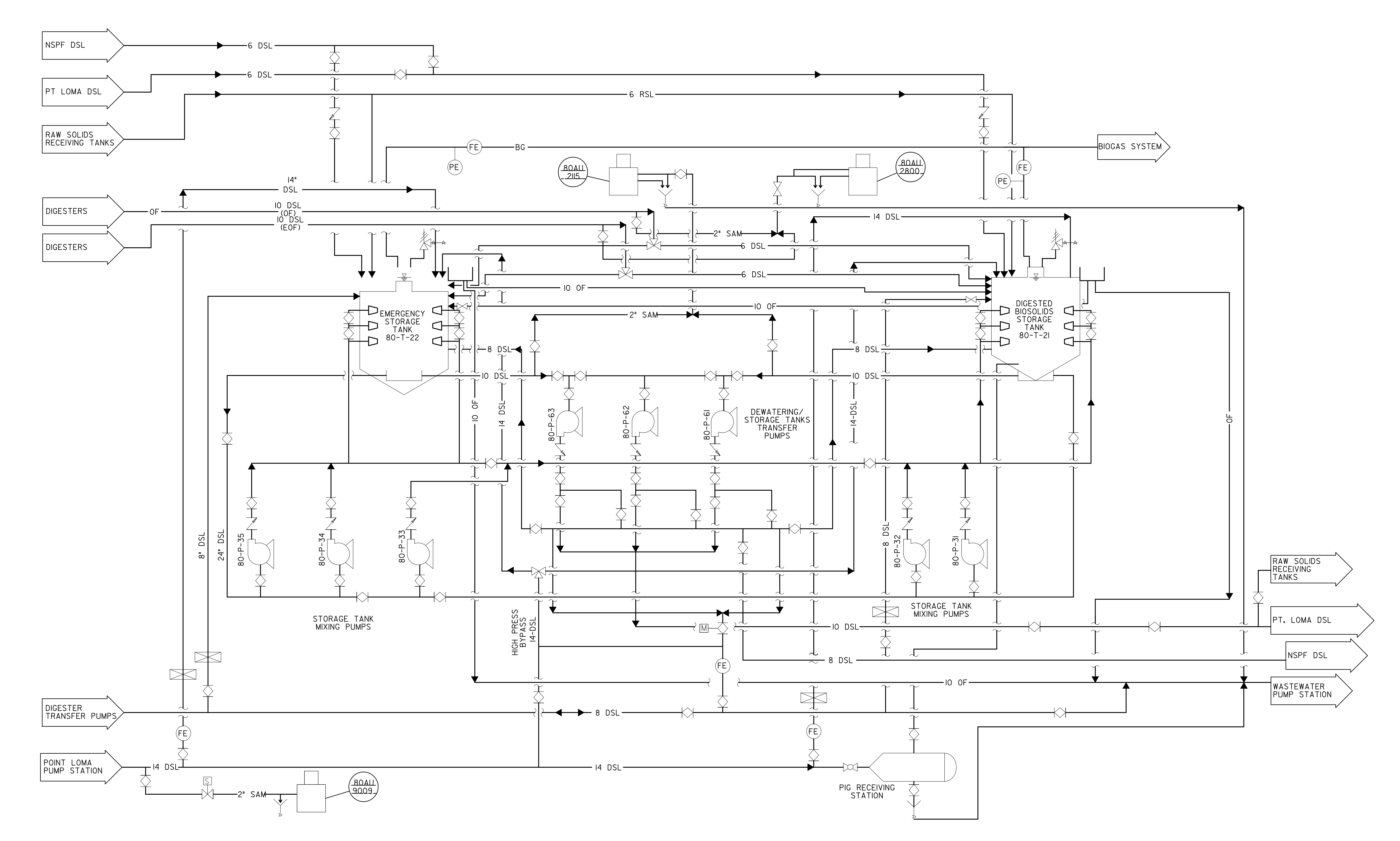
1. CONSTRUCTION OF DIGESTER NO.4 (80-T-14) WILL BE REQUIRED TO ACCOMMODATE PHASE II CONDITIONS WITH ADDITION OF FOG.
2. CROSS-CONNECT TO DIGESTER NO.4 BIOSOLIDS DRAW-OFF.
3. HYDRAULIC LOADING REPRESENTS AN NCPWF PRODUCTION OF 30 MGD. REFER TO SECTION 9 OF THIS TECHNICAL MEMORANDUM FOR FURTHER DETAILS.

MWH. Brown AND Caldwell
BLP Engineers, Inc.

IMPACTS OF NCWRP EXPANSION ON MBC

FIGURE 5-4

DIGESTER SYSTEM PROCESS SCHEMATIC



LEGEND:

NCWRP EXPANSION (PURE WATER PROGRAM) UPGRADES
FOG ADDITION UPGRADES
OTHER RECOMMENDED IMPROVEMENTS

NOTES:

1. HYDRAULIC LOADING REPRESENTS AN NCPWF PRODUCTION OF 30 MGD. REFER TO SECTION 9 OF THIS TECHNICAL MEMORANDUM FOR FURTHER DETAILS.

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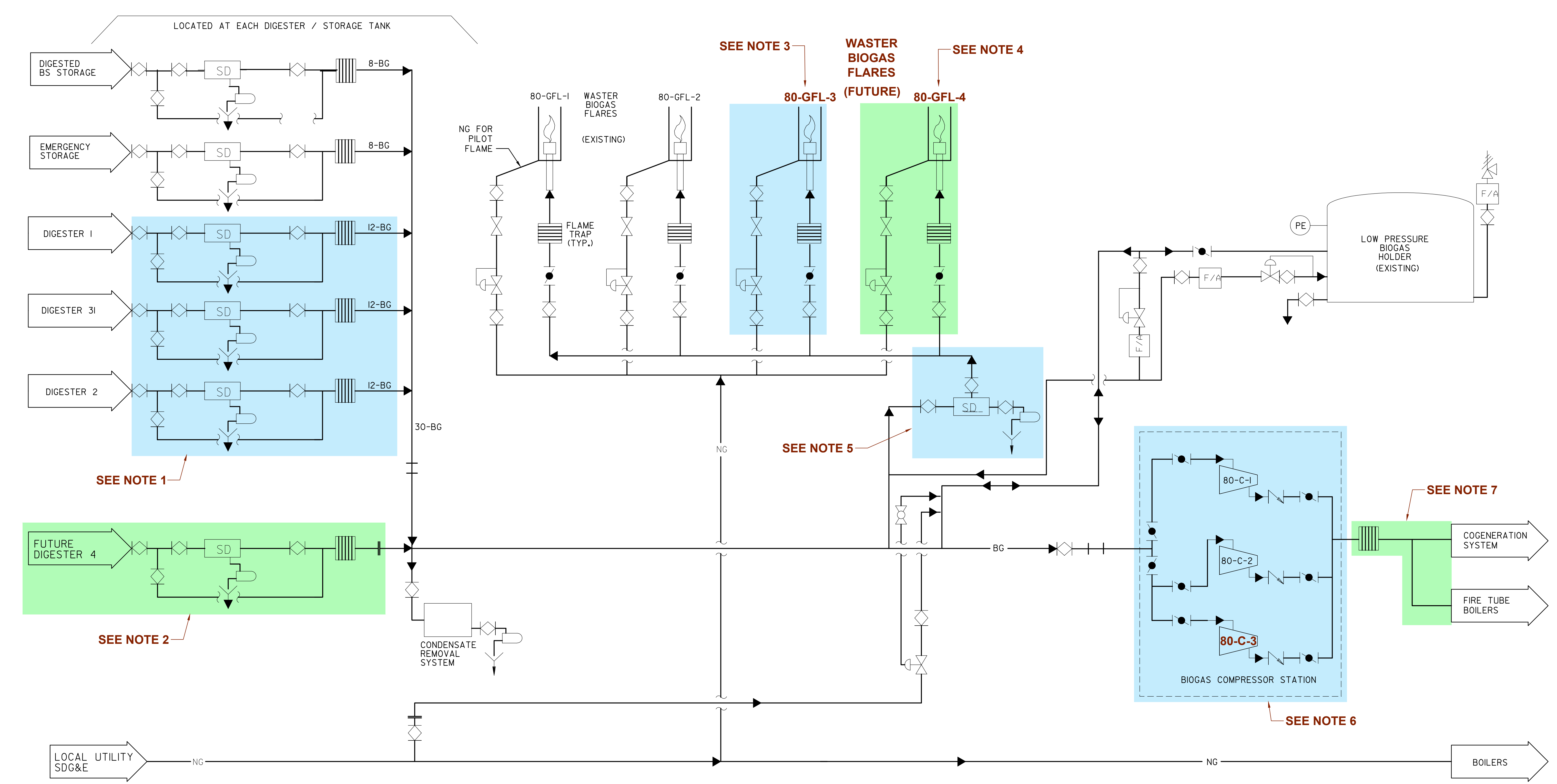
IMPACTS OF NCWRP EXPANSION ON MBC

FIGURE 5-5

DIGESTER BIOSOLIDS STORAGE SYSTEM PROCESS SCHEMATIC



LEGEND:

- NCWRP EXPANSION (PURE WATER PROGRAM) UPGRADES
- FOG ADDITION UPGRADES
- OTHER RECOMMENDED IMPROVEMENTS

NOTES:

1. ENLARGE BIOGAS LATERALS FOR EACH EXISTING DIGESTER.
2. CONSTRUCTION OF DIGESTER NO.4 WILL BE REQUIRED TO ACCOMMODATE PHASE II CONDITIONS WITH ADDITION OF FOG.
3. CONSTRUCTION OF FLARE NO.3 WILL BE REQUIRED TO ACCOMMODATE PHASE II CONDITIONS WITHOUT ADDITION OF FOG.
4. CONSTRUCTION OF FLARE NO.4 WILL BE REQUIRED TO ACCOMMODATE PHASE II CONDITIONS WITH ADDITION OF FOG.
5. ENLARGE BIOGAS LATERALS TO FLARES.
6. REPLACING OF EXISTING COMPRESSORS WITH LARGER UNITS AND ADDING AN ADDITIONAL COMPRESSOR WILL BE REQUIRED FOR PHASE II CONDITIONS.
7. ENLARGE BIOGAS HEADER TO COGENERATION FACILITY AND TO FIRE TUBE BOILERS.
8. HYDRAULIC LOADING REPRESENTS AN NCPWF PRODUCTION OF 30 MGD. REFER TO SECTION 9 OF THIS TECHNICAL MEMORANDUM FOR FURTHER DETAILS.

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BLP Engineers, Inc.

IMPACTS OF NCWRP EXPANSION ON MBC

FIGURE 5-6

BIOGAS SYSTEM PROCESS SCHEMATIC

5.3.1.1.b Biosolids Recirculation and Mixing

Each digester is provided with the following pump recirculation and mixing equipment:

- Two digester recirculation pumps (80P71–80P76)[11] take suction from the digester cone and provide recirculation of biosolids through a HEX back to the digester. One pump is normally kept in service with the other on standby mode.
- Three digester mixing pumps (80P21–80P29)[12] take suction from the digester cone and provide injection of return sludge back to the digester for mixing. Two pumps are normally kept in service with the third in standby mode.
- Three digester axial mixing pumps (80P01–80P09)[13] take suction just above the digester cone and inject biosolids back to the digester at different points for mixing. Currently all pumps are out of service because of hair clogging of the impellers and inability to isolate the pumps due to leaking isolation valves.

The original design intent was to operate one recirculation pump, two mixing pumps, and three axial mixing pumps continuously. The design allowed for two modes of operation for mixing: normal mode and "scum breakup" mode. This system was designed to provide a mixing flow of 18,150 gpm in a normal mode of operation and result in cell turnover time (CTT) of 160 minutes. Considering that all three axial mixing pumps are out of service, the actual mixing flow is 4,950 gpm, which results in a CCT of 588 minutes.

5.3.1.1.c Digester Heating

A temperature of 98 degrees Fahrenheit (°F) to 100°F is maintained in the digesters by heating recirculating biosolids in the HEXs. One HEX is provided for each digester (80H1–80H3). Each HEX is a spiral HEX, manufactured by Alfa Laval with a heat transfer capacity of 2.5 million British thermal units per hour (MMBtu/hr), hot water flow rate: 250 gpm, sludge flow rate: 550 gpm, HWS/HWR temperatures of 160°F–170°F/145°F respectively; sludge temperatures at inlet/outlet of 70°F/104°F respectively; and nominal pressure drop of 5 feet.

5.3.1.1.d Digester Feed

Thickened sludge from the thickening centrifuges wetwell is conveyed directly to the digesters[14] via a single 6-inch-diameter line and two 4-inch-diameter lines. A 4-inch-diameter branch line with an automated shutoff valve connects to the suction manifold of the mixing pumps for the digesters. Each branch line also includes a magnetic

[11] Each pump is an Aurora Model 651A centrifugal, non-clog horizontal flow pump, 550 gpm, 65-foot TDH, 1,765 rpm, constant-speed supplied with a 20 hp motor.

[12] Each pump is an Aurora Model 611A centrifugal, non-clog horizontal flow pump, 2,200 gpm, 41-foot TDH, 1,200 rpm, constant-speed supplied with a 40 hp motor.

[13] Each pump is a Lawrence Pump, Model LAOZ, size 12-by-12-by-11.9-inch centrifugal, non-clog horizontal flow pump, 4,400 gpm, 26-foot TDH, 1,775 rpm, constant-speed supplied with a 40 hp motor.

[14] The original design included facilities for screening and preheating thickened sludge prior to digester feed. Problems with plugging of the blending tank HEXs prompted operations staff to bypass the screens, HEXs, and blending tanks, and feed the digesters directly from the thickened sludge wetwell with unheated sludge. Dwight Correia pointed out that many other problems prompted bypassing the screens and the blending tanks, including unreliable operations of the screens because of the non-continuous flow from the thickened solids wetwell, unbalanced mixing flows in the blending tanks that resulted in all of the sludge being transferred to one blending tank only, undersized original digester feed pumps that tripped offline frequently (pumps were sized for static head only; no pipeline head losses were included in hydraulic calculations), and no check valve or reliable motorized valve to prevent high backflows from the digesters when the pumps tripped offline. High backflows to the low-elevation blending tanks overwhelmed the small blending tanks overflow pipes, causing spills from the blending tanks, which are located at the low point of the plant and adjacent to storm drain inlets. Plant staff have considerably reduced the level of required operator attention and maintenance labor by streamlining the system.

flow meter for tracking the sludge feed to each digester. The single digester is fed on a volumetric basis (1,000–10,000 gallons). See Section 4.2 for additional discussion on digester feed and the thickened sludge feed pumps.

5.3.1.1.e Digested Biosolids Draw-Off

Digested biosolids overflow by gravity from each in-service digester via an overflow box to one of the biosolids storage tanks (biosolids storage tank or emergency biosolids storage tank; 80T21, 80T22), where it is blended with digested sludge from PLWTP. Each storage tank is a 70-foot-diameter, 1.3 MG, prestressed concrete tank with a maximum operating level of 45 feet. One tank has been kept in service for 11 years with the other on standby mode. Five mixing pumps are provided (two-speed) for two tanks to keep solids in suspension. Each pump is a centrifugal, non-clog horizontal flow pump, 3,600 gpm/4,000 gpm capacity, 40-foot TDH, supplied with a 50 hp motor. The pumps are cross-connected and two pumps are operated for the in-service tank.

Section 5.4 discusses the current scheme for pumping blended digested sludge from the storage tanks to feed the dewatering centrifuges. The original pumps designated for feed to the centrifuges are no longer used in this capacity.[15]

5.3.1.1.f Digester Biogas System

Each digester is provided with an individual 12-inch-diameter biogas lateral connecting to a buried biogas collection header system. Each of these lateral connections includes flow and pressure monitoring, flame arrester, isolation valves, drip traps, and drain assemblies. The biogas collection headers consist of an 18-inch-diameter header (servicing digester 2) and a 30-inch-diameter header servicing digesters 1 and 3, the biosolids storage tank, and the biosolids emergency storage tank. The gas collection system is equipped with four condensate traps and two condensate collection sumps provided with sump pumps for pumping condensate to the wastewater pump station.

The biogas headers converge at the biogas holding tank and split into three transmission mains: a 30-inch-diameter header connected to the biogas holding tank, a 12-inch-diameter header supplying the biogas compressors, and an 8-inch-diameter header connected to the biogas flares.

The biogas holding tank (80GH01) is a 25,000-cubic-foot (ft^3) storage-capacity, low-pressure cylindrical steel tank with an internal water-sealed floating piston (floating cone) that rises as surplus gas is produced and falls as biogas consumption exceeds biogas production. The tank is sized to hold approximately 45 minutes of peak gas production of 550 standard cubic feet per minute (scfm). Two biogas compressors (80C01 and 80C02)[16] are provided to deliver biogas to the Fortistar cogeneration facility or to the Energy Building boilers. The latter option, provided as part of the original design, is not used anymore and all biogas is sent to the Cogeneration Facility. The boilers are used as standby units in case the Cogeneration Facility is taken out of service, and operate on natural gas only.

[15] Blended digested biosolids from the in-service biosolids storage tank could be transferred to the digesters or to the dewatering centrifuge pump feed loop using the dewatering transfer pumps (80P61–80P63). Three dewatering transfer pumps are provided at MBC. Each is a centrifugal, chopper pump, Vaughan, Model HE4P6CS-114, 810 gpm, 97-foot TDH, 1,750 rpm, supplied with a 50 hp constant-speed motor. Design intent was to operate these pumps in a lead/lag/standby mode to maintain a set point pressure and flow rate through the dewatering centrifuge feed loop. Currently, these pumps are not used for transferring biosolids to the dewatering centrifuge feed loop and used only rarely to transfer biosolids between the storage tanks.

[16] Each biogas compressor is a Hoffman multistage centrifugal blower, Model 4207A3 rated for 300 scfm capacity at 5 psig static pressure, 3,600 rpm, with 6-inch discharge/12-inch suction connections, and equipped with a 20 hp motor. A 6-inch discharge header from the compressors is further connected to an 8-inch header leading to the Fortistar cogeneration facility and to the Energy Building.

Two biogas flares (80GFL01 and 80GFL02)[17] are provided. The flares are used to burn unused biogas, if necessary, and routinely run for maintenance testing.

5.3.1.1.g Digester Chemical Addition System

Ferrous chloride is added to digester 3 to control sulfide formation. For a detailed description of the $FeCl_2$ addition system, see Section 5.7.

5.3.1.2 Current Operating Parameters and Performance

Table 5-9 summarizes the existing design and current capacity-related operating parameters for major equipment components and performance characteristics of the digester system. As shown in Table 5-9, current digester facilities are generally adequate to handle current flows and loads with the exception of digester mixing. Based on our analysis of the existing conditions, in-service digester 3 does not satisfy design and industry-recognized mixing criteria. At minimum, the existing axial mixing pump isolation valves on digester 3 need to be refurbished and the axial mixing pumps need to be placed back in operation to ensure proper mixing in the digester (new isolation valves have been already installed on digesters 1 and 2). Our recommendation is to replace the existing recirculation, mixing, and axial mixing pumps on all existing digesters with the chopper-style pumps. In addition, we recommend to replace spiral HEXs on digesters 1 and 2 with new units. These recommendations are reflected in our OPC as “other recommended improvements.”

5.3.2 Projected Conditions: Phase I (15 mgd production at NCPWF) and Phase II (30 mgd production at NCPWF) without FOG and/or Lystek

5.3.2.1 Summary

Projected NCWRP biosolids flows and loads for different operating scenarios have been analyzed based on the mass balance data discussed in Section 4.1. The results of the modeling for Phase I (15 mgd production at NCPWF) and Phase II (30 mgd production at NCPWF) are summarized in the tables included in Appendices B and C. Scenario A.1 is the worst-case scenario from the standpoint of impacts on the capacity of the anaerobic digestion facilities, without consideration of potential addition to digesters of FOG or implementation of the Lystek process (low-temperature biosolids hydrolysis process to increase biogas production in the digesters) currently considered by the City (refer to (39) *and* Section 5.3.3 below). Tables 5-5 and 5-5 show that the anaerobic digestion facilities will have to process a five-fold increase in flows and loads. In accordance with industry standard anaerobic digester sizing practice described in references (29), (30), and (31), projected peak flows and loads have been calculated based on 14-day hydraulic and solids loading peaking factors described in Section 4. As directed by the City, MBC digesters will not be used in the future for wet weather storage or for NCPWF off-spec water diversion considering digester capacity limitations at MBC.

Table 5-10 summarizes the existing system design criteria and projected operating conditions without FOG addition or implementation of Lystek process. The cells in the table with numbers shown in bold represent conditions where projected conditions will approach or exceed the assumed process design criteria or estimated firm capacity. Table 5-10 shows that the existing system is adequate to handle the projected flows and loads with one digester out of service under Phase I operating conditions.

[17] Each biogas flare is a Flare Industries, 72-foot-by-24-inch EGF flare, 420–550 scfm capacity, 1,400°F temperature, 450–650 British thermal units (Btu)/ft^3 heat content, 11.34–21.45 MMBtu/hr heat loading.

Under Phase II operating conditions, the existing system is adequate to handle the projected flows and loads with all digesters in service, but will require a temporary, partial bypass of flows to PLWTP under maximum flows/loadings if one digester is taken out of service. The portion of the NCWRP biosolids flow that needs to be temporarily bypassed to PLWTP is shown in Table 5-10 and it could reach 13.8% of NCWRP biosolids flow under Phase II maximum loading conditions. Based on our calculations using the mass balance model developed by BC, this increase in the MER at PLWTP from 7,790 mt/yr to 8,241 mt/yr is still below the MER limit of 9,942 mt/yr established by the current permit (46).

Assuming there is a system to track any unused capacity in the MER, this short-term strategy would allow the City to handle the projected loads with its existing digesters and avoid substantial capital expenditures associated with building an additional digester. To accommodate such high loading conditions, all axial mixing pumps should be refurbished and placed back in service to maintain proper mixing in the digesters (the isolation valves for digester 1 and 2 pumps have already been replaced, so the pumps could be isolated and serviced; when digester 3 is taken out of service all of its valves will be replaced so that in the future the axial mix pumps can be isolated and repaired when needed).

A stress test of the digester system must be conducted to analyze the system's ability to respond to fairly high loads. The predesign consultant should be required to develop a stress test protocol and conduct a test that should include holding a portion of biosolids load within NCWRP and in the raw-solids-receiving tanks to develop an inventory necessary for the stress test. The predesign consultant should be required to evaluate whether the digester stress test is possible to accomplish until multiple digesters are in service. The biogas conveyance headers appear to be adequate to handle Phase I and Phase II flows/loads. However, digester biogas laterals, biogas compressors, and biogas flares will need to be upsized (biogas lateral should be upsized at Phase I).

Biogas production numbers shown in Table 5-10 are slightly higher than biogas production values shown in the FOG Project Draft TM (39) (for example, there are 1,084,000 standard cubic feet per day [scfd] vs. 944,000 scfd under annual average conditions) because data in (39) were calculated under lower NCWRP flows and biosolids production and assuming substantially lower VSS reduction rates than historically observed at MBC.

As pointed out by City staff, taking one digester out of service for cleaning or repairs has historically been a lengthy process at MBC because of procurement logistics within the City. Although industry-wide it is possible to expedite digester cleaning in 4 to 6 months, City staff have indicated that digester cleaning may take up to 18 months.

Table 5-9: Anaerobic Digestion System - System Design Criteria and Current Operating Conditions for the Existing System							
Parameter	**Unit of Measure**	**System Design Capacity (1)(2)**		**Estimated Firm Capacity**	**Current Operating Conditions(8)**		**Comments**
		Avg.	**Max.**		**Avg.**	**Max.**	
Digester Feed Rate							
All units in-service(3)	MGD	0.27	0.41	0.49			
One unit out of service(4)	MGD	0.18	0.27	0.39			
Two units out of service(4)	MGD			0.19	0.08	0.12	System is adequate to handle current loads
Volume of In-Service Digesters(13)							
All units in-service	MGALS	8.73	8.73	8.73			
One unit out of service	MGALS	5.82	5.82	5.82			
Two units out of service	MGALS	2.91	2.91	2.91	2.91	2.91	System is adequate to handle current loads
VSS Feed Rate(5)							Peaks of digester feed and solids loading occur at different times
All units in-service (5)	LB VSS/D			175,067			
One unit out of service (6)	LB VSS/D	51,116	76,674	140,053			
Two units out of service(6)	LB VSS/D			70,027	30,000	43,269	System is adequate to handle current loads
VSS Rereduction Rate(7)(8)	%	50	50	52	62.7	62.7	System is adequate to handle current loads
Biosolids Recirculation Capacity (each digester)(9)	GPM	550	550	495	550	550	2 pumps in-service System is adequate to handle current loads
Biosolids Mixing Capacity (each digester)(9)	GPM	4,400	4,400	3,960	4,400	4,400	2 pumps in-service System is adequate to handle current loads
Axial Mixing Capacity (each digester)(9)(12)	GPM	13,250	13,250	11,925	0	0	Pumps are currently out of service System is adequate to handle current loads with refurbishement of existing pumps
Total Digester Mixing Capacity (each digester)(9)	GPM	18,150	18,150	16,380	4,950	4,950	Axial mixing pumps are currently out of service System is adequate to handle current loads with refurbishement of existing pumps
Cell Turnover Time (each digester)	MIN	160	160	178	588	588	System is adequate to handle current loads with refurbishement of existing pumps
Heat Exchanger Capacity(14)	MMBTU/HR	2.50	2.50	2.50	2.50	2.50	System is adequate to handle current loads
Capacity of Biosolids Storage and Emergency Biosolids Storage Tanks(10)	MGALS	1.30	1.30	1.17	1.30	1.30	System is adequate to handle current loads

Table 5-9: Anaerobic Digestion System - System Design Criteria and Current Operating Conditions for the Existing System							
Parameter	Unit of Measure	System Design Capacity (1)(2)		Estimated Firm Capacity	Current Operating Conditions(8)		Comments
		Avg.	Max.		Avg.	Max.	
Biogas Production(11)	CFD	387,370	575,056	1,365,521	245,520(8)- 283,637(10)	283,637	System is adequate to handle current loads
Biogas Production Rate	CF/LB VSS DESTR	15	15	15	13.1(7) -15.1(8)	10.5(7)	System is adequate to handle current loads
Biogas Holding Tank	CF	25,000	25,000	25,000	25,000	25,000	System is adequate to handle current loads
Biogas Compressors(10)	SCFM	300	300	270	171	197	System is adequate to handle current loads
Biogas Flares(12)	SCFM	1,100	1,100	990	1,100	1,100	System is adequate to handle current loads

(1) Reference X

(2) Design hydraulic and solids peaking factors of 1.5

(3) Firm capacity is calculated based on 18-day HRT with all units in-service

(4) Firm capacity is calculated based on 15-day HRT with one unit out of service

(5) Firm capacity is calculated based on 0.15 lbs VSS/D-CF loading

(6) Firm capacity is calculated based on 0.18 lbs VSS/D-CF loading

(7) Based 0n 2013-2014 plant data; tow digesters out of service

(8) Based on PUD Operations Optimization Study TMS (References 39 and 44)

(9) Firm capacity of existing equipment is assumed at 90% of nominal capacity

(10) 1 unit is out of service

(11) Firm capacity is calculated based on 15 cf/lb VSS DEST and 52% VSS Digester VSS Reduction Rate

(12) All units in-service

(13) Based on digester cleaning history and recorded low grit deposition limited to the cone, digester firm capacity is assumed to be 100% of cylindrical active volume

(14) Based on heat exchanger cleaning history, its firm capacity is assumed to be 100% of nominal capacity

Table 5-10: Anaerobic Digestion Facilities - Existing System Design Criteria and Projected Operating Conditions for the Anaerobic Digestion System (without FOG and/or Lystek)									
Parameter	**Unit of Measure**	**System Design Capacity (1)**		**Estimated Firm Capacity(1)(2)**	**Phase I Operating Conditions(3)(4)**		**Phase II Operating Conditions(3)(4)**		**Comments**
		Avg.	**Max.**		**Avg.**	**Max.**	**Avg.**	**Max.**	
Volumetric VSS Loading									
All units in-service	LB VSS/CF-D			0.15	0.07	0.08	0.11	0.12	System is adequate for Phase I and Phase II loads.
One unit out of service	LB VSS/CF-D	0.07	0.10	0.18	0.11	0.12	0.16	**0.18**	At maximim loading condition, the digesters are just at borderline of the estimated VSS loading. All axial mixing pumps are required to be operated, digester stress activities to be conducted, or partial bypass to PLWTP to be established.
Detention Time(2)									
All units in-service	DAYS			18	34	30	22	20	System is adequate for Phase I and Phase II loads.
One unit out of service	DAYS	32	22	15	22	20	**15**	**13**	15 days is a minimum Hrt allowed by 40 CFR, Part 503 Regulations. All axial mixing pumps are required to be operated, digester stress activities to be conducted, and temporary bypass of system to PLWTP is required to accommodate taking one digester out of service.
Percent of Flow to be Bypassed to Meet Firm Capacity Criteria									
All units in-service	%				0	0	0	0	Bypass is not required.
One unit out of service	%				0	0	0	**13.8**	Bypass is required for Phase II maximum loading conditions.
Biogas Production(1)(2)(5)	CFD	383,370	575,056	1,365,521	764,749	864,166	1,080,127	1,220,543	System is adequate for Phase I loads and for Phase II loads. digester biogas laterals need to be upsized(8).
Biogas Conveyance/Handling(1)(2)(5)	CFD	1,100,155	1,650,233	1,650,233	764,749	864,166	1,080,127	1,220,543	System is adequate for Phase I and Phase II loads.
Short-term Peak(6)	CFD			1,650,233	**1,911,871**	**2,160,415**	**2,700,317**	**3,051,359**	System is in adequate for Phase I and Phase II loads, and inadequate to handle short term peaks. digester biogas laterals need to be upsized(8).
Flare Peak(7)	CFD			1,584,000	1,147,123	1,296,249	**1,620,190**	**1,830,815**	System is adequate for Phase I and borderline for Phase II with two flares in service. For Phase II maximum condition, additional flares and upsizing of biogas header to flares should be considered(8).

(1) Reference 19

(2) Refer to Table 5-9

(3) Refer to Tables B.1 and C.1

(4) Maximum system capacity is based on a peak 2-week hydraulic and VSS loading factors of 1.11 and 1.13, respectively

(5) Biogas production calculated at 15CF/LB VSS DESTR at 52% VSS reduction in digesters and at 10CF/LB VSS DESTR at 52% reduction in biosolids storage tanks

(6) Calculated at 2.5 short term peaking factor (Brown and Caldwell Design Guidelines)

(7) Calculated at 1.5 flare peaking factor (Brown and Caldwell Design Guidelines)

(8) Reference 39 (PUD Operations Optimization Study)

BOLD FONT indicates that operating conditions are borderline or exceed assumed design criteria or firm capacity.

In addition, having no standby digester would put substantially higher pressure on the O&M staff and would not allow the City to use the standby digester in a strategy of indirect diversion of NCPWF's off-spec water as described in (42). Table 5-11 summarizes the general pros and cons of adding an additional digester.

Table 5-11: Advantages and Disadvantages of Adding a Digester at MBC at Phase II Operating Conditions without Addition of FOG and/or Lystek Process

Advantages	Disadvantages
Additional reliability of digester operation by having one standby digester	High capital cost for construction of an additional digester with auxiliary equipment and piping
Reserve capacity at MBC for NCPWF off-spec water diversion	
Less operational attention and control required over the digester process	
Easier digester cleaning scheduling and maintenance procedures	

Based on the above pros and cons, the City should consider reaching consensus among engineering, planning, and O&M staff, which may result in selecting the more conservative and safer approach of building an additional digester and eliminating concerns cited above.

Operating digesters at the elevated organic loads outlined above in Table 5-10 for conditions without FOG and Lystek and further in the text may require substantial modification of the digester mixing system for the existing and future required digesters. These modifications are not necessarily required at this stage of evaluation but should be considered during predesign and final design efforts.

The current standard of a good digester mixing design has a nameplate mixing power of about 0.25 hp/ 1,000 ft^3 and input power of about 0.16 hp/1,000 ft^3—this is about 100 hp nameplate and 60 hp input for a digester of this size. These designs have about a 20- to 30-minute turnover rate of the digesters. In practice, these systems are often rotated so that the in-service operating turnover rate is around 60 minutes. These designs are gas mixing or draft tubes, where most of the input energy is imparted on the sludge (very little line losses).

This mixing horsepower/volume input level cannot be applied directly to pumped mixing where there is a lot of suction and discharge piping and nozzles that use up a significant amount of the input energy—this is the case for the MBC digesters. Drawings show significant piping and 6-inch nozzles. Suction is from multiple points in the cone bottom and discharge is radial at various points and elevations along the sidewall. We believe that the layout of suction and discharge is good and with proper mixing input will provide good mixing. However, the energy used will provide significantly more efficient cell turnover if one of the known packaged systems is implemented. Jet mixing manufacturers (such as Vaughan) argue that much of the pumped mixing energy goes into high-velocity jets that impart good mixing. This is partially true, but not a sufficient argument for less turnover.

Based on our evaluation, existing digesters have 280 hp per digester connected, 220 of which is from "duty" pumps. This represents 0.72 hp/1,000 ft^3 connected and 0.57 hp/1,000 ft^3 duty. Currently, only 100 hp is running because of clogged pumps. If all mixing pumps were running, CTT would be 139 minutes, and if duty pumps were running, CTT would be 160 minutes. Based on current pumps operating, CTT is 588 minutes (9.8 hours). Based on energy input there should be enough mixing energy, but the CTTs are low and the current situation with 588 minutes of CTT should be considered less than optimum to sustain required organic loads of 0.15 lb or even 0.18 lb VSS per day per cubic foot (cfd) of active digester volume.

Predesign and final design consultants should consider digester stress testing, developing a stress test protocol considering that a portion of NCWRP should be held at NCWRP and in the raw-solids-receiving tanks as indicated above, and evaluating the opportunity to modify the digester mixing systems.

City staff have pointed out to the project team that under certain conditions, MBC occasionally needs to process stored flows at twice those under average conditions. In advocating for a 2:1 peaking factor, City staff are accounting for unusual circumstances because of construction or maintenance activities, or emergencies (based on anecdotal history). Section 3.2.2 provides a discussion of different ways of managing such unusually high peaking conditions.

5.3.2.2 Required Equipment Improvements

Figures 5-4 and 5-6 present required or recommended improvements to the digester and biogas systems and identify specific improvements related to the NCWRP expansion (Pure Water Program), FOG addition, and other recommended improvements focused on improving process reliability and performance.

Table 5-12 and Table 5-13, respectively, show the projected operating conditions and improvements without FOG addition or Lystek under Phase I and Phase II, respectively. It is shown that construction of a new digester will not be required to accommodate projected Phase I or Phase II conditions, as described above. Axial mixing pump isolation valves of digester 3 (this work has already been completed for digesters 1 and 2) will need to be refurbished, and the pumps will need to be refurbished and placed back in service.

However, the following improvements will need to be implemented:

- Upsize digester gas laterals and the digester-handling equipment associated with these laterals, as outlined in (39)
- Upsize digester feed lines and modifying digester feed strategies (see Section 4.2)
- Replace existing two biogas compressors with two (for Phase I) and three (for Phase II) larger centrifugal biogas compressors
- Upsize biogas laterals from the biogas compressors, and the biogas header to the cogeneration facility, or provide a new, enlarged header to new cogeneration facility that is planned to be constructed by the City
- Add one additional biogas flare for Phase II conditions, and upsize the header to flares

Under the “no FOG/no Lystek” case, it appears that no modifications to the biogas headers will be required between the digesters and the biogas holding tank. Biogas holding tank capacity will decrease to 29 minutes (from current 45 minutes) at Phase II maximum loadings, which appears to be adequate considering that gas production is expected to become more stable because of more consistent digester feed.

Consideration should be given to replacing all aged recirculation, mixing, and axial mixing pumps for three existing digesters with new Vaughan chopper pumps or equals to enhance biosolids mixing system performance and reliability, and to replacing spiral HEXs on digesters 1 and 2 with new units. However, these modifications are not absolutely required at this time, and should be seen as part of required routine maintenance/repair activities.

The capacity of the overflow pipes should be analyzed in detail by the predesign consultant. It seems that with the modification to the emergency overflow weir made by plant staff, two 6-inch-diameter lines (normal overflow and emergency overflow) are now available for conveyance of overflow from each digester via two 10-inch-diameter lines.

Table 5-12: Anaerobic Digestion Facilities - Phase I Projected Equipment Improvements and Phase I Operating Conditions (no FOG and/or Lystek)												
Equipment Subsystem	Unit of Measure	Phase I Improvements								Phase I Operating Conditions		Capacity Assessment
		Number of Units				Capacity			Summary of Improvements			
		Status	Total	Duty	Standby	Unit Capacity	Rated Capacity	Firm Capacity		Avg.	Max.	
Anaerobic Digesters[(2)(3)]	MGALS	Existing	3	2	1	2.91	8.73	5.82				
		New	0	0	0							New digesters are not required
TOTAL	**MGALS**		**3**	**2**	**1**			**5.82**		4.68	5.19	Firm capacity > Phase I max required based on 18-day HRT
Biosolids Recirculation Pumps (each digester)[(1)]	gpm	Existing	2	1	1	550	1,100	495				
		New	0	0	0							New pumps are not required
TOTAL	**gpm**		**2**	**1**	**1**			**495**		550	550	Firm capacity close to Phase I max
Biosolids Mixing Pumps (each digester)[(1)]	gpm	Existing	3	2	1	2200	4,400	3,960				
	gpm	New	0	0	0							New pumps are not required
TOTAL	**gpm**		**3**	**2**	**1**			**3,960**		4,400	4,400	Firm capacity close to Phase I max
Biosolids Axial Mixing Pumps (each digester)[(1)]	gpm	Existing	3	3	0	4400	13,200	11,880	Replace isolation valves, refurbish and place pumps back in service			
	gpm	New	0	0	0							New pumps are not required
TOTAL	**gpm**		**3**	**3**	**0**			**11,880**		13,200	13,200	Firm capacity close to Phase I max
Digester Heat Exchangers (each digester)[(1)]	MMBTU	Existing	1	1	0	2.5	3	2.5				
	MMBTU	New	0	0	0							New heat exchangers are not required
TOTAL	**MMBTU**		**1**	**1**	**0**			**2.5**		2.5	2.5	Firm capacity close to Phase I max
Biosolids Storage and Emergency Biosolids Storage Tanks	MGALS	Existing	2	1	1	1.3	2.6	1.3				
	MGALS	New	0	0	0							New biosolids storage tanks are not required
TOTAL	**MGALS**		**2**	**1**	**1**			**1.3**		1.3	1.3	Firm capacity close to Phase I max

Table 5-12: Anaerobic Digestion Facilities - Phase I Projected Equipment Improvements and Phase I Operating Conditions (no FOG and/or Lystek)

Equipment Subsystem	Unit of Measure	Phase I Improvements								Phase I Operating Conditions		Capacity Assessment
		Number of Units				Capacity			Summary of Improvements			
		Status	Total	Duty	Standby	Unit Capacity	Rated Capacity	Firm Capacity		Avg.	Max.	
Biosolids Storage Tank Mixing Pumps (each tank)[(1)]	gpm	Existing	3	2	1	3600/4000	10,800/12,000	6,480/7,200				Five pumps are provided for two tanks, two pumps per each tank with a swing standby pump
	gpm	New	0	0	0							New pumps are not required
TOTAL	**gpm**		**3**	**2**	**1**			**6,480/7,200**		7,200	8,000	Firm capacity close to Phase I max
Biosolids Transfer Pumps[(1)]	gpm	Existing	3	2	1	750	2,250	1,350				See Note (4)
	gpm	NEW	0	0	0							New pumps are not required
TOTAL	**gpm**		**3**	**2**	**1**			**1,350**		1,500	1,500	Firm capacity close to Phase I max
Biogas Holding Tank[(1)]	CFD	Existing	1	1	0	25,000	25,000	22,500				
	CFD	New	0	0	0							New biogas holding tanks are not required
TOTAL	**CFD**		**1**	**1**	**0**			**22,500**		25,000	25,000	Firm capacity close to Phase I max
Biogas Compressors[(1)]	SCFM	Existing	2	1	1	300	600	270	Remove existing compressors			
	SCFM	New	2	1	1	600	1,200	600	Replace with new, larger units			New biogas compressors are required
TOTAL	**SCFM**		**2**	**1**	**0**	**600**	**1,200**	**600**		531	600	Firm capacity close to Phase I max
Biogas Flares[(1)]	SCFM	Existing	2	2	0	550	1,100	1,100				
	SCFM	New	0	0	0							New biogas flares are not required
TOTAL	**SCFM**		**2**	**2**	**0**			**1,100**		797	900	

(1) firm capacity is assumed at 90% of nominal capacity

(2) Required detention time is calculated at 18-day HRT

(3) One digester is on standby mode

(4) Pumps are rarely used to transfer biosolids between digesters

Table 5-13: Anaerobic Digestion Facilities - Phase II Projected Equipment Improvements and Phase II Operating Conditions (no FOG and/or Lystek)												
Equipment Subsystem	Unit of Measure	Phase II Improvements								Phase II Operating Conditions		Capacity Assessment
		Number of Units				Capacity			Summary of Improvements			
		Status	Total	Duty	Standby	Unit Capacity	Rated Capacity	Firm Capacity		AVG	MAX	
Anaerobic Digesters[1][2]	MGALS	Existing	3	2	1	2.91	8.73	5.82				
		New	0	0	0							New digesters are not required.
TOTAL	**MGALS**	**Modified**	**3**	**3**	**0**			**8.73**	Three digesters to be kept in-service most of the time. If one digester is taken out of service, bypass of NCWRP biosolids flow to PLWTP is required at maximum flow condition and maybe required at average condition.	7.02	7.79	Firm capacity > Phase II max required based on 18-day HRT with all units in-service.
Biosolids Recirculation Pumps (each digester)[1]	gpm	Existing	2	1	1	550	1,100	495				
		New	0	0	0							New pumps are not required.
TOTAL (each digester)	**gpm**		**2**	**1**	**1**			**495**		550	550	Firm capacity close to Phase II max.
Biosolids Mixing Pumps (each digester)[1]	gpm	Existing	3	2	1	2200	6,600	3,960				
	gpm	**New**	**0**	**0**	**0**							New pumps are not required.
TOTAL (each digester)	**gpm**	**Modified**	**3**	**2**	**1**			**3,960**		4,400	4,400	Firm capacity close to Phase II max.
Biosolids Axial Mixing Pumps (each digester)[1]	gpm	Existing	3	3	0	4400	13,200	11,880	Replace isolation valves, refurbish and place pumps back in service.			New pumps are not required.
	gpm	**New**										
TOTAL	**gpm**		**3**	**3**	**0**			**11880**		13,200	13,200	Firm capacity close to Phase II max.
Digester Heat Exchangers (each digester)[1]	MMBTU	Existing	**1**	**1**	**0**	**2.5**	**2.5**	**2.5**				
	MMBTU	**New**	0	0	0							New heat exchangers are not required
TOTAL	MMBTU		**1**	**1**	**0**			**2.5**		2.5	2.5	Firm capacity close to Phase II max.
Biosolids Storage and Emergency Biosolids Storage Tanks[1]	MGALS	Existing	**2**	**1**	**1**	**1.3**	**1.3**	**1.3**				
	MGALS	**New**	0	0	0							New biosolids storage tanks are not required.
TOTAL	MGALS		**2**	**1**	**1**			**1.3**		1.3	1.3	

Table 5-13: Anaerobic Digestion Facilities - Phase II Projected Equipment Improvements and Phase II Operating Conditions (no FOG and/or Lystek)												
Equipment Subsystem	Unit of Measure	Phase II Improvements								Phase II Operating Conditions		Capacity Assessment
		Number of Units				Capacity			Summary of Improvements			
		Status	Total	Duty	Standby	Unit Capacity	Rated Capacity	Firm Capacity		AVG	MAX	
Biosolids Storage Tank Mixing Pumps (each tank)(1)	gpm	Existing	3	2	1	3600/4000	10,800/12,000	6,480/7,200				5 PUMPS ARE PROVIDED FOR TWO TANKS, TWO PUMPS PER EACH TANK WITH A SWING STANDBY PUMP.
	gpm	**New**	**0**	**0**	**0**							New pumps are not required.
TOTAL	**gpm**		**3**	**2**	**1**			**6,480/7,200**		7,200	8,000	Firm capacity close to Phase II max.
Biosolids Transfer Pumps(1)	gpm	Existing	3	2	1	750	2,250	1,350				Note(3)
	gpm	**New**	**0**	**0**	**0**							New pumps are not required.
TOTAL	**gpm**		**3**	**2**	**1**			**1,350**		1,500	1,500	Firm capacity close to Phase II max.
Biogas Holding Tank(1)	CFD	Existing	**1**	**1**	**0**	**25,000**	**25,000**	**22,500**				
	CFD	**New**	0	0	0							New biogas holding tanks are not required.
TOTAL	CFD		**1**	**1**	**0**			**22,500**		25,000	25,000	
Biogas Compressors(1)	SCFM	Existing	**2**	**1**	**0**	**300**	600	**270**	Remove existing compressors and replace with larger units.			
	SCFM	**New**	3	2	1	600	1,800	1,200	Install three new compressors.			Provide new biogas compressors and biogas main to cogeneration facility.
TOTAL	SCFM		**3**	**2**	**1**	**600**	1,800	**1,200**		750	848	
Biogas Flares(1)	SCFM	Existing	**2**	**2**	**0**	**550**	1,100	1,100				
	SCFM	**New**	**1**	**1**	**0**	**550**	**550**	**550**	Provide one additional flare of the same size as existing units.			Add one new biogas flare.
TOTAL	SCFM		**3**	**3**	**0**	**550**	**1,650**	**1,650**		1125	1271	

(1) Firm capacity is assumed at 90% of nominal capacity

(2) Required detention time is calculated at 18-day HRT

(3) Pumps are rarely used to transfer biosolids between digesters

The additional biogas flares will be tied into the emergency power supply.

Construction of these improvements will require engineering design and preparation of construction documents including design drawings and specifications, with exception of recommended replacement of existing (digesters 1, 2, and 3) digester recirculation, mixing, and axial mixing pumps with chopper-style pumps, and replacing existing HEXs for digesters 1 and 2.

5.3.3 Projected Conditions: Phase I (15 mgd production at NCPWF) and Phase II (30 mgd production at NCPWF) with FOG and Lystek

5.3.3.1 Summary

As described in (39), the proposed FOG receiving station could include two 350 gpm capacity rock/sediment traps, two 3 hp in-line grinders, two 300–350 gpm FOG unloading pumps, one 300 gpm FOG recirculation pump (two pumps will be added for further expansion), one 750 MMBtu/hr HEX (two HEXs could be added for future expansion), one 40,000-gallon FOG storage tank (two additional tanks could be added for further expansion), one 5 hp storage tank mixer (two additional mixers will be added for further expansion), two 2–20 gpm digester feed pumps (one additional pump could be added for further expansion), and potentially a future OCS. The facility is proposed to be located at the intersection of Plant Roads “C” and “D” at the northeast corner of MBC and immediately northwest from the parking lot, occupying an approximately 61-by-55-foot space next to the Miramar Landfill.

As reported in (39), the City is considering adding the Lystek process to treat biosolids, which could increase digester gas production by approximately 25%. Lystek is a new, low-temperature hydrolysis process owned by R.W. Tomlinson, Ltd. The potential option of implementation of this new, embryonic technology of biosolids treatment was considered in (39) and in this analysis.

Projected NCWRP biosolids flows and loads for different operating scenarios have been analyzed based on the mass balance data discussed in Section 3.1. The results of the modeling for Phase I (15 mgd production at NCPWF) and Phase II (30 mgd production at NCPWF) are summarized in the tables included in Appendices B and C. FOG addition and/or Lystek process implementation, as defined in (39), is considered in this section. For the tables pertaining to FOG addition and Lystek, refer to the tables in Appendix B and Appendix C for scenarios B.1, B.2, C.1, and C.2 for Phase I and Phase II conditions; scenarios B.1 and C.1 serve as the worst-case scenarios. As shown in Appendix C, Tables C5 and C6 the anaerobic digestion facilities will have to process substantially increased flows and loads. In accordance with industry standard practice for sizing anaerobic digesters (29), projected peak flows and loads have been calculated based on the 14-day hydraulic and solids loading peaking factors described in Section 3.1.

Table 5-14 summarizes the existing system design criteria and projected operating conditions with FOG addition and implementation of the Lystek process. The cells in the table with numbers shown in bold represent conditions where projected conditions will approach or exceed the assumed process design criteria or estimated firm capacity. As evident from Table 5-14, the existing system is adequate to handle the projected flows and loads for Phase I conditions while one digester is out of service. For Phase II conditions, the system is only marginally able to handle maximum projected flows/loads with all digesters in service, and it is inadequate if one digester is taken out of service under either average or maximum flow/loads.

Decommissioning a digester (for cleaning or maintenance/repairs) will require a temporary, partial bypass of flows to PLWTP under Phase II average or maximum flows/loadings. Table 5-13 shows that a significant portion of the NCWRP biosolids flow needs to be temporarily bypassed to PLWTP (13.3% and 21.2% of NCWRP biosolids flow under Phase II average and maximum flows, respectively). Predesign and final design consultants should further evaluate the NCWRP biosolids diversion infrastructure, PLWTP solids reserve capacity and ability to sustain additional soluble BOD loads, and means and methods of conveying biosolids from MBC to PLWTP without shorting flows to MPS.

Based on our calculations using the mass balance model developed by BC, the bypass operation will increase the MER at PLWTP from 8,134 mt/yr to 8,518 mt/yr under Phase II average conditions, and from 7,777 mt/yr to 8,474 mt/yr under Phase II maximum conditions—an increase that is still below the MER limit established by the current permit of 9,942 mt/yr (46). All axial mixing pumps need to be fully operational to maintain proper mixing in the digesters. A stress test of the digester system will need to be conducted to analyze the system's ability to respond to fairly high loads.

Considering that the partial bypass of solids from NCWRP would be required most of the time to accommodate Phase II loads with FOG and Lystek, it is recommended that the City add a digester for the MBC anaerobic digestion facilities.

The biogas conveyance headers appear to be adequate to handle Phase I flows only under average conditions for FOG-only case, and are inadequate to handle any Phase II flows/loads. For the FOG plus Lystek scenarios, it is inadequate for all Phase I and Phase II conditions. The digester biogas laterals, biogas compressors, biogas flares, and biogas headers leading to the cogeneration facility and to the flares will need to be upsized.

As referenced above, City staff have pointed out to the project team that certain unusual and rare peak hydraulic and solids conditions could be experienced by MBC because of construction or maintenance activities, events requiring the use of peaking factors as high as 2:1 in design. Section 3.2.2 provides a discussion of the ways of managing such unusually high peaking conditions.

5.3.3.2 Required Equipment Improvements

Figures 5-4 and 5-6 present required or recommended improvements to the digester and biogas systems and identify specific improvements related to the NCWRP expansion (Pure Water Program), FOG addition, and other recommended improvements focused on improving process reliability and performance.

Table 5-15 and Table 5-16, respectively, show Phase I and Phase II projected operating conditions and improvements with FOG addition and with FOG plus Lystek, respectively. Construction of one additional new digester will be required to accommodate projected Phase II conditions. Axial mixing pump isolation valves for the existing digesters will need to be refurbished, and the existing axial mixing pumps will need to be refurbished and placed back in service.

The following improvements, shown in Figures 5-4 and 5-6 will need to be implemented:

- Add one digester of the size and design similar to the existing units including all associated piping, valving, recirculation, mixing, and axial mixing equipment; heating, digester gas piping, and safety equipment; and all required appurtenances and specialty items. New digester recirculation, mixing, and axial mixing pumps are recommended to be Vaughan chopper pumps, or equal versus existing horizontal non-clog centrifugal pumps. Predesign and design consultants should also include a digester transfer equipment for the new digester, and incorporate cost-efficient means of connecting it to the existing digester transfer pumps.

- Extend digester gallery to accommodate placement of additional equipment.

- Increase the capacity of digester gas laterals and the digester-handling equipment associated with these laterals, as outlined in (39).

Table 5-14: Anaerobic Digestion Facilities - Existing System Design Criteria and Projected Operating Conditions for the Anaerobic Digestion System (with FOG and/or Lystek)

Parameter	Unit of Measure	System Design Capacity (1)		Estimated Firm Capacity(2)	Phase I Operating Conditions (3)(4)		Phase II Operating Conditions(3)(4)		Comments
		Average	Maximum		Average	Maximum	Average	Maximum	
Volumetric VSS Loading									
- All units in-service	LB VSS/CF-D			0.15	0.10	0.11	0.13	**0.15**	System is adequate for Phase I and borderline for Phase II loads. all axial mixing pumps should be operated.
- One unit out of service	LB VSS/CF-D	0.07	0.10	0.18	0.15	0.16	**0.20**	**0.22**	At maximum loading condition, system is inadequate to handle the estimated VSS loading. all axial mixing pumps are required to be operated, digester stress activities to be conducted, and temporary partial bypass to PLWTP to be established.
Detention Time(2)									
- All units in-service	DAYS			18	27	25	19	**18**	System is adequate for Phase I and bordeline for Phase II loads
- One unit out of service	DAYS	32	22	15	18	17	**13**	**12**	15 days is a minimum HRT allowed by 40 CFR, Part 503 Regulations. At maximum loading condition, system is inadequate to handle the estimated flows. all axial mixing pumps are required to be operated, digester stress activities to be conducted, and temporary partial bypass of system to PLWTP is required to accommodate taking one digester out of service.
Percent of Flow to be Bypassed to Meet Firm Capacity Criteria									
- All units in-service	%				0	0	0	0	Bypass is not required.
- One unit out of service	%				0	0	**13.3**	**21.2**	Bypass is required for Phase II conditions based on highest of detention time or VSS loading criteria, if fog addition is maintained.
Biogas Production(1)(5)	CFD	383,370	575,056	1,650,233					
- With FOG Only					1,353,296	1,485,852	**1,759,386**	**1,946,608**	System is inadequate for Phase I and borderline for Phase II loads. Digester biogas laterals need to be upsized(8).
- With FOG and Lystek					**1,691,620**	**1,857,315**	**2,199,233**	**2,433,260**	System is adequate for Phase I loads and slightly exceeds bordeline for Phase II loads. digester biogas laterals need to be upsized(8).

Table 5-14: Anaerobic Digestion Facilities - Existing System Design Criteria and Projected Operating Conditions for the Anaerobic Digestion System (with FOG and/or Lystek)

Parameter	Unit of Measure	System Design Capacity [1]		Estimated Firm Capacity[2]	Phase I Operating Conditions [3][4]		Phase II Operating Conditions[3][4]		Comments
		Average	Maximum		Average	Maximum	Average	Maximum	
Biogas Conveyance/Handling[1][5]	CFD	1,100,155	1,650,233	1,650,233					
- With FOG Only					1,353,296	1,485,852	**1,759,386**	**1,946,608**	System is adequate for Phase I and borderline for Phase II loads. replacing of biogas compressors with larger units and adding additional compressor is required for Phase II.
- With FOG and Lystek					**1,691,620**	**1,857,315**	**2,199,233**	**2,433,260**	System is adequate for Phase I and slightly exceeds borderline for Phase II loads. replacing of biogas compressors with larger units and adding additional compressor is required for Phase II.
Biogas Short-Term Peak[6]	CFD			1,650,233					
- With FOG Only					**3,383,240**	**3,714,631**	**4,398,466**	**4,866,521**	System is inadequate for Phase I and Phase II loads. System is inadequate to handle short term peaks. Digester biogas laterals need to be upsized.[8]
- With FOG and Lystek					**4,229,050**	**4,643,288**	**5,498,082**	**6,083,151**	System is inadequate for Phase I and Phase II loads. System is inadequate to handle short term peaks. Digester biogas laterals need to be upsized.[8]
Biogas Flare Peak[7]	CFD			1,584,000					
- With FOG Only					**2,029,944**	**2,228,778**	**2,639,079**	**2,919,912**	System is inadequate for Phase I and Phase II loads and requires additional gas flares and upsizing of gas lateral to flares.[8]
- With FOG and Lystek					**2,537,430**	**2,785,973**	**3,298,849**	**3,649,890**	System is inadequate for Phase I and Phase II loads and requires additional gas flares and upsizing of gas lateral to flares.[8]

(1) Reference 19

(2) Refer to table 4.3-1

(3) Refer to tables b.4 and c.4

(4) Maximum system capacity is based on a peak 2-week hydraulic and VSS loading factors of 1.11 and 1.13, respectively, for NCWRP biosolids loadings and no peaking factor for fog loadings

(5) Biogas production calculated at 15cf/lb VSS DESTR at 52% VSS reduction in digesters and at 10cf/lb VSS DESTR at 52% reduction in biosolids storage tanks

(6) Calculated at 2.5 short term peaking factor (Brown and Caldwell Design Guidelines)

(7) Calculated at 1.5 flare peaking factor (Brown and Caldwell Design Guidelines)

(8) Reference 39

BOLD FONT indicates that operating conditions are borderline or exceed assumed design criteria or firm capacity.

Table 5-15: Anaerobic Digestion Facilities - Phase I Projected Equipment Improvements and Phase I Operating Conditions (with FOG and/or Lystek)												
Equipment Subsystem	Unit of Measure	Phase I Improvements								Phase I Operating Conditions		Capacity Assessment
		Number of Units				Capacity			Summary of Improvements			
		Status	Total	Duty	Standby	Unit Capacity	Rated Capacity	Firm Capacity		Avg.	Max.	
Anaerobic Digesters[1]	MGALS	Existing	3	2	1	2.91	8.73	5.82				
		New	0	0	0							New digesters are not required
TOTAL at Average Conditions	**MGALS**		**3**	**2**	**1**			**5.82**		5.76		Firm capacity > Phase I max required based on 18-day HRT
TOTAL at Maximum Conditions	**MGALS**		**3**	**2**	**1**			**5.82**			5.93	Firm capacity equals to Phase I max required based on 17-day HRT
Biosolids Recirculation Pumps (each digester)[1]	gpm	Existing	2	1	1	550	1,100	495				
		New	0	0	0							New pumps are not required
TOTAL	**gpm**		**2**	**1**	**1**			**495**		550	550	Firm capacity close to Phase I max
Biosolids Mixing Pumps (each digester)[1]	gpm	Existing	3	2	1	2,200	4,400	3,960				
	gpm	**New**	**0**	**0**	**0**							New pumps are not required
TOTAL	**gpm**		**3**	**2**	**1**			**3,960**		4,400	4,400	Firm capacity close to Phase I max
Biosolids Axial Mixing Pumps (each digester)[1]	gpm	Existing	3	3	0	4,400	13,200	11,880	**Replace isolation valves, refurbish and place pumps back in service**			
	gpm	**New**	**0**	**0**	**0**							New pumps are not required
TOTAL	**gpm**		**3**	**3**	**0**			**11,880**		13,200	13,200	Firm capacity close to Phase I max
Digester Heat Exchangers (each digester)[1]	MMBTU	Existing	**1**	**1**	**0**	2.5	2.5	2.5				
	MMBTU	**New**	0	0	0							New heat exchangers are not required
TOTAL	**MMBTU**		**1**	**1**	**0**			**2.5**		2.5	2.5	Firm capacity close to Phase I max
Biosolids Storage and Emergency Biosolids Storage Tanks[1]	MGALS	Existing	**2**	**1**	**1**	1.3	1.3	1.3				
	MGALS	**New**	0	0	0							New biosolids storage tanks are not required
TOTAL	**MGALS**		**2**	**1**	**1**			**1.3**		1.3	1.3	Firm capacity close to Phase I max
Biosolids Storage Tank Mixing Pumps (each tank)[1]	gpm	Existing	3	2	1	3,600/4,000	10,800/12,000	6,480/7,200				Five pumps are provided for two tanks, two pumps per each tank with a swing standby pump
	gpm	**New**	**0**	**0**	**0**							New pumps are not required
TOTAL	**gpm**		**3**	**2**	**1**			**6,480/7,200**		7,200	8,000	Firm capacity close to Phase I max

Table 5-15: Anaerobic Digestion Facilities - Phase I Projected Equipment Improvements and Phase I Operating Conditions (with FOG and/or Lystek)												
Equipment Subsystem	**Unit of Measure**	**Phase I Improvements**								**Phase I Operating Conditions**		**Capacity Assessment**
		Number of Units				**Capacity**			**Summary of Improvements**			
		Status	**Total**	**Duty**	**Standby**	**Unit Capacity**	**Rated Capacity**	**Firm Capacity**		**Avg.**	**Max.**	
Biosolids Transfer Pumps[1]	gpm	Existing	3	2	1	750	2,250	1,350				See Note [2]
	gpm	**New**	**0**	**0**	**0**							New pumps are not required
TOTAL	**gpm**		**3**	**2**	**1**			**1,350**		1,500	1,500	Firm capacity close to Phase I max
Biogas Holding Tank[1]	CFD	Existing	**1**	**1**	**0**	**25,000**	**25,000**	**22,500**				
	CFD	**New**	0	0	0							New biogas holding tanks are not required
TOTAL	**CFD**		**1**	**1**	**0**			**22,500**		**25,000**	**25,000**	Firm capacity close to Phase I max
Biogas Compressors[1]	SCFM	Existing	2	1	0	300	600	540.0	**Remove existing compressors and replace with new**			Firm capacity is less than Phase I required
- With FOG Only	SCFM	**New**	**3**	**2**	**1**	**600**	**1,800**	**1,200**	**Install 3 larger units**			
- With FOG and Lystek	SCFM	**New**	**3**	**2**	**1**	**600**	**1,800**	**1,200**	**Install 3 larger units**			
TOTAL w/FOG Only	**SCFM**		**3**	**2**	**1**	**600**	**1,800**	**1,200**		**940**	**1,032**	Two in-service units will be able to satisfy 1290 scfm maximum capacity
TOTAL w/FOG and Lystek	**SCFM**		**3**	**2**	**1**	**600**	**1,800**	**1,200**		**1,175**	**1,290**	Two in-service units will be able to satisfy 1290 scfm maximum capacity
Biogas Flares[1]	SCFM	Existing	2	2	0	550	1,100	1,100				Firm capacity is less than Phase I required
- With FOG Only	SCFM	**New**	**1**	**1**	**0**	**550**	**550**	**550**	**Add 1 flare of size of existing flares**			
- With FOG and Lystek	SCFM	**New**	**2**	**2**	**0**	**550**	**1,100**	**1,100**	**Add 2 flares of size of existing flares**			
TOTAL w/FOG Only	**SCFM**		**3**	**3**	**0**	**550**	**1,650**	**1,540**		**1,410**	**1,548**	Three in-service flares will be able to satisfy 1548 scfm maximum capacity
TOTAL w/FOG and Lystek	**SCFM**		**4**	**4**	**0**	**550**	**2,200**	**2,090**		**1,762**	**1,935**	Four in-service flares will be required

(1) Firm capacity for existing equipment is assumed at 90% of nominal capacity

(2) Pumps are rarely used to transfer biosolids between digesters

Table 5-16: Anaerobic Digestion Facilities - Phase II Projected Equipment Improvements and Phase II Operating Conditions (with FOG and/or Lystek)												
Equipment Subsystem	Unit of Measure	Phase II Improvements								Phase II Operating Conditions		Capacity Assessment
		Number of Units				Capacity			Summary of Improvements			
		Status	Total	Duty	Standby	Unit Capacity	Rated Capacity	Firm Capacity		Avg	Max	
Anaerobic Digesters[1][2]	MGALS	Existing	3	2	1	2.91	8.73	5.82				
		New	1	1	0	2.91	2.91	2.91	Add one digester of the same size/design as existing digester			Additional digester is required
TOTAL at Average Conditions	**MGALS**		**4**	**3**	**1**			**8.73**		8.10		Firm capacity < Phase I max required based on 18-day HRT
TOTAL at Maximum Conditions	**MGALS**		**4**	**3**	**1**			**8.73**			8.38	Firm capacity < Phase I max required based on 17-day HRT
Biosolids Recirculation Pumps (each digester)[1]	gpm	Existing	2	1	1	550	1,100	495				
		New	2	1	1	550	1,100	495	Two pumps will need to be provided for new digester			
TOTAL (each digester)	**gpm**		**2**	**1**	**1**	**550**	**1,100**	**495**		550	550	Firm capacity close to Phase I max
Biosolids Mixing Pumps (each digester)[1]	gpm	Existing	3	2	1	2,200	4,400	3,960				
	gpm	**New**	**3**	**2**	**1**	**2,200**	**4,400**	**3,960**	Three pumps will need to be provided for new digester			
TOTAL (each digester)	**gpm**		**3**	**2**	**1**	**2,200**	**4,400**	**3,960**		4,400	4,400	Firm capacity close to Phase I max
Biosolids Axial Mixing Pumps (each digester)[1]	gpm	Existing	3	3	0	4,400	13,200	11,880	Replace isolation valves and place pumps back in service			
	gpm	**New**	**3**	**3**	**0**	**4,400**	**4,400**	**11,880**	Three pumps will need to be provided for new digester			
TOTAL	**gpm**		**3**	**3**	**0**	**4,400**	**4,400**	**11,880**		13,200	13,200	Firm capacity close to Phase I max
Digester Heat Exchangers (each digester)[1]	MMBTU	Existing	**1**	**1**	**0**	**2.5**	**2.5**	**2.3**				
	MMBTU	**New**	1	1	1	2.5	2.5	2.5	One heat exchanger will be provided for new digester			
TOTAL	MMBTU									2.5	2.5	
Biosolids Storage and Emergency Biosolids Storage Tanks[1]	MGALS	Existing	**2**	**1**	**1**	**1.3**	**1.3**	**1.3**				
	MGALS	**New**	0	0	0							New biosolids storage tanks are not required
TOTAL	MGALS		**2**	**1**	**1**			**1.3**		1.3	1.3	

Table 5-16: Anaerobic Digestion Facilities - Phase II Projected Equipment Improvements and Phase II Operating Conditions (with FOG and/or Lystek)												
Equipment Subsystem	**Unit of Measure**	**Phase II Improvements**								**Phase II Operating Conditions**		**Capacity Assessment**
		Number of Units				**Capacity**			**Summary of Improvements**			
		Status	**Total**	**Duty**	**Standby**	**Unit Capacity**	**Rated Capacity**	**Firm Capacity**		**Avg**	**Max**	
Biosolids Storage Tank Mixing Pumps (each tank)(1)	gpm	Existing	3	2	1	3,600/4,000	10,800/12,000	6,480/7,200				Five pumps are provided for two tanks, two pumps per each tank with a swing standby pump.
	gpm	**New**	**0**	**0**	**0**							new pumps are not required
TOTAL	**gpm**		**3**	**2**	**1**			**6,480/7,200**		7,200	8,000	Firm capacity close to Phase I max
Biosolids Transfer Pumps(1)	gpm	Existing	3	2	1	750	2,250	1,350				Pumps are rarely used to transfer biosolids between digesters
	gpm	**New**	**0**	**0**	**0**							New pumps are not required
TOTAL	**gpm**		**3**	**2**	**1**			**1,350**		1,500	1,500	Firm capacity close to Phase I max
Biogas Holding Tank(1)	CFD	Existing	**1**	**1**	**0**	**25,000**	**25,000**	**22,500**				
	CFD	**New**	0	0	0							New biogas holding tanks are not required
TOTAL	CFD		**1**	**1**	**0**			**22,500**		**25,000**	**25,000**	
Biogas Compressors(1)	SCFM	Existing	**2**	**1**	**0**	**300**	**600**	**270**	**Remove existing compressors and replace with new**			
- With FOG Only		**New**	**3**	**2**	**1**	**680**	**2,040**	**1,360**	**Install 3 larger units**			
- With FOG and Lystek	SCFM	**New**	**3**	**2**	**1**	**850**	**2,550**	**1,700**	**Install 3 larger units**			
TOTAL w/FOG Only	SCFM							**1,360**		1,222	1,352	Two in-service units will be able to satisfy 1352 scfm maximum capacity
TOTAL w/FOG and Lystek	SCFM							**1,700**		1,527	1,690	Two in-service units will be able to satisfy 1690 scfm maximum capacity
Biogas Flares(1)	SCFM	Existing	**2**	**2**	**0**	**550**	1,100	1,100				
- With FOG Only		**New**	**2**	**2**	**0**	**550**	1,100	1,100	**Add 2 flares of size of existing flares**			
- With FOG and Lystek	SCFM	**New**	2	2	0	800	1,600	1,600	**Add 2 larger flares**			
TOTAL w/FOG Only	SCFM		**4**	**4**	**0**	**550**		**2,200**		**1,833**	**2,028**	Four flares will be required to handle full biogas production
TOTAL w/FOG and Lystek	SCFM		**4**	**4**	**0**	**2 AT 550 SCFRM AND 2 AT 800 SCFM**		**2,700**		**2,291**	**2,535**	Four flares will be required to handle full biogas production

(1) Firm capacity for existing equipment is assumed at 90% of nominal capacity

- Increase the size of the digester feed lines and modify digester feed strategies as described in Section 5.2.
- Replace the existing two biogas compressors with two (for Phase I) and three (for Phase II) larger centrifugal biogas compressors.
- Increase the size of the biogas laterals from the biogas compressors, and the biogas header to the cogeneration facility, or provide a new, parallel header to the cogeneration facility. If the City elects to construct a new cogeneration facility, a separate biogas header is recommended to accommodate maximum gas production. In this case, a parallel header to the existing cogeneration facility or upsizing of the existing header will not be required. Predesign and design consultants should further coordinate this with ongoing development of the new cogeneration system, and provide means of biogas conveyance, as necessary.
- For the scenarios with FOG addition only, install one or two additional biogas flares of the size similar to the existing flares for Phase I or Phase II conditions, respectively. For scenarios with FOG plus Lystek, install two additional biogas flares of the size similar to the existing flares for Phase I conditions, or install two larger size flares for Phase II conditions.
- Increase the size of the biogas header supplying the biogas flares.

It appears that no modifications for the biogas headers leading to the biogas holding tank will be required. Under projected loading conditions, biogas holding tank capacity will decrease to 15 minutes (from the current 45 minutes) at Phase II maximum loadings, which appears to be adequate considering that gas production is expected to become more stable because of more consistent digester feed. Potential concerns related to swings of level in the biogas holding tank and the compressor speeds will need to be further evaluated by the predesign and final design consultants.

In addition, consideration should be given to replacing all aged recirculation, mixing, and axial mixing pumps for three existing digesters with new chopper-style pumps or equals at Phase I to enhance biosolids mixing system performance and reliability. However, this modification is not absolutely required at this time, and should be seen as part of required routine maintenance/repair activities, and is listed as “other recommended improvements” in the OPC shown in Section 6 below. These improvements are also identified in Figures 5-4 and 5-6.

As for Section 5.3.2.2, construction of these improvements will require engineering design and preparation of construction documents including design drawings and specifications, with the exception of recommended replacement of existing (digesters 1, 2, and 3) digester recirculation, mixing, and axial mixing pumps with chopper-style pumps, and replacing the existing HEXs for digesters 1 and 2.

5.4 Digested Sludge Dewatering System

5.4.1 Existing Conditions

5.4.1.1 Current Operating Conditions

MBC receives digested sludge from two sources that are blended at the biosolids storage tanks: digested sludge pumped from PLWTP and digested sludge that overflows from the MBC digesters to the online biosolids storage tank (currently the “emergency” biosolids storage tank is kept in service). See Section 5.3 for details on the digestion system and the biosolids storage tanks.

Historical data from June 20, 2013, to June 19, 2014, indicated an average flow of 1,200 gpm of digested sludge pumped from PLWTP to MBC. Within the year, the daily rate of pumping ranged from a minimum of 850 gpm to a maximum of 1,800 gpm. On 3 of those 365 days, there is no recorded flow of digested sludge. These events could be related to pump outages or shutdown/tie-in events by contractors at either PLWTP or MBC. Even within a single day, there can be significant variability in the operation of the PLWTP digested sludge pumps. On February 2, 2016, for example, the average flow of digested sludge pumped from PLWTP was 1.3 mgd, but the rate varied from a low of 0.5 mgd to a high of 2 mgd.

The equalization volume available in the biosolids storage tank dampens any variability in digested sludge flows from PLWTP.

The digested sludge dewatering system begins with the pumping of digested sludge from the tank and consists of four major components, each of which is discussed in turn below:

- Sludge pressurization pumps and feed loop
- Dewatering centrifuge digested sludge feed pumps
- Dewatering centrifuges
- Polymer feed pumps

Process schematics for the sludge dewatering and polymer systems are presented in Figure 5-7, Figure 5-8, and Figure 5-9, respectively. Three chopper pumps[18] (80-P-61–80-P-63) pump digested sludge from the emergency biosolids storage tank 80-T-71 through a recirculation loop that (1) supplies up to eight dewatering centrifuge feed pumps for the dewatering centrifuges; and (2) returns any remaining surplus flow back to the tank. The supply header is a 10-inch-diameter ductile iron line; the return line is 6-inch diameter. A modulating valve (76-MV-1499) on the return line controls the pressure in the header to maintain a pressure of approximately 13 pounds per square inch gauge (psig).

Operations staff maintain the level in the emergency biosolids storage tank between 9 and 11 feet (elevation of instrument [EOI] at elevation [El.] 387.50). Pressure on the discharge side of the pumps is maintained by manually throttling a series of valves through the sludge grinder bypass. The design duty point for each chopper pump is 1,100 gpm at 85 feet TDH.

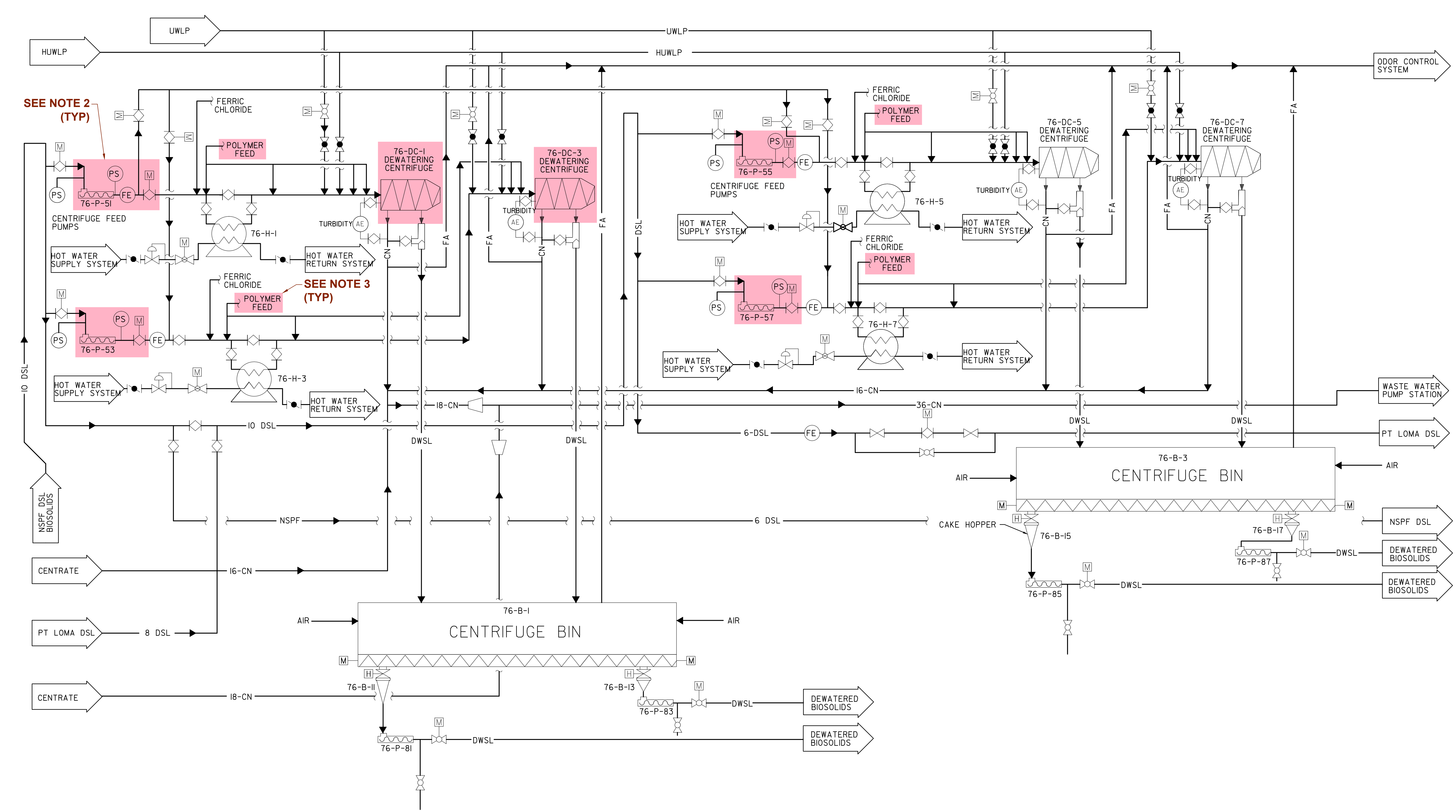
Dewatering centrifuges 1 through 8[19] operate with dedicated sludge feed pumps[20] (76-P-51–76-P-58). Each feed pump delivers digested sludge from the recirculation loop to its respective centrifuge. Dewatered sludge cake is discharged into a cake storage bin with live-bottom augers. Schwing plunger pumps deliver the dewatered cake from the storage bins to silos where it is stored and loaded into trucks for delivery offsite.[21] Centrate from the dewatering centrifuge operations flows by gravity to the centrate pump station. See Section 4.5 for further discussion of the centrate pump station.

[18] Vaughan HE4P6CS, 1,100 gpm at 85 feet TDH, 1,750 rpm, 50 hp.

[19] Sharples DS-706, 250 hp main drive motor, 25 hp backdrive motor.

[20] Seepex Model 110-6L, 25 hp, 1,780 motor rpm, 7.87:1 gearbox ratio.

[21] The dewatered sludge cake systems are not within the scope of this TM.



LEGEND:

- NCWRP EXPANSION (PURE WATER PROGRAM) UPGRADES
- FOG ADDITION UPGRADES
- OTHER RECOMMENDED IMPROVEMENTS

NOTES:

1. INSTALLATION OF 2 NEW CENTRIFUGES TO REPLACE EXISTING CENTRIFUGES NO.1 AND NO.8 IS RECOMMENDED TO ACCOMMODATE PHASE II CONDITIONS.
2. INSTALLATION OF 8 NEW, LARGER CENTRIFUGE FEED PUMPS (ONE FOR EACH CENTRIFUGE) IS RECOMMENDED TO ACCOMMODATE PHASE II CONDITIONS.
3. INSTALLATION OF 8 NEW, LARGER POLYMER FEED PUMPS (ONE FOR EACH CENTRIFUGE) IS RECOMMENDED TO ACCOMMODATE PHASE II CONDITIONS.
4. HYDRAULIC LOADING REPRESENTS AN NCPWF PRODUCTION OF 30 MGD. REFER TO SECTION 9 OF THIS TECHNICAL MEMORANDUM FOR FURTHER DETAILS.

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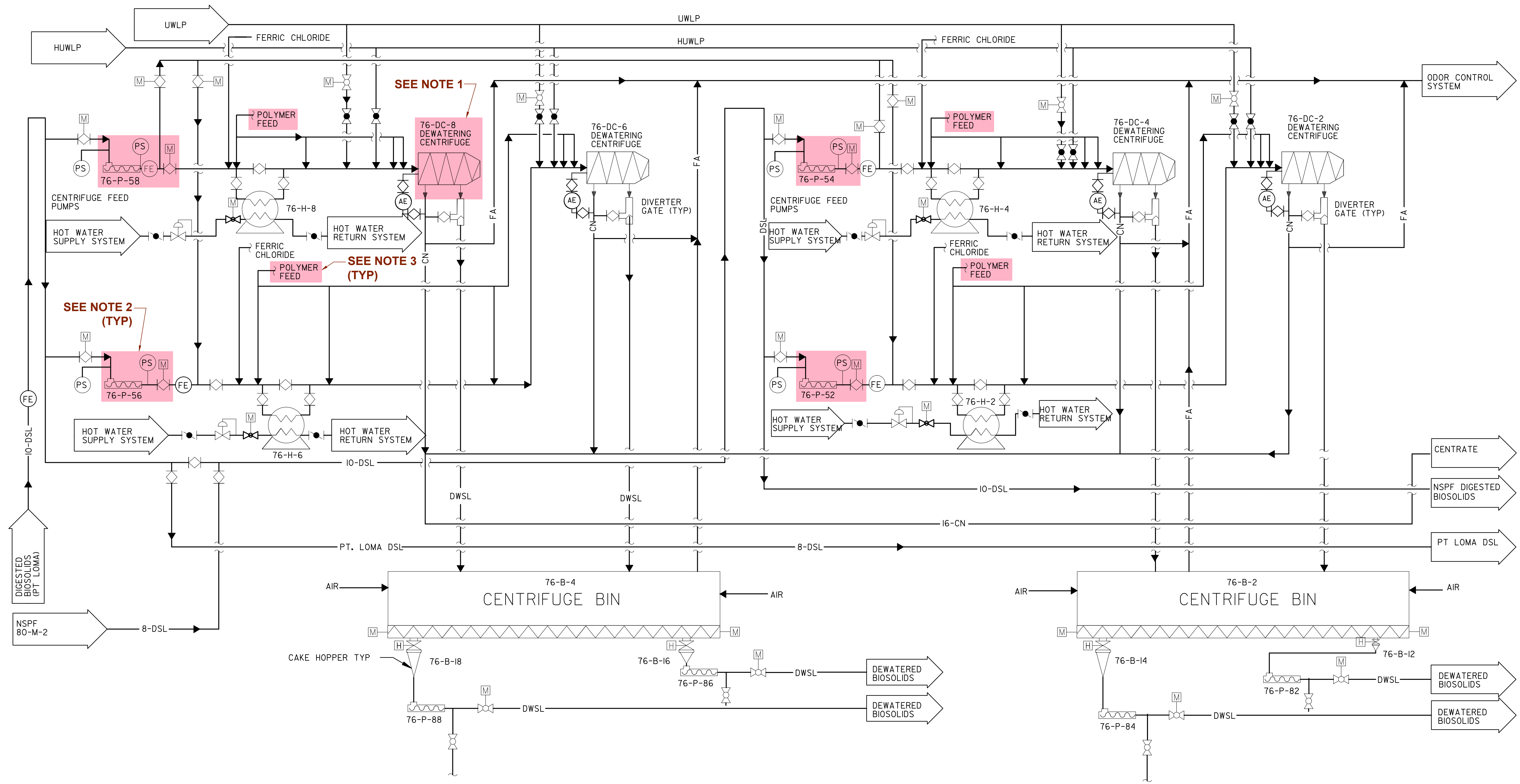
BLP Engineers, Inc.

IMPACTS OF NCWRP EXPANSION ON MBC

FIGURE 5-7

SLUDGE DEWATERING SYSTEM PROCESS SCHEMATIC - 1



LEGEND:

- NCWRP EXPANSION (PURE WATER PROGRAM) UPGRADES
- FOG ADDITION UPGRADES
- OTHER RECOMMENDED IMPROVEMENTS

NOTES:

1. INSTALLATION OF 2 NEW CENTRIFUGES TO REPLACE EXISTING CENTRIFUGES NO.1 AND NO.8 IS RECOMMENDED TO ACCOMMODATE PHASE II CONDITIONS.
2. INSTALLATION OF 8 NEW, LARGER CENTRIFUGE FEED PUMPS (ONE FOR EACH CENTRIFUGE) IS RECOMMENDED TO ACCOMMODATE PHASE II CONDITIONS.
3. INSTALLATION OF 8 NEW, LARGER POLYMER FEED PUMPS (ONE FOR EACH CENTRIFUGE) IS RECOMMENDED TO ACCOMMODATE PHASE II CONDITIONS.
4. HYDRAULIC LOADING REPRESENTS AN NCPWF PRODUCTION OF 30 MGD. REFER TO SECTION 9 OF THIS TECHNICAL MEMORANDUM FOR FURTHER DETAILS.

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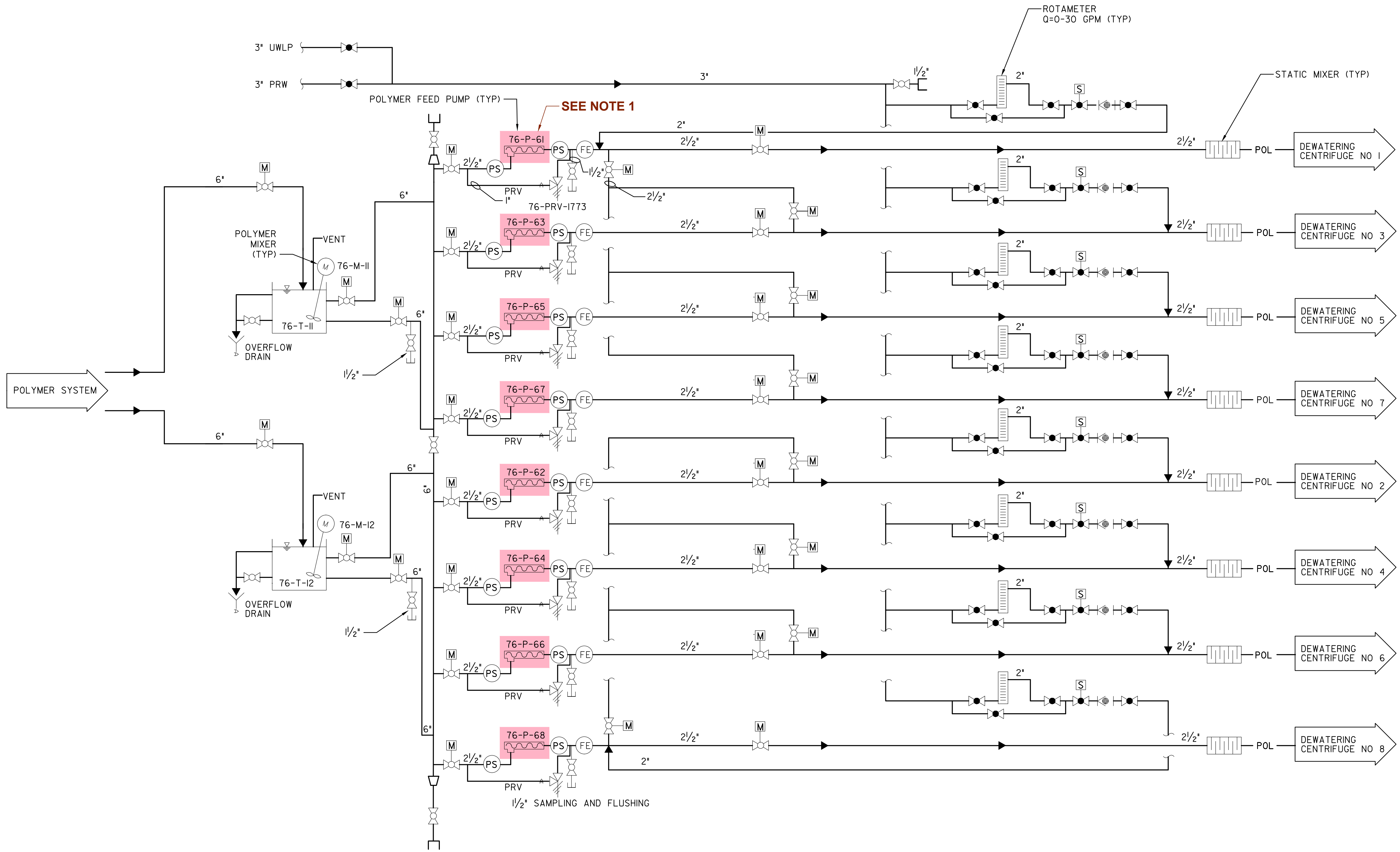
IMPACTS OF NCWRP EXPANSION ON MBC

FIGURE 5-8

SLUDGE DEWATERING SYSTEM PROCESS SCHEMATIC - 2



LEGEND:

- NCWRP EXPANSION (PURE WATER PROGRAM) UPGRADES
- FOG ADDITION UPGRADES
- OTHER RECOMMENDED IMPROVEMENTS

NOTES:

1. INSTALLATION OF 8 NEW LARGER POLYMER FEED PUMPS (ONE FOR EACH CENTRIFUGE) IS RECOMMENDED TO ACCOMMODATE PHASE II CONDITIONS.
2. HYDRAULIC LOADING REPRESENTS AN NCPWF PRODUCTION OF 30 MGD. REFER TO SECTION 9 OF THIS TECHNICAL MEMORANDUM FOR FURTHER DETAILS.

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IMPACTS OF NCWRP EXPANSION ON MBC

FIGURE 5-9

SLUDGE DEWATERING POLYMER SYSTEM PROCESS SCHEMATIC

Operations staff manage the supply/demand relationship between the digested sludge supplied by the chopper pumps and the demand of the dewatering centrifuges via the existing Ovation DCS. Two of the three chopper pumps serve as lead and lag pumps while the third is a standby pump. The lead pump is operational while the first four operating centrifuges are online. If circumstances require the operation of a fifth centrifuge, the lag chopper pump is started to maintain adequate pressure in the supply header.

Each of the existing Sharples dewatering centrifuges (76-DC-1–76-DC-8) operates with a dedicated progressive-cavity sludge feed pump. Under conditions at the time of this writing, each sludge feed pump nominally delivers up to 250 gpm of digested sludge to its dewatering centrifuge. At the time of this writing, the City typically operates between four and five centrifuges continuously (24 hours per day, 7 days per week) between 195 gpm and 225 gpm each.

A dedicated polymer feed pump[22] delivers up to 40 gpm of dilute polymer solution to the centrifuge inlet to improve the ability of the centrifuge to dewater the solids.

Because of the suction pressure available at the inlet to each of the sludge feed pumps, the pumps operate in a "metering" capacity. Each progressive-cavity pump is a constant-torque machine and maintains a relatively constant delivery to its receiving centrifuge across a widely varying range of pressures.[23]

5.4.1.2 Near-Term Upgrades and Modifications

The City is in the process of retrofitting six new Alfa Laval G2 centrifuges[24] to replace existing centrifuges 76-DC-2 through 76-DC-7. Two of the original Sharples centrifuges, 76-DC-1 and 76-DC-8, will remain.

Although the new centrifuges are rated for up to 400 gpm capacity, they require higher inlet pressures than the existing Sharples centrifuges. Because the new centrifuges will operate with the original sludge feed pumps and polymer feed pumps, the capacities of the pumps limit the capacity of the new centrifuges. Table 5-17 compares the current maximum operating conditions for sludge and polymer feed with the proposed operating conditions.

Table 5-17: Comparison of Current Maximum Operating Conditions and Proposed Near-term Operating Conditions for Sludge Feed Pumps and Polymer Feed Pumps (25)

Equipment	Current Max Conditions			Proposed Near-term Max Conditions		
	gpm	psi	rpm	gpm	psi	rpm
Sludge feed pump	250	21	220	340	33	250
Polymer feed pump	22	38	178	30	58	320
Total flow	**272**			**370**		

[22] Seepex BN15-6LT, 5 hp, 1,760 rpm motor with 6.7:1 gearbox ratio, 40 gpm at 50 psi discharge pressure.

[23] A review of Seepex pump curves shows that a 50% increase in discharge pressure from 60 to 90 psig results in only a 7% decrease in flow at maximum speed. As a result, the operation of the centrifuges is relatively insensitive to pressure fluctuations.

[24] Alfa Laval Aldec G2 centrifuge: 200 hp main drive motor, 50 hp backdrive motor.

TM 3 (25) proposes operating the existing sludge feed pump and polymer feed pump at higher speeds to maximize the output of the new centrifuges. In the case of the polymer feed pumps, operation requires that the VFDs control the motor at speeds that are higher than its synchronous speed.[25]

The proposed operational modifications do not require replacement of motors, drives, or pump components, but pump operation at higher speeds necessarily leads to an increase in stator wear. Table 5-18 summarizes the system design capacity of the digested sludge dewatering system that will be available once the project to replace six of the existing centrifuges is completed. In addition, it compares the pending available capacity with the current operating conditions. All of the subsystems have sufficient firm capacity to satisfy current conditions. It is anticipated that the centrifuge retrofits currently under way will be completed prior to commissioning of the expansion to NCWRP and NCPWF.

5.4.2 Projected Conditions: 30 mgd Production at NCPWF

5.4.2.1 Summary

Table 5-19 shows the projected flows of digested sludge under Phase I conditions and Phase II conditions, and compared to the system design capacity. No substantial difference between the current sludge flows and loadings and the projected Phase II conditions is shown in Table 5-18. The current maximum flow of digested sludge is 1.94 mgd based on data provided for 2013/2014; the projected Phase II maximum flow of digested sludge is 2.24 mgd under the worst case scenario dewatering centrifuge loadings for Phase II(Scenario B.2 in Appendix C).

Table 5-18: Sludge Dewatering Facilities(1) - System Design Criteria and Current Operating Conditions for the Existing System

Parameter	Unit of Measure	System Design Capacity		Estimated Firm Capacity	Current Operating Conditions		Comments
		Avg,	Max.(2)		Avg.	Max.	
Digested Sludge Pressurization(3)	MGD	N/A	3.2	2.85	1.46	1.94	Ex. System adequate to handle current loads
	gpm		2,200	1,980	1,014	1,347	
Digested Sludge Feed Rate (sludge feed pumps)	MGD	N/A	2.9	**2.32**	1.46	1.94	Ex. System adequate to handle current loads.
	gpm		2,000	**1,600**	1,014	1,347	See Note (4)
	LB TSS/D		757,000	**605,600**	327,000	551,000	
Digested Sludge Centrifuge Dewatering	MGD	N/A	3.31	2.65	1.46	1.94	Ex. System adequate to handle current loads.
	gpm		2,300	1,840	1,014	1,347	
	LB TSS/D		860,000	688,000	327,000	551,000	

[25] The listing of configuration parameters in the manual for the Robicon 454 GT drive indicates that the overspeed trip setting can be set as high as 440 Hz. The speed setting of 99 Hz proposed by Arcadis in TM 3 (25) is within the range allowed by the VFD.

Table 5-18: Sludge Dewatering Facilities(1) - System Design Criteria and Current Operating Conditions for the Existing System							
Parameter	**Unit of Measure**	**System Design Capacity**		**Estimated Firm Capacity**	**Current Operating Conditions**		**Comments**
		Avg,	**Max.(2)**		**Avg.**	**Max.**	
Polymer feed rate	gpm	N/A	240(5)	192	51(6)	86(7)	Ex. System adequate to handle current loads

(1) System design capacities are summarized based on the completion of the current upgrade which replaces 6 of the existing Sharples Centrifuges with six Alfa Laval Aldec G2 centrifuges.

(2) Maximum centrifuge capacity based on running 5 Aldec units at 400 gpm and 1 Sharples unit at 300 gpm and 3.0% solids. maximum sludge feed rate based on running 5 sludge feed pumps at 340 gpm each and one at 300 gpm for a total of 2000 gpm maximum pressurization system output based on running 2 of the 3 pressurization pumps.

(3) Pressurization pump system design capacities are listed based on the design TDH of 85 feet. Actual gpm output will vary depending on system backpressure and storage tank level. Three pumps total with 2 duty and 1 standby.

(4) Sludge feed pumps are the capacity-limiting component of the system. Capacities are highlighted in ***bold****.*

(5) System capacity based on an individual pump capacity of 40 gpm per pump in accordance with the original data sheets for the polymer pumps.

(6) Equates to an average of 4.5 centrifuges in operation at 11.3 gpm each.

(7) Equates to a maximum of 6 centrifuges in operation at 14.33 gpm each.

As a result, the centrifuge upgrades currently in progress provide sufficient firm capacity to handle Phase II maximum flows and loads.

5.4.2.2 Recommended Equipment Improvements

The City should consider increasing the capacity of the digested sludge feed pumps and polymer feed pumps to take full advantage of the additional available capacity in the larger Aldec G2 centrifuges. Replacing the pumps will ensure that the pumps are adequately sized, in terms of motor horsepower, to meet the higher inlet pressure requirements of the Aldec G2 centrifuges without resulting in excessive wear of stators. The recommended improvements to the sludge dewatering and polymer systems are shown in Figures 5-7 through 5-9 and illustrate specific improvements focused on improving process reliability and performance.

If the recommended peaking factor of 2:1 is used instead of 1.6:1 (see Section 3.2), the Phase II maximum flow of digested sludge to the centrifuges increases from 2.24 mgd to 2.79 mgd (see Table 5-19). With a firm capacity of 2.32 mgd established by the limitations of the sludge feed pumping systems, the improvements being installed now are marginal. Even if sludge pumps and polymer feed pumps are upgraded to attain a firm capacity of 2.65 mgd, the result would be slightly below the hypothetical maximum of 2.79 mgd.

Table 5-19: Sludge Dewatering Facilities(1) - Existing System Design Criteria and Projected Operating Conditions for the Dewatering System

Parameter	Unit of Measure	System Design Capacity		Estimated Firm Capacity	Phase I Operating Conditions		Phase II Operating Conditions		Comments
		Avg.	Max.(2)		Avg.	Max.	Avg.	Max.	
Digested Sludge Pressurization(3)	MGD	N/A	3.2	2.85	1.57	2.17	1.60	2.24	System adequate for Phase I and Phase II loads
	gpm		2,200	1,980	1,090	1,507	1,111	1,556	
Digested Sludge Feed Rate (sludge feed pumps)	MGD	N/A	2.9	**2.32**	1.57	2.17	1.60	2.24	System adequate for Phase I and Phase II loads
	gpm		2,000	**1,600**	1,090	1,507	1,111	1,556	See Note (4)
	LB TSS/D		757,000	**605,600**	373,000	524,000	388,000	552,000	
Digested Sludge Centrifuge Dewatering	MGD	N/A	3.31	2.65	1.57	2.17	1.60	2.24	
	gpm		2,300	1,840	1,090	1,507	1,111	1,556	System adequate for Phase I and Phase II loads
	LB TSS/D		860,000	688,000	373,000	524,000	388,000	552,000	
Polymer feed rate	gpm	N/A	240(5)	192	55	100(7)	58	106(6)	System adequate for Phase I and Phase II loads

(1) System design capacities are summarized based on the completion of the current upgrade which replaces six of the existing Sharples centrifuges with six Alfa Laval Aldec G2 centrifuges.

(2) Maximum centrifuge capacity based on running 5 Aldec units at 400 gpm and 1 Sharples unit at 300 gpm and 3.0% solids. Maximum sludge feed rate based on running 5 sludge feed pumps at 340 gpm each and one at 300 gpm for a total of 2000 gpm maximum pressurization system output based on running 2 of the 3 pressurization pumps.

(3) Pressurization pump system design capacities are listed based on the design TDH of 85 feet. Actual gpm output will vary depending on system backpressure and storage tank level. Three pumps total with 2 duty and 1 standby.

*(4) Sludge feed pumps are the capacity-limiting component of the system. Capacities are highlighted in **bold**.*

(5) System capacity based on an individual pump capacity of 40 gpm per pump in accordance with the original data sheets for the polymer pumps.

(6) Six units running with 17.7 gpm polymer to each centrifuge.

(7) Six units running with 16.7 gpm polymer dose to each centrifuge.

(8) Maximum loadings are related to Scenarios B.2 shown in Appendices B and C.

This TM recommends removing and replacing 76-DC-1 and 76-DC-8 to match those currently being installed. Removing and replacing 76-DC-1 and 76-DC-8, in conjunction with sludge feed pumps and polymer feed pumps, provides a firm capacity of 2.8 mgd (six units at 320 gpm each). There are no clear, compelling reasons to replace the two centrifuges, and all eight sludge feed pumps and polymer feed pumps, based on the expansion of NCWRP to supply NCPWF. However, long-term, operational factors on a system-wide scale may need to be considered (see Section 2.2.2). In addition, the City should consider the age of the existing VFDs, and possible replacement. Obsolescence, and the availability of technical support, factor into the decision because the aging electrical components for feed pumps may control the availability of relatively new dewatering centrifuges. While replacing the centrifuges is a significant upgrade, the older remaining support equipment becomes the weak link in the availability of a given centrifuge, new or old.

Budget pricing for upgrades to the solids-dewatering system have been included as a separate line item for general reference in considering system-wide alternatives to biosolids inventory management.

Construction of these improvements will require engineering design and preparation of construction documents including design drawings and specifications.

5.5 Centrate System

5.5.1 Existing Conditions

5.5.1.1 Existing Facilities

The wastewater and centrate pump station is located in Area 94 in the western portion of the site. The pump station receives centrate from both the thickening and dewatering centrifugation processes. It is also designed to receive and pump sanitary wastewater from plant facilities. However, the centrate is the majority of the fluid pumped at this pump station. The City has evaluated options for separating the centrate from the dewatering centrifuges and treating it onsite before discharging back to the pump station under a separate project. The goal of centrate treatment is the reduction of nitrogen concentration as well as removal of N-Nitrosodimethylamine (NDMA) precursors from this stream. This would allow the centrate to augment influent flow to NCWRP. We understand that the City has decided to proceed with centrate disposal versus onsite treatment with potential discharge of the centrate through the brine line.

5.5.1.1.a Wetwell

The wetwell at the pump station has a total working capacity of 10,600 gallons. Flow into the wetwell is controlled by an automatic sluice gate measuring 36 by 36 inches that shuts off the wetwell in case of pump failure or flooding is detected in the drywell. A hand-operated sluice gate can be opened to allow sanitary wastewater from the plant into the wetwell. The wetwell is equipped with level indicators and transmitters that are linked to the DCS.

5.5.1.1.b Centrifugal Pumps

The pump station is equipped with three centrifugal non-clog pumps (94-P-01–94-P-03) with a nominal capacity of 2,650 gpm each. The pumps are operated in lead-lag configuration and in variable-speed mode. The control strategy allows operation of all three pumps if required, although this is not expected to be typical or frequent for current operating conditions. The operating speeds of each pump vary between approximately 900 and 1,160 rpm.

Flow rates range between approximately 1,000 gpm and 3,000 gpm with one pump operating, and between 2,500 gpm and 5,000 gpm with two pumps operating for the low-friction condition. The maximum combined flow rate drops to approximately 4,000 gpm for the high-friction condition. The maximum head developed, at this condition, is 100 feet, while the shutoff head of the pumps is 130 feet. The pump station layout provides room for a future additional pump (94-P-04) of similar capacity as the existing three pumps.

5.5.1.1.c Force Main

The force main is a 20-inch-diameter, Class 350 steel pipeline that runs from MBC to NCWRP. The pipeline runs approximately 4.2 miles northwest from MBC until it reaches the influent pump station (IPS) at NCWRP. The original pipeline design included a pressure-monitoring station that is located outside the MBC site perimeter. The pressure-monitoring system is used for automatically operating a pressure-sustaining station located on the pipeline just upstream of the IPS at NCWRP. The pressure-sustaining station has been bypassed and the pressure-monitoring station is also no longer in use.

5.5.1.1.d Auxiliary Mechanical Equipment

The pumps require various types of auxiliary equipment for operation. These include check valves, isolation valves, force main drain valve, a new air-release valve at the force main high point, seal water system, and various sensors and transmitters. The 36-inch-diameter centrate collection header that conveys the centrate from the Centrifuge Building in Area 76 can also be considered an auxiliary item to the pump station.

5.5.1.2 Current Operating Parameters and Performance

The pump station is currently operating normally with two pumps typically in service and one pump in standby mode. As per the control strategy, the lead pump starts at low speed and ramps up speed to maintain the wetwell level set points. When the level exceeds the preset threshold, the lag pump also starts and both pumps reduce speed initially. Both pumps then ramp up speed and reach full speed before the next higher set point is reached. Although the control strategy allows for three pumps to operate, this mode of operation is rare. The pumps are adequate for handling current flows.

One issue noted by City staff is the possibility that grit deposition has occurred within the force main. The force main lacks intermediate stations along its alignment and is also not equipped with a means for cleaning or pigging. Although the City has attempted to inspect and clean the force main in the past, this was possible only for a short distance beyond the pump station. The likelihood of grit deposition is evidenced by the fact that the pumps are currently operating at much higher discharge heads than anticipated. The condition of the force main is currently being assessed via the condition assessment program; hydraulic testing of the force main has already been completed.

Pump data obtained were plotted to generate a system curve, which was superimposed on the design system curves. Figure 5-10 presents the comparison, where the red curve represents current operational data. The comparison shows that the system curve is significantly steeper than both the low-loss and high-loss system curves. Table 5-20 also shows the performance characteristics of the pumps.

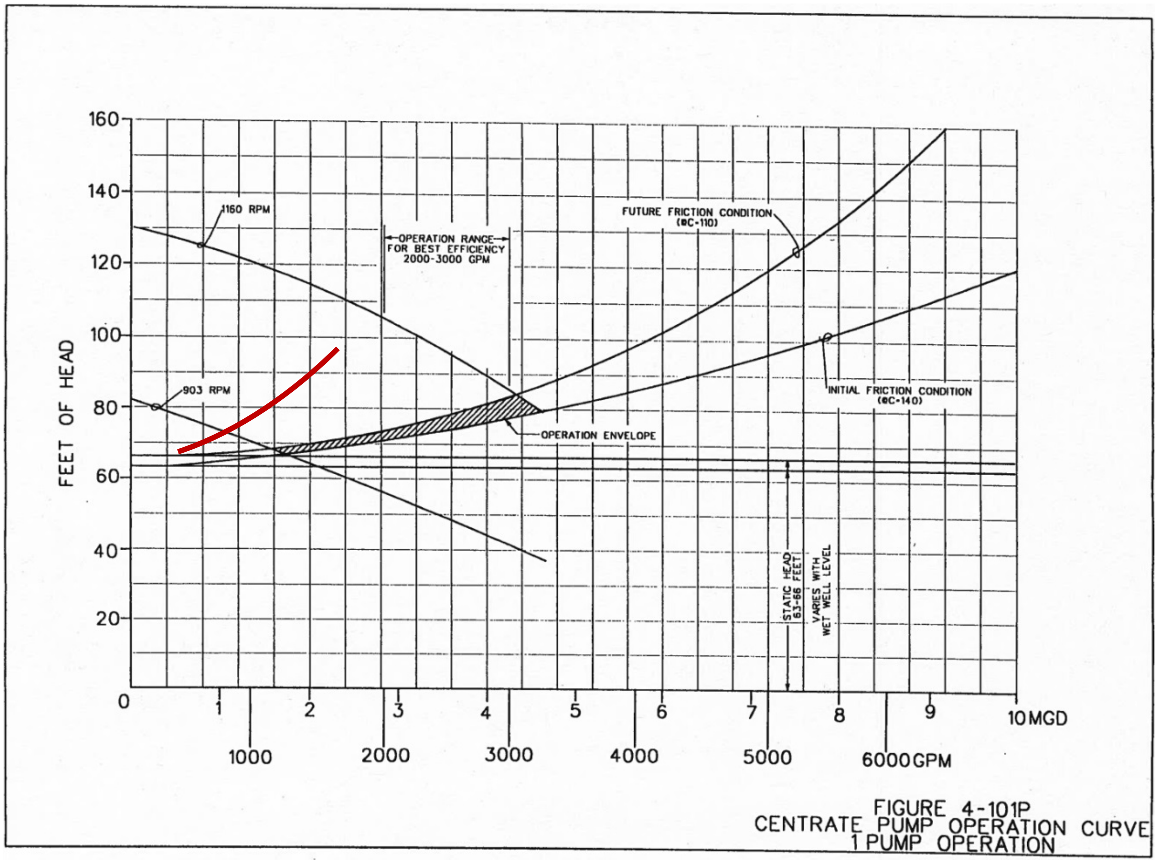


Figure 5-10: Comparison of Design and Current Centrate Pump System Curves

Table 5-20: Centrate Pump Station Facilities - System Design Criteria and Current Operating Conditions for the Existing System

Parameter	Unit of Measure	System Design Capacity		Estimated Firm Capacity	Current Operating Conditions(1)		Comments
		Avg,	Max.		Avg.	Max.	
Centrate Pumps	MGD	N/A	7.6	6.9	1.15	3.20	Ex. System adequate to handle current loads
	gpm		5,300	4,770	799	2,222	
Centrate Force Main	MGD	N/A	11.3	11.3	1.15	3.20	Ex. System adequate to handle current loads(2)
	gpm		7,833	7,833	799	2,222	

(1) Based on data from January 2016 through March 2016.

(2) Based on assumption of maximum velocity of 8 feet per second and that force main will be restored to design conditions.

5.5.2 Projected Conditions: Phase I (15 mgd production at NCPWF) and Phase II (30 mgd Production at NCPWF)

5.5.2.1 Summary

As discussed in Section 3.1, centrate flows are projected to increase significantly with the expansion of NCWRP, with thickener centrifuge centrate contributing a large part of this increase. Table 5-21 shows that the existing pumps operating as currently configured would be adequate for handling increased flows following Phase I expansion. However, the pumps would need to be operated at their maximum capacity and outside the zone of best efficiency during peak conditions.

Table 5-21 also shows the Phase II projected conditions. During peak conditions, the centrate flows generated, when pumped through the existing force main, will generate much higher dynamic losses than anticipated during original design. The total head during peak conditions exceeds the shutoff head of the existing pumps. Therefore, all pumps would need to be replaced with new pumps capable of delivering higher head to handle peak conditions. In addition, a fourth pump would need to be added so that the pump station may be operated with three pumps in service and one on standby.

Table 5-21: Centrate Pump Station Facilities - System Design Criteria and Projected Operating Conditions

Parameter	Unit of Measure	System Design Capacity		Estimated Firm Capacity	Phase I Operating Conditions		Phase II Operating Conditions		Comments
		Avg.	Max.		Avg.	Max.	Avg.	Max.	
Centrate Pumps	MGD	N/A	7.6	6.9	2.90	4.43	4.28	6.55	Ex. System inadequate to handle Phase II loads(1)
	gpm		5,300	4,770	2,014	3,076	2,972	4,548	
Centrate Force Main	MGD	N/A	11.3	11.3	2.90	4.43	4.28	6.55	Ex. System adequate to handle projected loads(2)
	gpm		7,833	7,833	2,014	3,076	2,972	4,548	

(1) Although the capacity of the pumps is greater than the projected flows, the pumps do not have the ability to generate sufficient head.

(2) Based on assumption of maximum velocity of 8 feet per second and that force main will be restored to design conditions.

The existing force main is adequate for handling future flows, both average and peak, at velocities below 8 fps. This velocity is generally the maximum preferred in municipal wastewater systems. Peak flow velocities following Phase II improvements would be below 6 fps and velocity during the average flow condition would be below 4 fps. However, this is predicated on a clean force main that is free of grit and obstructions. A system curve for future conditions developed by extrapolating current data indicates that total head required would be significantly higher than that indicated by the system curve developed during initial design of the plant. The existing 36-inch-diameter centrate collection header was also evaluated and determined to be adequate for all future flow conditions.

5.5.2.2 Required Equipment Improvements

Table 5-22 and Table 5-23, respectively, summarize the required improvements during Phases I and II. The existing pumps are adequate for handling increased flows during Phase I. However, Phase II would require replacement of all existing pumps with new pumps capable of developing higher head, together with installation of a fourth pump. Construction of these improvements will require engineering design and preparation of construction documents including design drawings and specifications.

The centrate pump station represents a critical component of the plant and shutdown of this process will impact operation of the entire plant. Therefore, it is critical that the force main be equipped with a means for inspection and cleaning, or bypassing flow to an alternate location or conveyance system. Evaluating the system for installation of such facilities is outside the scope of this study. However, it is strongly recommended that the City conduct such an evaluation as soon as possible. The required improvements are shown schematically in Figure 5-11.

5.6 Odor Control System

5.6.1 Existing Conditions

5.6.1.1 Existing Facilities

The Area 60 OCS serves a large portion of the MBC process facilities. Foul air from pre-digestion and post-digestion facilities is collected in separate headers and then commingles at the OCS. These facilities include grit removal, centrifugation, and biosolids loading (truck loadout), among others. Foul air treatment is accomplished using chemical scrubbers and carbon adsorbers. The OCS consists of three trains, two of which operate continuously while the third serves as a standby.

5.6.1.1.a Chemical Scrubbers

The OCS consists of acid scrubbers and caustic/hypochlorite scrubbers. The acid scrubbers were designed for treating only the post-digestion foul air stream, while the caustic/hypochlorite scrubbers were designed for treating the entire foul air stream. Each acid scrubber was designed for treating 8,000 cubic feet per minute (cfm) of foul air and each caustic/hypochlorite scrubber was designed for treating 26,000 cfm of foul air.

The acid scrubbers are cylindrical fiberglass-reinforced plastic (FRP) shells with plastic packing media. Each vessel is 60 inches in diameter and approximately 22 feet tall. Sulfuric acid is used for treating ammonia in the foul air. The caustic/hypochlorite scrubbers are also constructed of FRP and are 108 inches in diameter and approximately 22 feet tall. Each scrubber is served by a recirculation pump that recirculates chemical from the scrubber sump to the top of the packing media. Foul air treatment occurs when recirculating chemical liquid comes in contact with the foul air within the packing media.

5.6.1.1.b Heat Exchangers

After treatment in the chemical scrubbers, the foul air stream is directed to the carbon adsorbers. Because excessive moisture in the air stream can significantly reduce the removal efficiency of activated carbon, the OCS was designed to move the air from the scrubbers through HEXs directly upstream of the carbon vessels. The HEXs were designed to heat the air for increasing the dry-bulb temperature. The HEXs were air heating coil type, manufactured by Aerofin Corporation and used hot water for heating foul air. Each had a total surface area of approximately 2,500 square feet (ft^2) and was designed to increase the dry bulb temperature of foul air by 20°F.

5.6.1.1.c Carbon Adsorbers

Carbon adsorption is used as a polishing stage following chemical scrubbing. Heated foul air from the HEXs moves through two carbon adsorbers per train. Each adsorber in turn contains two carbon beds of 3-foot depth arranged vertically. Each adsorber is an FRP vessel 108 inches in diameter and approximately 15 feet tall, and loaded with granular activated carbon. Treated foul air exits the carbon adsorbers at the top of the FRP vessel and is discharged to the atmosphere via a stack.

5.6.1.1.d Foul Air Fans

Each odor control train is served by a single foul air fan with a rated capacity of 26,000 cfm and was designed to develop a static pressure of 17 inches of water column. The fans are all constructed of FRP and include FRP wheels that are 40.25 inches in diameter. The motors are 125 hp each, totally enclosed and fan-cooled, and rated for 95% efficiency at full load. Each fan discharges foul air directly upward into a vertical stack through air that exits the OCS. The inlet opening at each fan is regulated using an inlet vane damper to ensure that each train is operating at the design airflow rate. The fans operate at constant speed and pressure.

5.6.1.2 Current Operating Parameters and Performance

The performance of the OCS was evaluated in September 2012, when field investigations were conducted and airflow measurements were obtained at various points in the foul air collection system and the OCS. The field investigation showed that the airflow rates in the system varied between 85% and 104% of design capacity. However, the airflow in the OCS directly upstream of the foul air fans was higher and varied between 91% and 104%. Prior to the field investigation, it was thought that the system was operating at airflow rates significantly lower than design.

In addition to airflow measurements, grab samples and four-gas meter readings were taken at various locations in the system. Results of the laboratory analysis of the samples and the readings obtained from the four-gas meter indicated that the OCS was operating well. The hydrogen sulfide (H_2S) and ammonia concentrations at the inlet to the OCS were fairly low and the system was thus lightly loaded. Finally, the activated carbon in one of the adsorber vessels was sampled for visual observation. Although biofilm growth was suspected, it was not detected in the samples. A slight amount of stratification had occurred in the beds with smaller carbon granules occurring in greater numbers in the sample from the lower port of the bed compared to the top port. Details of the field investigation are available in the *Basis of Design Report, MBC Odor Control Facilities Upgrade, Brown and Caldwell, September 2013.*

Some of the mechanical equipment originally installed in the OCS are no longer in use. The water-carrying tubes in the HEXs corroded several years ago and the HEXs are therefore no longer in use. The inlet vane dampers upstream of the foul air fans were also removed and replaced with a flexible neoprene fitting. Modifications were also made to the foul air headers inside the carbon adsorber vessels to allow for better drainage of condensate. These modifications resolved operational issues related to condensate aspiration and carry-over that had previously existed.

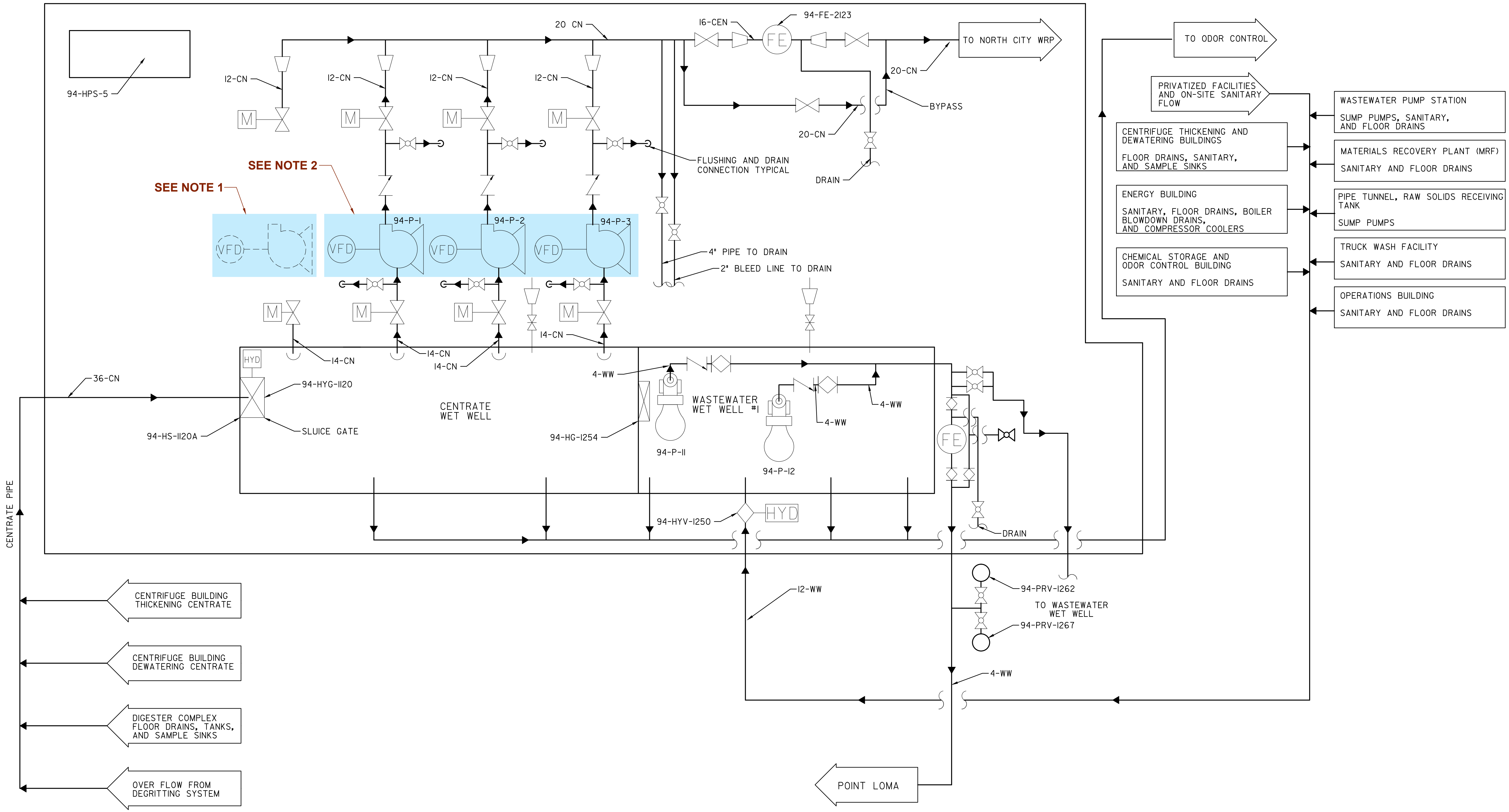
Table 5-22: Centrate Pump Station Facilities - Phase I Projected Equipment Improvements and Phase I Operating Conditions

Equipment Subsystem	Unit of Measure	Phase I Improvements								Phase I Operating Conditions		Capacity Assessment
		No. of Units Under Max. Conditions				Capacity			Summary of Improvements			
		Status	Total	Duty	Standby	Unit Capacity	Rated Capacity	Firm Capacity		Avg.	Max.	
Centrate Pumps	gpm	Existing	3	2	1	2,650	5,300	4,770				
TOTAL	**gpm**		**3**	**2**	**1**	**2,650**	**5,300**	**4,770**	No improvements needed	2,014	3,076	Firm capacity > Phase I max(1)
	MGD									2.90	4.43	

(1) Existing pumps have both the capacity and ability to develop the required head for the projected conditions.

Table 5-23: Centrate Pump Station Facilities - Phase II Projected Equipment Improvements and Phase II Operating Conditions

Equipment Subsystem	Unit of Measure	Phase II Improvements								Phase I Operating Conditions		Capacity Assessment
		No. of Units Under Max. Conditions				Capacity			Summary of Improvements			
		Status	Total	Duty	Standby	Unit Capacity	Rated Capacity	Firm Capacity		Avg.	Max.	
Centrate Pumps	gpm	Existing	3	2	1	2,650	5,300	4,770	Replace existing pumps and add fourth pump			Existing pumps are inadequate due to inability to generate sufficient head at projected flow
	gpm	**New**	**4**	**3**	**1**	**1,700**	**5,100**	**4,590**				
TOTAL	**gpm**		**4**	**3**	**1**	**1,700**	**5,100**	**4,590**		2,972	4,548	
	MGD									4.28	6.55	



LEGEND:

- NCWRP EXPANSION (PURE WATER PROGRAM) UPGRADES
- FOG ADDITION UPGRADES
- OTHER RECOMMENDED IMPROVEMENTS

NOTES:

1. INSTALL FOURTH CENTRATE PUMP.
2. REPLACE EXISTING CENTRATE PUMPS WITH NEW PUMPS CAPABLE OF HANDLING HIGHER HEAD.
3. HYDRAULIC LOADING REPRESENTS AN NCPWF PRODUCTION OF 30 MGD. REFER TO SECTION 9 OF THIS TECHNICAL MEMORANDUM FOR FURTHER DETAILS.

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IMPACTS OF NCWRP EXPANSION ON MBC

FIGURE 5-11

CENTRATE PUMP STATION REQUIRED EQUIPMENT IMPROVEMENTS

5.6.2 Projected Conditions: Phase I (15 mgd production at NCPWF) and Phase II (30 mgd Production at NCPWF)

5.6.2.1 Summary

The required expansion of the Grit Removal Facility will slightly increase the amount of foul air that requires treatment at the OCS. No other process changes or building expansions would increase the airflow requiring treatment. The expansion of the Grit Removal Facility will require treatment of an additional 2,000 cfm of foul air. This represents an increase of 4% in the foul airflow and possible H_2S loading at the OCS. Although the chemical scrubber was designed for an inlet H_2S concentration of 5 parts per million by volume (ppmv), the field investigation described earlier indicated inlet concentrations of under 0.5 ppmv. Therefore, a 4% increase in H_2S loading at the OCS would not pose any operation issues because the system is currently operating far below design loadings and has adequate capacity to handle higher loads.

In addition, the MBC Odor Control Facilities Upgrade work currently under way will implement certain changes to operational strategy as well as changes to equipment. The flexible connection upstream of the fan inlet will be replaced with an open-close type motorized damper to better isolate trains during standby mode. The fan motors will be provided with VFDs and will be operated to achieve constant flow to ensure that the system is operated in compliance with Air Pollution Control District (APCD) permit conditions.

5.6.2.2 Required Equipment Improvements

As discussed earlier, the existing OCS has adequate capacity to handle the minor increase in foul airflow. Therefore, this process does not require any improvements during either Phase I or Phase II.

5.7 Chemical Storage and Handling Systems

5.7.1 Existing Conditions

The discussion of chemical addition systems under this section is confined to only those chemicals that have a direct impact on the solids-processing operations at MBC. Sodium hypochlorite (SHC) and sodium hydroxide are stored and handled on site, and used to support the operation of OCSs, as described in Section 5.6.

The two chemicals of interest for the thickening, dewatering, and anaerobic digestion facilities are ferrous chloride ($FeCl_2$)[26] and anionic polymer (PEA)[27]. $FeCl_2$ is used to control sulfide production in the digesters, and PEA is used in conjunction with thickening and dewatering centrifuges to enhance solids removal.

In general, bulk chemicals are stored and diluted at the central Chemical Handling Facility (Area 60). From the central facility, chemicals are pumped to remote day tanks and day tanks located in the areas where the chemicals are used. In the case of PEA, the dilute polymer solution is transferred to two separate sets of day tanks: one set serves the dewatering centrifuges and the other serves the thickening centrifuges. In the case of $FeCL_2$, commercially available 28% to 32% concentration by weight $FeCL_2$ is transferred to either one of two day tanks located in a chemical room adjacent to the pipe galley in Area 80 at the digesters.

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[26] $FeCl_2$ is supplied as a liquid solution that is between 28% and 32% active ingredient by weight. The brown liquid has a specific gravity of 1.4 and is supplied by Kemira Inc. A value of 30% active ingredient by weight was used in calculations. See the safety data sheet for additional information (28).

[27] Polydyne supplies the PEA Clarifloc 331, which is used for both thickening and dewatering centrifuges. Clarifloc 331 is a Mannich polymer. See safety data sheet (27) for additional information.

5.7.1.1 Anionic Polymer Handling Facilities

Dilute PEA is stored in two separate areas within Building 76 in two separate sets of polymer day tanks. The dilute polymer feed pumps that deliver polymer to each centrifuge are mounted adjacent to the polymer day tanks. The room on the southeast corner of Building 76 serves the dewatering centrifuges; the room on the northeast corner of Building 76 serves the thickening centrifuges.

Modeling results indicate that the projected combined production of digested sludge from PLWTP and MBC is largely unchanged over the span of time between current conditions and Phase II conditions. As a result, the diversion of wastewater to meet the needs of the NCWRP Expansion has no significant impact on the existing polymer mixing and storage facilities for solids thickening and dewatering.

Although the throughput of dilute polymer solution for the thickening centrifuges will increase dramatically, the existing system will be able to meet the increased demand because of the batch-processing nature of the operation. Under current conditions, each of the two polymer day tanks for the thickening centrifuges alternates operation. It currently takes 10 hours for the thickening centrifuge to use the volume of dilute polymer solution. Extrapolating from this time span, a five-fold increase in throughput will result in a 2-hour cycle time. Even with a reduced cycle time for polymer transfer from the Chemical Building, the polymer system for thickening centrifuges is adequate to handle Phase II conditions. Further adjustments in high- and low-level set points can be made to lengthen cycle times if necessary.

The polymer feed pumps that feed thickening and dewatering centrifuges are discussed under the sections for thickening and dewatering—Sections 5.2 and 5.4, respectively. Based on this overall assessment of polymer systems, the remainder of this section focuses on the $FeCl_2$ addition system.

5.7.1.2 Ferrous Chloride Handling Facilities

$FeCl_2$ is transferred from Area 60 to one of two day tanks (80-T-01 and 80-T-02) housed in a dedicated chemical-handling area adjacent to the main gallery in Area 80. Currently, one day tank is operational and the other is out of service.

Two peristaltic feed pumps[28] (80-P-80 and 80-P-81), one duty and one standby, feed $FeCl_2$ from the day tank directly into the operating digester (digester 3 at the time of this writing) for control of H_2S. The speed of the duty pump is manually set based on the results of biweekly tests of H_2S levels in the digester gas. Each pump is fitted with a 12-millimeter (mm) Marprene tube element.

Using the available data for 2013/2014, the estimated ratio of dry active chemical per 1 ton of VSS is 99.3 lb/ton. Extrapolations based on this dosage are used to project the chemical addition feed rates under Phase I and Phase II conditions.

[28] Watson Marlow Bredel 620DUN/RE pumps. Although each pump is capable of operating at up to 265 rpm, the rotor warranty is void if the pump discharge pressures exceed 2 bar (29 psig) above the upper limit of 165 rpm. Currently, each pump operates with a two-roller head and a 12 mm Marprene tubing element. Each pump has the ability to operate at a higher capacity by replacing the 12 mm tube with a 17 mm tube.

Pump output under actual field conditions is considerably less than that predicted by the theoretical curves published by the pump manufacturer. Based on pump drawdown tests, the pump output at 92 rpm was 0.31 gpm. Assuming a maximum pump speed of 165 rpm, and prorating the pump output accordingly, the maximum output is 0.56 gpm. Typical operating feed rates are between 0.28 and 0.34 gpm. Occasionally feed rates are as high as 0.44 gpm when high sulfide concentrations are present. Table 5-24 presents this information. This assessment is based on 165 rpm and 0.56 gpm per pump as the maximum firm capacity of each peristaltic pump using 12 mm tubing[29].

Table 5-24: Chemical Handling - Ferrous Chloride Addition Facilities
System Design Criteria and Current Operating Conditions for the Existing System - 1 Digester in Operation

PARAMETER	UNIT OF MEASURE	SYSTEM DESIGN CAPACITY (1)		ESTIMATED FIRM CAPACITY	CURRENT OPERATING CONDITIONS		COMMENTS
		Avg.	Max.		Avg.	Max.	
Ferrous Chloride Feed	gpm	N/A	1.62	0.58 (3)	0.28	0.34	Ex. System adequate to handle current loads.
Day Tank Working Volume	gallons	N/A	576	576	N/A	217 (2)	Ex. System adequate to handle current loads.
Day Tank Cycle Time (2)	hours	N/A	5.9	7	N/A	10.6	Ex. System adequate to handle current loads.

(1) Capacity per pump based on a max rated rpm of 165 rpm. There are no design average values.

(2) Day tank fill starts at level 2.02 and shuts off at level 5.05. Levels are adjustable at the DCS.

(3) The firm capacity is derived by applying a derating factor for the pump to account for tubing attrition. Derating factor of 0.36 based on tests in which an existing pump at 130 rpm delivered 0.44 gpm instead of 1.28 gpm.

5.7.1.3 Ferrous Chloride: Near-Term Upgrades and Modifications

Under a construction contract that is in progress, City staff will add a third $FeCl_2$ metering pump (80-P-82). This pump will be identical to the existing peristaltic pumps. Pump 80-P-81 will serve as a standby pump to either 80-P-80 or 80-P-82.

The proposed chemical discharge piping system allows one pump to supply chemical to any one digester as long as only one digester is in service. The proposed piping does not necessarily anticipate the operating condition when all three digesters are in service. If all digesters are in service, 80-P-80 can feed only digester 1, 80-P-82 can feed only digester 3, and 80-P-81 can feed digester 2. If digester 2 is out of service, 80-P-81 is able to feed either digester 1 or digester 3 as a backup unit. No fourth backup pump is available to deliver $FeCl_2$ if any one of the three pumps is out of service.

[29] Although it is possible to run the pump at a maximum speed of 265 rpm, the warranty for the rotor is no longer in effect for applications above 165 rpm when the pressure exceeds 2 bar.

5.7.2 Projected Conditions: 30 mgd Production at NCPWF

5.7.2.1 Summary

Under Phase II maximum conditions, all three digesters will be operational and each of the three $FeCl_2$ pumps will be in service. No backup pump will be available under these conditions.

The projected rate of $FeCl_2$ delivery based on maximum VSS feed per digester is 0.47 gpm, which is less than the firm capacity per pump of 0.56 gpm. Table 5-25 shows that as a result, the existing pumps will have sufficient firm capacity assuming that 99.3 lb of active chemical per 1 ton of VSS is still an acceptable value at higher loadings.

5.7.2.2 Recommended Equipment Improvements

Under Phase II maximum conditions, there are no clear operating constraints on the $FeCl_2$ feed system. Several recommended modifications may improve the operability and longevity of the system. The projected pump speed at 0.47 gpm is 139 rpm.

Because of accelerated rates of wear on the tubing, this TM recommends the following based on feedback from pump manufacturers:

- Each pump is capable of operating with either 12 mm or 17 mm tubing. The larger-diameter tubing can be installed with the existing pump heads with relatively minor adjustments. With larger tubing installed, operations staff will have greater capacity. Alternately, the pumps with larger-diameter tubes can deliver the same rate of $FeCl_2$ at lower pump head speeds.

- Keep an off-the-shelf spare replacement pump in-stock at MBC as a backup to the three pump installation, which is pending.

If a fourth digester is constructed, the existing system will need to be expanded to include a fourth feed pump complete with valves, flow metering to match the existing, and associated double-containment feed piping between the pump and digester 4.

Construction of these improvements will require engineering design and preparation of construction documents including design drawings and specifications with exception of the spare off-the-shelf $FeCl_2$ feed pump.

5.7.3 Projected Conditions: 15 mgd Production at NCPWF

No special conditions are associated with the Phase I maximum conditions. The same recommendations provided under Section 4.7.2.2 also apply to Phase I.

Table 5-25: Chemical Handling Facilities - Ferrous Chloride Addition Facilities Existing System Design Criteria and Projected Operating Conditions									
Parameter	**Unit of Measure**	**System Firm Capacity (1) No. of Digesters Online**			**Phase I Operating Conditions**		**Phase II Operating Conditions**		**Comments**
					Avg.	**Max.**	**Avg.**	**Max.**	
Number of Digesters Online	#	1	2	3	2	2	3	3	
Volatile Solids Loading	lb VSS/d	70,027 (1)	140,053 (1)	175,067 (1)	85,337	96,431	125,972	142,348	
	tons VSS/d	35.0	70.0	87.5	42.7	48.2	63.0	71.2	
VSS Loading Per Digester	tons VSS/d	35.0	35.0	29.2	21.3	24.1	21.0	23.7	
Ferrous Dosage - lb active per ton VSS	lb active/ ton VSS	99.3 (2)	99.3	99.3	99.3	99.3	99.3	99.3	
Ferrous Chloride lb Active per Day	lb active/day	3,477	3,477	2,897	2,118	2,394	2,085	2,356	
Gallons per Day Ferrous Chloride	GPD	992.6	992.6	827.2	604.8	683.4	595.2	672.6	
Required Pump Output per Digester Loading	gpm	0.69 (3)	0.69	0.57	0.42	0.47	0.41	0.47	System adequate to handle max loads (3)
Available Pump Output Based on Tests (see Table 5-24)	gpm	0.58	0.58	0.58					

(1) See Table 5-9 for digester firm capacities.

(2) 99.3 lb Ferrous Chloride per lb VSS is current digester feed rate based on actual operating conditions.

(3) At their firm VSS loading capacity, and the same dose of Ferrous per ton as existing conditions, the projected chemical pumping rate is 0.69 gpm per digester. at a practical maximum of 0.58 gpm per Table 5-24 based on field tests, the pump is not sized to take full advantage of the digester loading capacity.

5.8 Utilities Extension Needs

The impact of increased raw solids flows and loadings from NCWRP on unit processes at MBC extends to the support utilities and systems. This assessment of support utilities is not exhaustive; it represents a summary of impacts on support utilities that were identified in the course of evaluating principal unit processes. Construction of these improvements will require engineering design and preparation of construction documents including design drawings and specifications.

In some cases, the expansion of existing unit processes was anticipated in the planning and design of the support systems for the original facility—for example, planning for electrical loads associated with a sixth thickening centrifuge.

In other cases, such as the overflows at the raw-solids-receiving tanks, the collateral impacts on support utilities are unintended. In this case, this TM has not made an attempt to include costs for these impacts for the following two main reasons:

- The raw-solids-receiving tanks were not included in the scope of this assessment. This TM identifies the issues for future consideration.
- Even if limited overflow capacity has a chance of occurring, it may be possible to address the issue through corrective action at NCWRP rather than at MBC. While these alternatives may not be hydraulically fail-safe, they may represent a cost-effective approach to an unlikely event.

5.8.1 Overflow/Site Drain

5.8.1.1 Existing Conditions

Two raw-solids-receiving tanks (73-T01 and 73-T-02) provide a storage buffer for flows of raw sludge from NCWRP. The current flow rate of raw sludge to the tanks is roughly 1 mgd, but projections at Phase II maximum conditions indicate that flows will increase from 0.89 mgd to a maximum of 6.55 mgd (see Table 5-6).

Each receiving tank has a capacity of 0.54 MG. One tank is the duty tank while the other is a backup. Raw solids are pumped out of the duty tank, through the closed-loop grit removal system and back to the tank; the thickening centrifuges take suction from the return line on the downstream side of the grit removal process.

In theory, the existing raw solids storage facilities are hydraulically fail-safe. Regardless of what may happen in terms of monitoring and control at the biosolids storage tank, the raw solids have a flow path that allows return of raw solids to the wastewater and centrate pump station. On high-high level conditions, the duty tank overflows to the backup tank assuming that the overflow lines are unobstructed. If the backup tank overflows, the overflow box discharges by gravity to a 10-inch-diameter drain and 8- and 12-inch-diameter plant sewer, which in turn flows by gravity to the wastewater pump station. An 18- by-12-inch gate at the wastewater pump station allows for overflow or displacement of solids into the adjacent wetwell of the centrate pump station. At the centrate pump station, drainage is returned to the NCWRP headworks.

Plant staff maintains a level reading between 20 and 24 feet in the duty receiving tank. The tank overflows at a level reading of 48. The net freeboard represents a volume of approximately 0.3 MG. Based on steady uniform flow, and flowing 90% full, the limiting capacity of the sewer is 2.03 mgd. For the final reach of 12-inch-diameter sewer upstream of the wastewater pump station, the limiting capacity is 5.4 mgd. The minimum capacity of the 10-inch-diameter drain is 1 mgd based on minimum slope.

5.8.1.2 Projected Phase II Conditions and Impacts

If we apply the current level settings at the Phase II maximum condition of 6.55 mgd, the available freeboard in the raw-solids-receiving tank will fill in approximately 1 hour and begin overflowing to the backup tank. It is likely that the 8-inch-diameter gas vent at the top of each tank is too small to handle the proposed rate of gas displacement without pressurizing the tank. Although the overflow weir has sufficient length for the Phase II maximum flow, the energy loss for a 10-inch-diameter outlet at 10.15 cubic feet per second (cfs) is such that the existing weir will become submerged, and the level in the tank will back up to fill the available headspace in the tank.

Assuming that the in-service tank is able to overflow to the backup tank, the backup tank will overflow in approximately 2 hours after the in-service tank fills. Downstream of the backup tank, the 8- and 12-inch-diameter sewers are too small to handle the Phase II maximum flow without surcharging the line.

It is anticipated that the 18-inch-wide by 12-inch-high gate opening between the wastewater pump station wetwell and the centrate pump station wetwell will act as a submerged orifice under Phase II maximum flows. The level will back up in the wetwell, but the structure will be able to contain the overflow water surface elevation.

5.8.1.3 Recommended Improvements

No discussion of improvements is provided at this time pending a review of facilities at NCWRP.

5.8.2 Evaluation of Existing Electrical Facilities and Expansion Needs

A preliminary evaluation of the impacts of the proposed process improvements at MBC required because of the NCWRP Expansion was conducted to determine needs for utilities extensions. In general, no major issues were noted in terms of electrical bus rating or transformer capacity at any of the process power distribution equipment. More details on specific equipment are available in the load list provided in Appendix D. However, below is a summary of findings and recommendations, organized by process.

5.8.2.1 Raw Solids and Grit Removal (Areas 73 and 76)

The analysis of the raw solids and grit removal processes resulted in the following findings:

- The electrical distribution system (EDS) overall capacity is sufficient to accommodate the net increase in process loads
- New raw solids pumps shall be supplied with a new circuit breaker, VFD, disconnect switch, conduit, and feeder as required

5.8.2.2 Thickening (Area 76)

The analysis of the thickening system processes resulted in the following findings:

- The EDS overall capacity is sufficient to accommodate the net increase in process loads
- New thickening centrifuge sludge feed pumps shall be supplied with a new circuit breaker, VFD, disconnect switch, conduit, and feeder as required
- New thickening centrifuge polymer feed pumps shall be supplied with a new circuit breaker, VFD, disconnect switch, conduit, and feeder as required
- New thickening centrifuge units shall be supplied with new a drive, disconnect switch, conduit, and feeders (main drive and backdrive motors) as required

5.8.2.3 Digester Facilities without FOG or Lystek Option (Area 80)

The analysis of the digestion processes (without FOG addition or Lystek) resulted in the following findings:

- The EDS overall capacity is sufficient to accommodate the net increase in process loads
- Motor control centers (MCC) lack sufficient space for the new loads
- New biogas compressors shall be supplied with a starter (at the MCC), disconnect switch, conduit, and feeder as required
- The new biogas flare shall be supplied with circuit breaker, conduit, and feeder as required

5.8.2.4 Digester 4 with FOG and Lystek Option (Area 80)

The analysis of the digestion process (with FOG addition and Lystek implementation) processes resulted in the following findings:

- The EDS overall capacity is sufficient to accommodate the net increase in process loads
- MCCs lack sufficient space for the new loads
- Two new 480-volt (V), 600-ampere (A) MCCs powered from unit substation (USS) 80 shall be provided for the new mixing pumps, axial mix pumps, and recirculation pumps
- New biogas compressors, mixing pumps, axial mix pumps, and recirculation pumps shall be supplied with a starter (at the MCC), disconnect switch, conduit, and feeder as required
- New biogas flares shall be supplied with circuit breaker, conduit, and feeder as required
- Miscellaneous digester and FOG loads shall be supplied with circuit breaker/starter/VFD, disconnect switch, conduit, and feeder as required

5.8.2.5 Dewatering (Area 76)

The analysis of the dewatering processes resulted in the following findings:

- The EDS overall capacity is sufficient to accommodate the net increase in process loads
- New dewatering centrifuge sludge feed pumps shall be supplied with a new circuit breaker, VFD, disconnect switch, conduit, and feeder as required
- New dewatering centrifuge polymer feed pumps shall be supplied with a new circuit breaker, VFD, disconnect switch, conduit, and feeder as required
- New dewatering centrifuge units shall be supplied with new a drive, disconnect switch, conduit, and feeders (main drive and backdrive motors) as required

5.8.2.6 Centrate Pump Station (Area 94)

The analysis of the centrate pumping processes resulted in the following findings:

- USS 94 2,000-kilovolt-ampere (kVA) transformers will need to rely on their forced-air (fan-cooled) rating to accommodate the net increase in process loads or be replaced with 2,250 kVA units as an option
- New centrate pumps shall be supplied with a new circuit breaker, VFD, disconnect switch, conduit, and feeder as required

5.8.2.7 Capacity of the SDG&E and Fortistar Cogeneration System

The analysis of the cogeneration processes resulted in the following findings:

- Per a review of SDG&E electric bills for MBC from December 2012 through May 2014, the existing maximum demand is estimated to be approximately 2.5 MW
- Per the load list provided in Appendix D, the (net) added maximum demand at MBC is estimated to be approximately 3.1 MW (assuming 0.9 power factor, 0.83 efficiency) with FOG and Lystek option considered (worst-case scenario)
- The new maximum demand at MBC is estimated to be approximately 5.6 MW (2.5 MW + 3.1 MW)
- Assuming a generation capacity of 6.4 MW, the Fortistar cogeneration system appears to have sufficient capacity to accommodate the new maximum demand at MBC
- If the Fortistar cogeneration system is not to be relied upon to supply the entire power to the facility, SDG&E shall make provisions if necessary to ensure that it can meet the new maximum demand

5.8.3 Thickened Sludge Feed Lines

See Section 5.2.3.2 for discussion of thickened sludge transfer/digester feed operation.

5.8.4 Biogas Headers

See Section 5.3.3.2 for discussion of biogas headers.

5.8.5 Hot Water Supply/Hot Water Return Lines

See Section 5.10.2.2 for discussion of HWS and HWR.

5.8.6 Ferrous Chloride Feed

See Section 5.7 for a discussion of $FeCl_2$ feed lines to digester 4.

5.8.7 Utility Water High-Pressure

For those scenarios including construction of a fourth digester, utility water high-pressure (UWHP) piping will be extended to digester 4 in conjunction with construction of a gallery extension.

5.8.8 Distributed Control System

5.8.8.1 Existing Conditions

MBC uses Emerson's Ovation DCS platform for process control and data acquisition. The DCS consists of a series of process control modules (PCMs) that are interconnected via drops on a plant information network. Each PCM includes dual redundant processors. The PCMs are housed in dedicated control enclosures located throughout the facility.

PCMs interface with manufacturer-furnished programmable logic controllers (PLCs), field instruments, and primary control elements such as valve actuators, VFDs, and MCCs to create an integrated DCS. In the listing of input/output (I/O) points that interface at each PCM, there are usually spare I/O points for future use.

Thickening centrifuges 1 and 2, and their related sludge and polymer feed pumps, are controlled via 76-PCM-01; thickening centrifuges 3 and 4 are controlled via 76-PCM-02A; and thickening centrifuge 5 is controlled via 76-PCM-03. Each of these PCM cabinets is located on the second floor of Building 76.

The existing biogas compressors and related system components are controlled via 80-PCM-05 located in the Digester Control Building.

5.8.8.2 Projected Phase II Conditions and Impacts

The installation of a sixth thickening centrifuge, with its related support equipment, will have an impact on the I/O associated with centrifuge monitoring and control. The cabinet and racks in 76-PCM-03 have available slots for additional I/O. This is predictable given that both 76-PCM-01 and 76-PCM-02A support two thickening centrifuges. Based on recent experience with the replacement dewatering centrifuges, the three PCM cabinets will need to be retrofitted with Ethernet controllers and routers for managing the interface between the manufacturer-furnished control enclosures for the thickening centrifuges and the existing PCM cabinets.

PCM enclosure 80-PCM-05 will need to be field-verified to confirm that I/O slots are available for the proposed future expansion of the biogas compressors and flares.

5.8.8.3 Recommended Improvements

The only alternative available entails retrofitting the existing PCM enclosures to support the proposed additional process equipment and replacement equipment as outlined in Section 5.2-3.

5.9 Additional Siting Considerations

5.9.1 Existing Conditions

Figure 2-1 shows the existing site configuration. Each process area is coded to a number in the figure, which describes its function.

5.9.2 Projected Conditions: 30 mgd Production at NCPWF

Figure 2-1 shows the proposed upgrades that would impact the site: primarily the FOG facilities, grit facilities, and digester 4. All other upgrades and improvements occur within or adjacent to existing buildings.

5.10 Waste Heat Utilization System

5.10.1 Existing Conditions

5.10.1.1 Existing Facilities

5.10.1.1.a Waste Heat Utilization System

The current waste heat utilization system consists of eight internal-combustion engines owned and operated by Fortistar under contract to provide waste heat from the engine jacket and lube oil cooling, two natural gas 10.2 MMBtu/hr boilers, primary and secondary water recirculation pumps, and a 10-inch-diameter HWS/HWR conveyance system that provides hot water to three anaerobic digesters (with potential addition of two digesters in the future) and building space heating. The hot water loop operates within a supply/return temperature range of 160°F–170°F/145°F, respectively.

The hot water/engine waste heat is provided on an as-needed contractual basis by Fortistar and is invoiced monthly for the amount used. MBC was designed for waste heat absorption chilled water and other building- and process-related opportunities including supplemental heating for enhanced odor control treatment.

5.10.1.1.b Cogeneration Facility

The MBC Cogeneration Facility consists of four 1,600-kilowatt (kW) tandem cogeneration units, each consisting of two 800 kW Caterpillar 3516 engines connected to one 1,600 kW generator, and associated switchgear and heat recovery system. Eight Caterpillar G3516TA 1,053 HP engines operating on a blend of landfill and digester gas with heat recovery of 2.28 MMBtu/hr from the jacket and lube oil heat rejection. The recovered heat from each engine is run through a HEX to extract the heat that is provided to MBC.

Table 5-26 below summarizes that design intent was to operate three 1,600 kW tandem systems with a combined available waste heat. Original design allowed for maximum heat utilization for all digester HEXs, building heating, sludge, and odor process heating and a 675-ton absorption cooler. The absorption cooler concept as well as the odor and sludge heat were abandoned and removed from the waste heat system.

Table 5-26: Available Waste Heat from MBC Engines/Generators 1–4

Power Production Unit	Size (MW)	Available Jacket Waste Heat (MMBtu/hr)	Annual Waste Heat Available @ 90% Online (MMBtu)
Cogeneration engines 1A and 1B	1.60	5.50	43,350
Cogeneration engines 2A and 2B	1.60	5.50	43,350
Cogeneration engines 3A and 3B	1.60	5.50	43,350
Cogeneration engines 4A and 4B	1.60	5.50	43,350
Total	**4.8** [a]	**16.50***	**130,005** [(1)]

(1) Assuming three of four in operation.

5.10.1.1.c Backup Waste Heat Generation: Boilers

If for any reason the hot water source from the MBC Cogeneration Facility is interrupted and/or curtailed, two Superior Boiler Works fire tube boilers (70-B-01 and 70-B-02), are used to reheat the HWR. The purpose of the fire tube boilers is to transfer heat to water by gradually heating HWR as it passes through the boiler, traveling around the heating tubes. The hot water (180°F) then exits the boiler and mixes with the secondary loop as required to maintain the desired HWS temperature of 160°F.

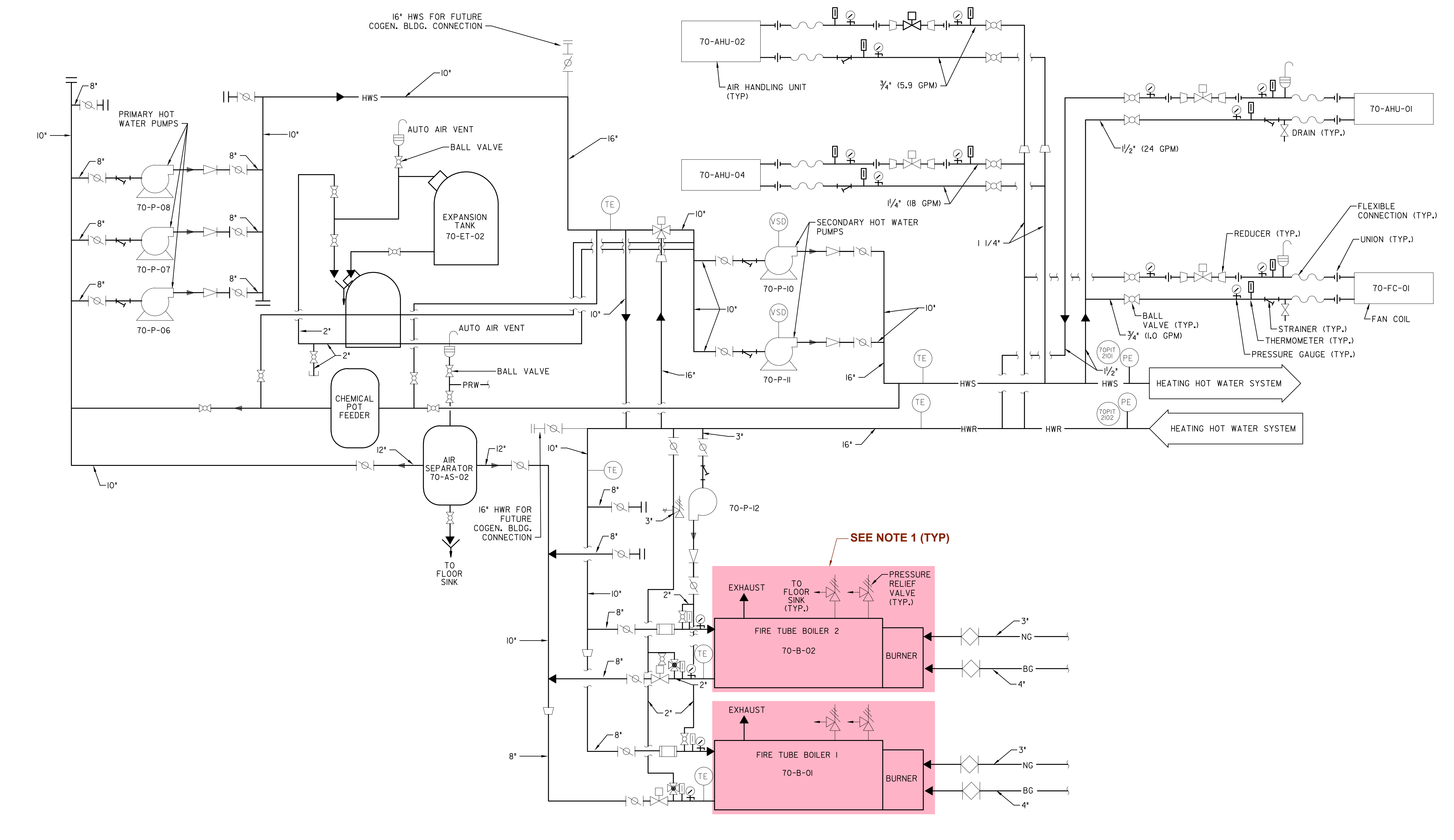
Each boiler is a three-pass fire tube with a water flow rate of 850 gpm outlet temperature 180°F natural, digester, landfill gas rated at 10.2 MMBtu/hr firing rate. Currently, each boiler has an air permit for natural gas firing with an annual fuel limit of 220,000 therms.

5.10.1.1.d Waste Heat Circulation System

Waste heat from the cogeneration engines is utilized in the heating hot water system. Process schematics for the heating hot water system and for the hot water circulation piping are presented in Figure 5-12 and Figure 5-13, respectively.

In accordance with the design, two sets of hot water circulation pumps are provided. The primary hot water pumps consist of three pumps (70-- 06 through 08). The purpose of these pumps is to recirculate HWR through the fire tube boiler for reheating. The primary hot water pumps draw off a common 10-inch HWR header through an 8-inch-diameter suction line, and discharge through an 8-inch-diameter discharge line to a common 10-inch-diameter HWS discharge line. The HWS/HWR temperatures range from 160°F to 170°F /145°F. Each pump is a Bell & Gossett centrifugal pump, 850 gpm equipped with a constant-speed 20 hp motor.

The secondary hot water pumps consist of two pumps (70-P-10 and 7- P-11) that circulate hot water throughout the HWS loop at MBC. Each pump is a Bell & Gossett centrifugal pump, 2,550 gpm equipped with a VFD 150 hp motor. The MBC hot water system is a dynamic system, meaning hot water is always flowing, and is designed to supply hot water on demand. The maximum flow rate of hot water through the HWS loop is 5,100 gpm, as determined by the pumping capacity of the two secondary hot water pumps.



LEGEND:

- NCWRP EXPANSION (PURE WATER PROGRAM) UPGRADES
- FOG ADDITION UPGRADES
- OTHER RECOMMENDED IMPROVEMENTS

NOTES:

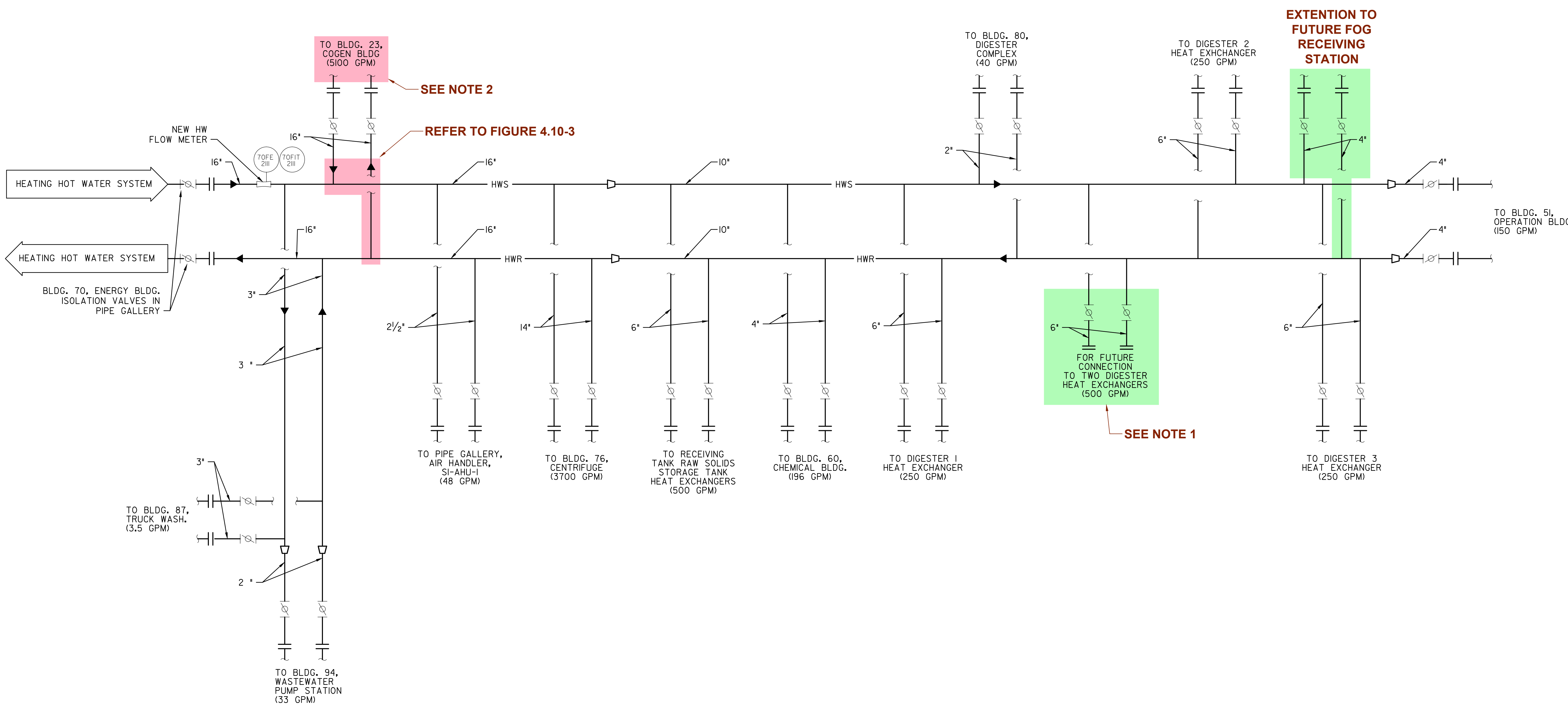
1. CONVERSION OF EXISTING BOILERS TO BIOGAS UTILIZATION IS RECOMMENDED.
2. HYDRAULIC LOADING REPRESENTS AN NCPWF PRODUCTION OF 30 MGD. REFER TO SECTION 9 OF THIS TECHNICAL MEMORANDUM FOR FURTHER DETAILS.

MWH. Brown AND Caldwell
BLP Engineers, Inc.

IMPACTS OF NCWRP EXPANSION ON MBC

FIGURE 5-12

HEATING HOT WATER SYSTEM PROCESS SCHEMATIC



LEGEND:

- NCWRP EXPANSION (PURE WATER PROGRAM) UPGRADES
- FOG ADDITION UPGRADES
- OTHER RECOMMENDED IMPROVEMENTS

NOTES:

1. CONSTRUCTION OF DIGESTER NO.4 WILL BE REQUIRED TO ACCOMMODATE PHASE II CONDITIONS WITH ADDITION OF FOG.
2. POTENTIAL ADDITIONAL HARVESTING OF WASTE HEAT FROM COGENERATION ENGINES NO.5 AND NO.6 IS RECOMMENDED.
3. HYDRAULIC LOADING REPRESENTS AN NCPWF PRODUCTION OF 30 MGD. REFER TO SECTION 9 OF THIS TECHNICAL MEMORANDUM FOR FURTHER DETAILS.

MWH. Brown AND Caldwell
BLP Engineers, Inc.

IMPACTS OF NCWRP EXPANSION ON MBC

FIGURE 5-13

HEATING HOT WATER CIRCULATION PIPING PROCESS SCHEMATIC

5.10.1.1.e Waste Heat Use Areas

Table 5-27 summarizes the HWS/HWR loop services several areas within MBC and the design intention and allocated hot water flow rates. The information in this table is also depicted in Figure 5-13.

Table 5-27: Design Hot Water Distribution

Process Area	Maximum Flow
Digester complex	40 gpm
Digester HEXs	750 gpm (future expansion will add 500 gpm flow demand)
Operations Building	150 gpm
Chemical Building	196 gpm
Raw-solids-receiving tank HEXs	500 gpm (not currently used)
Centrifuge Building	3,700 gpm
Pipe gallery	48 gpm
Wastewater pump station	33 gpm
Truck wash	3.5 gpm
Total connected hot water system flow requirement	5,420.5 gpm

5.10.1.2 Current Operating Parameters and Performance

As noted above, the current waste heat utilization system consists of eight internal-combustion engines owned and operated by Fortistar under contract to provide waste heat from the engine jacket and lube oil cooling, two natural gas 10.2 MMBtu/hr boilers, primary and secondary water recirculation pumps, and a 10-inch-diameter HWS/HWR hot water conveyance system that provides hot water to three anaerobic digesters (with potential addition of two digesters in the future) and building space heating.

Table 5-28 summarizes available waste heat and additional capability of boilers 70-B-01 and 70-B02.

Table 5-28: Available Waste Heat from Boilers 70-B-01 and 70-B-02			
Boiler Unit	**Input Fuel MMBtu/hr**	**Available Heat (MMBtu/hr) @ 70%**	**Annual Waste Heat Available @ 90% Online (MMBtu)**
70 B 01	10.2	7.1	55,980
70 B 01	10.2	7.1	55,980
Total	**20.4**	**14.2**	**111,960**

Total combined waste heat available is approximately 30 MMBtu/hr and 241,000 MMBtu/yr providing that three of the four engine modules and both boilers are in-service. Table 5-29 summarizes the current HWS/HWR loop service areas within MBC.

Table 5-29: Current Hot Water Distribution	
Process Area	**Maximum Flow**
Digester complex	40 gpm
Digester HEXs	750 gpm
Operations Building	150 gpm
Chemical Building	196 gpm
Raw-solids-receiving tank HEX	500 gpm (not currently used)
Pipe gallery	48 gpm
Wastewater pump station	33 gpm
Total connected hot water system flow required	1,757 gpm
Total hot water system flow available	5,450 gpm
% of excess hot water capacity	32%

Digester gas production and the potential for additional hot water generation is a critical component in the overall future of MBC and the long-term solids management. Table 5-30 summarizes the existing digester gas production considering design and current conditions. The digester gas is provided under contract to the MBC Cogeneration Facility as a fuel source for a beneficial energy rate to power MBC. The City has a contract with Fortistar (MBC Cogeneration) to allocate all MBC site-derived digester gas up to 354,068 scfd.

Table 5-30: Digester Gas Generation (design and current)		
Parameter	**Average Digester Gas (scfd)**	**Maximum Digester Gas (scfd)**
Design	387,370	575,056
Current	245,520	283,637
Fortistar contractual allocation	354,068	354,068
% of design	63	50
% of Fortistar allocation	70	80
% excess available	0	0

Tables 5-30 and 5-31 illustrate that MBC is operating well below the design capabilities of MBC.

5.10.2 Projected Conditions: Phase I (15 mgd production at North City Pure Water Facility [NCPWF]) and Phase II (30 mgd production at NCPWF) without FOG and/or Lystek

5.10.2.1 Summary

Projected NCWRP biosolids flows and loads for different operating scenarios have been analyzed based on the mass balance data presented in Section 4.1 and reflected in Appendix B for Phase I (15 mgd production at NCPWF), and Appendix C for Phase II (30 mgd production at NCPWF). **The hot water requirements for Phase I and Phase II are estimated to remain within the current hot water heat requirements and well below the hot water design capabilities.** Table 5-31 shows that the digester gas generation will substantially increase with the implementation of Phase I and Phase II Pure Water facilities.

Figure 5-14 illustrates that MBC/Pure Water will increase the generation of digester gas by approximately 300% and 400% of existing for Phase I and Phase II, respectively. The generation of digester gas will significantly exceed the contractual allocation of digester gas supply to Fortistar and therefore present possible digester gas utilization opportunities.

5.10.2.2 Recommended Equipment Improvements

Phase I and Phase II projected operating conditions and improvements without FOG addition and Lystek are shown in Tables 5-12 and 5-13, respectively. It is assumed that upgrades and new facilities associated with the HWS/HWR will not be required.

Discussions with MBC plant staff and MBC Cogeneration Facility operators indicated an opportunity to allow improved use of MBC Cogeneration Facility hot water and to minimize the need for standby boiler operation. In order to improve hot water loop management, it is recommended that the interconnection of the MBC Cogeneration Facility and the MBC HWS/HWR loop be reconfigured. This includes extension of the MBC Cogeneration Facility HWS return line to the HWR approximately length of 4 feet of 10-inch-diameter pipe, installation of a three-temperature/flow process control interface to allow a more refined control of the HWS/HWR loop, and minimize the inadvertent use of the standby boilers.

Figure 5-14, Figure 5-13 and Figure 5-14, respectively, present this information. This enhancement would provide an extension of the MBC Cogeneration Facility HWR interconnection to the HWR loop return line, similar to the original design intent and to incorporate and integrate a temperature/flow control strategy to allow more efficient use of MBC Cogeneration Facility hot water.

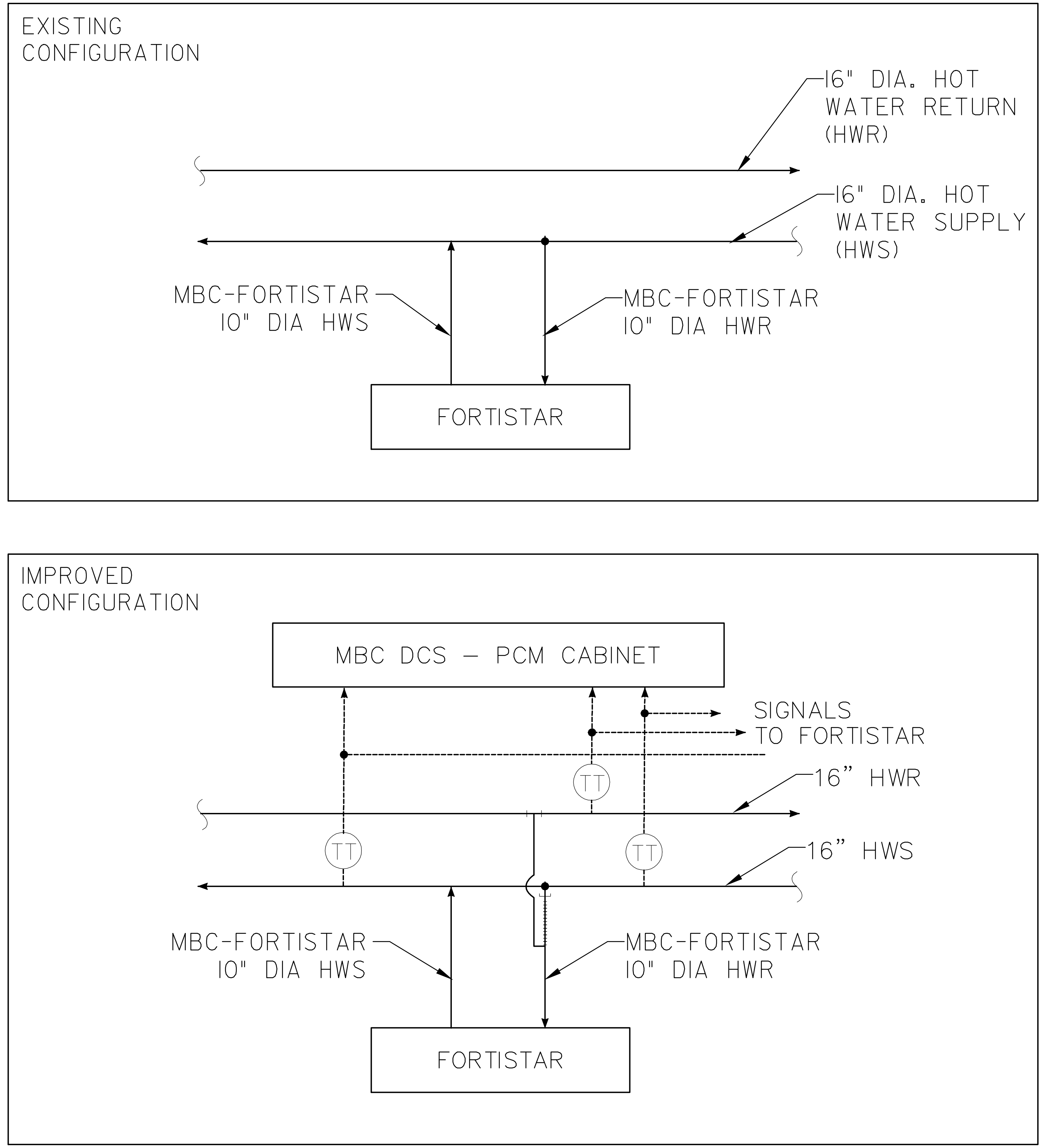
5.10.3 Projected Conditions: Phase I (15 mgd production at NCPWF) and Phase II (30 mgd production at NCPWF) with FOG and Lystek

5.10.3.1 Summary

The hot water requirements for Phase I and Phase II are estimated to increase slightly based on the addition of FOG (Phase I), digester 4 (Phase II), and additional building heating of future structures during Phase I and Phase II. Table 5-31 provides the estimated hot water flow projections with FOG/Lystek.

Table 5-31: Estimated Hot Water Distribution with FOG/Lystek

Process Area	Maximum Flow
Digester complex	40 gpm
Digester HEXs	750 gpm
Operations Building	150 gpm
Chemical Building	196 gpm
Raw-solids-receiving tank HEX	500 gpm (not currently used)
Pipe gallery	48 gpm
Wastewater pump station	33 gpm
FOG heating	250 gpm (Phase I)
Additional digester 4 HEX	250 gpm (Phase II)
Additional space heating future structures	100 gpm (Phases I–II)
Estimated total connected hot water system flow	2,357 gpm
Total available	5,450 gpm
% of hot water capacity	43%



IMPACTS OF NCWRP EXPANSION ON MBC

FIGURE 5-14

HWR AND HWS IMPROVEMENTS

MWH. Brown AND Caldwell BLP Engineers, Inc.

As noted above, with the entire buildout of Pure Water and FOG/Lystek, the existing hot water system is adequate to meet the heating requirements. The ultimate buildout will use slightly more than 40% of the original design capacity.

Table 5-32 shows that the digester gas generation will substantially increase with the implementation of Phase I and Phase II Pure Water facilities with FOG and Lystek.

Table 5-32: Digester Gas Generation: Comparison of Current, Phase I, and Phase II, FOG and FOG/Lystek

Parameter	Average Digester Gas (scfd)	Maximum Digester Gas (scfd)
Design: 2015	387,370	575,056
Current: 2015	245,520	283,637
Contractual allocation to Fortistar	354,068	354,068
Phase I Pure Water: 15 mgd	764,749	864,166
Phase II Pure Water: 30 mgd	1,080,127	1,220,543
Phase I Pure Water: 15 mgd—FOG	1,353,296	1,485,852

Table 5-32 illustrates how MBC/Pure Water, Pure Water plus FOG, and Pure Water plus FOG/Lystek will substantially increase the generation of digester gas well over the Fortistar digester gas allocation. Although the additional digester gas is not required to generate any additional hot water, the City is pursuing process alternatives to generate more renewable energy to augment the Pure Water NCWRP suite of projects, generate additional waste heat to convert Class B solids into Class A Exceptional Quality solids, and minimize the waste of a renewable fuel by flaring. The opportunities for development and utilization of waste heat are discussed in Section 5.10.4.

5.10.3.2 Required Equipment Improvements

Phase I and Phase II projected operating conditions and improvements with FOG addition and with FOG plus Lystek are shown in Tables 5-14 and 5-15, respectively and also presented in Figures 5-12 through 5-14 which identify specific improvements related to the NCWRP expansion (Pure Water Program), FOG addition, and other recommended improvements focused on improving process reliability and performance. The new FOG facilities will require supplemental hot water heating to maintain the FOG in a temperature range of 70°F to 80°F for ease of storage and distribution.

The following improvements will need to be implemented:

- **Phase I/Phase II:** Extend HWS and HWR lines to the new FOG receiving station. Based on the information presented on record drawings, existing 10-inch-diameter HWS and HWR pipes at the very eastern end of the digester gallery between digester 1 and digester 3 are each provided with a concentric reducer down to 4-inch diameter at El. 396 feet for further supply to the plant hot water needs. It is proposed to modify this arrangement and to replace the subject reducers with 10-by-4-by-4-inch tees to be connected to the existing 4-inch-diameter HWS and HWR lines and to new 4-inch-diameter HWS and HWR Schedule 80 insulated steel lines extending through the east wall of the digester gallery, then north via Plant Road “D” to the potential location of the FOG receiving station at the northeastern corner of the MBC side and immediately northwest from the existing parking lot. The length of each subject line is estimated to be 400 feet. These lines will further split into three 3-inch-diameter lines leading to the HEXs that will be provided to heat contents of the FOG receiving station holding tanks, and will each be equipped with isolation valves and three-way thermal valves. The firm selected for final design of MBC improvements will be required to further evaluate sizing of the HWS and HWR line extension to the FOG receiving station.

- **Phase II:** Extend HWS and HWR to new digester 4 HEX similar to the existing three digesters. Extension of the digester gallery to the south between digester 4 and future digester 5 and extension of the hot water system will be required to accomplish this connection.

5.10.4 Utilization of Excess Digester Gas: General Discussion

5.10.4.1 Summary

Table 5-32 illustrates that the ultimate digester gas production under the Phase II Pure Water and FOG/Lystek will generate approximately 1,530 cfm of digester gas on an average daily basis. The contractual allocation for Fortistar (245 cfm) will reduce the amount of available digester gas for use from 1,530 cfm to approximately 1,285 cfm. In 2009, BC prepared the Biosolids Technology Evaluation for MBC (18) and noted several possible options to improve the quality and reduce the quantity of biosolids using heating technologies. After extensive review of a large number of technologies and alternatives, the following four treatment technologies emerged as viable and warranting further assessment (see References (18) and (44)):

- Enhanced digestion (eliminated because of space and operational restrictions at MBC and PLWTP)
- Direct heat drying (belt dryer 51.6 MMBtu/hr; drum dryer 59 MMBtu/hr)
- Thermal oxidation/incineration (3.9 MMBtu/hr normal operating)
- Heat augmentation for greenhouse biosolids solar dryers (20.5 MMBtu/hr waste heat augmentation)

SlurryCarb technology listed in Reference (18) is out of business and is thus not recommended for further consideration.

Using the entire digester gas generated under Phase II + FOG/Lystek less the Fortistar contractual allocation as the potential hot water (waste heat source) of 1,285 cfm, a boiler operation can generate approximately 30.0 MMBtu/hr assuming 65% boiler efficiency in an external-combustion process or using a cogeneration type configuration similar to MBC Cogeneration Facility jacket waste heat, and 14.8 MMBtu/hr assuming an efficiency of 32%.

5.10.4.2 Additional Heating System Improvements Enhancements

Using the excess digester gas generation for supplemental hot water will reduce the need for natural gas fuel supplies to support the various biosolids alternatives. The following three hot water generation strategies could be provided to supply all or a large portion of the external heating demands as shown in Figures 5-12 through 5-14) harvest hot water from existing assets including MBC: cogeneration engines 5 and 6; 2) convert existing boilers to digester gas status and generate hot water; and 3) use the waste heat from the new cogeneration process being considered as part of Pure Water.

A brief narrative and implementation strategy is provided for each strategy below.

Strategy 1. Convert the existing Marine Air Corps Station (MCAS) Miramar two 1.6 MW engines into “air-cooled” or “water-cooled” configuration, allowing MBC to use the jacket waste heat from the engines if needed. The waste heat utilization concept would include the following components:

- Request and receive permission from MCAS Miramar to upgrade and recover waste heat from the two existing engines.
- Install a waste heat diversion system (HEXs, three-way valves, process controls) for two engines to allow circulation and use of waste heat or diversion to the existing air-cooled systems.
- Re-purpose the insulated 8-inch-diameter cooling water supply/return system to an underground HWS (8-inch diameter) and HWR conveyance pipe loop with two 25 hp circulation pumps (one operating and one standby) operating continuously. The interconnection, three-way valves, controls to the existing 16-inch-diameter HWS and HWR loop within the gallery will be similar to the existing engine-generators 1 through 4.
- Upgrade temperature controllers to monitor HWR temperature and divert sufficient HWS to maintain loop parameters. The ultimate distribution of the harvested hot water is dependent on the location of the specific hot water use and therefore further design and refinement will be required.

Strategy 2. Convert existing boilers to digester gas-fired boiler status to allow excess digester gas use. Integration of existing boilers operating on digester gas to support sludge processing hot water requirements would include evaluating reactivate digester gas supply systems to use digester gas, modify existing APCD permit to allow digester gas, and source test boilers to demonstrate air quality compliance.

Strategy 3. Develop a cogeneration facility (generate power and waste heat source) or expand the boiler plant (generate waste heat) to utilize the entire amount of renewable digester gas. The City is exploring the cogeneration, waste heat, and enhanced solids-processing options and this is beyond the scope of this analysis.

6 Opinion of Probable Cost

This TM includes an OPC for potential upgrades/modifications associated with impacts of the NCWRP Expansion on MBC. In accordance with Association for the Advancement of Cost Engineering International (AACEI) criteria, a Class 5 estimate has been prepared as part of this TM. A Class 5 estimate is typically based on a design where engineering is between 0 and 2% complete. Class 5 estimates are used to prepare planning-level cost scopes or evaluation of alternative schemes, long-range capital outlay planning, and can also form the base work for the Class 4 planning-level or design technical feasibility estimate.

The expected accuracy for a Class 5 estimate is between -50 and +100%, depending on the technological complexity of the project, appropriate reference information, and the inclusion of an appropriate contingency determination. In unusual circumstances, ranges could exceed those shown.

The estimate was prepared by using quantity takeoffs and vendor pricing for major equipment. Construction crew labor hours were calculated from production rates published in several databases such as R.S. Means and Mechanical Contractors Association. Costs related to the contractor's general conditions, risk, general liability, and automobile insurance are also included in the estimate. The estimate assumes that construction would be limited to 5 days per week during normal, daytime, 8-hour shifts. A complete list of assumptions is provided in the Basis of Estimate report in Appendix E.

The costs incurred for improvements at MBC are divided into the following three broad categories:

- The first category are costs related to the NCWRP Expansion. These are costs of upgrades required at MBC as a result of the NCWRP Expansion as part of implementation of Pure Water causing increased flows and loads at MBC. These upgrades will be required regardless of any other conditions at MBC.
- The second category are costs related to the implementation of FOG addition at MBC (utilization of other organic waste such as food waste or green waste are not evaluated under this project). These are costs of upgrades required to the anaerobic digestion system and their appurtenant facilities to handle the increased solids loading due to FOG addition, construction of the FOG receiving station, and extension of utilities to the FOG receiving station. These costs are attributed solely to the FOG addition and would not have been required if FOG is not added to the digesters.
- The third category are costs listed as "other." These are costs associated with upgrades that are recommended but not required. Although MBC would be capable of operating without these upgrades, the plant would operate more reliably and efficiently if these recommended upgrades are implemented. Table 6-1 and Table 6-2, respectively, present costs that have been separated into individual processes or process areas at MBC for Phase I and Phase II conditions, respectively. These costs reflect the current date (June 2016) and no escalation to midpoint of construction schedule is included. Complete details are available in the detailed OPC provided in Appendix E.

Table 6-1: Cost Summary for Upgrades Required for Phase I Conditions (1)

Construction Cost Breakdown	NCWRP Expansion (Pure Water)	FOG Addition	Other Recommended Improvements	See Note (3)
Grit removal	$0	$0	$0	
Thickening centrifuges	$9,119,000	$0	$0	
Digester system (2)	$1,165,000	$4,189,000	$2,206,000	
Dewatering centrifuges	$0	$0	$0	
Centrate system	$0	$0	$0	
Odor control	$0	$0	$0	
Chemical storage	$0	$0	$0	
Evaluation of utilities	$0	$0	$0	
Additional facilities siting	$0	$0	$0	
Waste heat utilization	$0	$73,000	$628,000	
Subtotal construction cost	$10,284,000	$4,262,000	$2,834,000	
Contingency (40%)	$4,114,000	$1,705,000	$1,134,000	
Total construction cost	**$14,398,000**	$5,967,000	$3,968,000	**See Note (4)**
Delivery Costs (5),(6)				
Predesign (2.1%)	$302,000	$125,000	$83,000	
Detailed design (7.1%)	$1,022,000	$424,000	$282,000	
ESDC (1.4%)	$202,000	$84,000	$56,000	

Table 6-1: Cost Summary for Upgrades Required for Phase I Conditions [1]				
Construction Cost Breakdown	**NCWRP Expansion (Pure Water)**	**FOG Addition**	**Other Recommended Improvements**	**See Note [3]**
CM: bid phase (0.4%)	$58,000	$24,000	$16,000	
CM: construction phase (6.8%)	$979,000	$406,000	$270,000	
Environmental: review and permitting (1.4%)	$202,000	$84,000	$56,000	
Environmental: construction compliance (2.1%)	$302,000	$125,000	$83,000	
PM: City project management (3.6%)	$518,000	$215,000	$143,000	
PM: other City departments (1.4%)	$202,000	$84,000	$56,000	
Subtotal delivery costs	**$3,787,000**	**$1,571,000**	**$1,045,000**	
Other Costs [6]				
Land acquisition	$0	$0	$0	
Environmental mitigation (2.1%)	$302,000	$125,000	$83,000	
Subtotal other costs	**$302,000**	**$125,000**	**$83,000**	
Total project cost	**$18,487,000**	**$7,663,000**	**$5,096,000**	**Grand Total**
Without FOG addition, other upgrades included	**$18,487,000**	**$0**	**$5,096,000**	**$23,583,000**
With FOG addition and other upgrades [7]	**$14,896,000**	**$7,663,000**	**$5,096,000**	**$27,655,000**

(1) All numbers presented in the table are construction OPCs without the 40% contingency.

(2) Cost for FOG-receiving station derived from CH2M Hill report, contingency deducted from reported cost.

(3) The total depends on whether FOG addition is selected.

(4) The project construction subtotal depends on whether FOG addition is selected.

(5) Fixed costs are per baseline budget or current Pure Water directive.

(6) Delivery and other costs based on the total construction cost.

(7) The total project cost excludes digester system costs related to NCWRP Expansion because the upgrades associated with FOG addition cover these operating conditions.

Table 6-2: Cost Summary for Upgrades Required for Phase II Conditions [(1)]				
Construction Cost Breakdown	**NCWRP Expansion (Pure Water)**	**FOG Addition**	**Other Recommended Improvements**	**See Note [(3)]**
Grit removal	$2,721,000	$0	$0	
Thickening centrifuges	$15,199,000	$0	$0	
Digester system [(2)]	$1,026,000	$14,764,000	$2,206,000	
Dewatering centrifuges	$0	$0	$3,337,000	
Centrate system	$956,000	$0	$0	
Odor control	$0	$0	$0	
Chemical storage	$0	$0	$0	
Evaluation of utilities	$0	$0	$0	
Additional facilities siting	$0	$0	$0	
Waste heat utilization	$0	$73,000	$628,000	
Subtotal construction cost	$19,902,000	$14,837,000	$6,171,000	
Contingency (40%)	$7,961,000	$5,935,000	$2,469,000	
Total construction cost	**$27,863,000**	**$20,772,000**	**$8,640,000**	**See Note [(4)]**
Delivery Costs [(5),(6)]				
Predesign (2.1%)	$585,000	$436,000	$181,000	
Detailed design (7.1%)	$1,978,000	$1,475,000	$613,000	
ESDC (1.4%)	$390,000	$291,000	$121,000	
CM: bid phase (0.4%)	$111,000	$83,000	$35,000	
CM: construction phase (6.8%)	$1,895,000	$1,412,000	$588,000	
Environmental: review and permitting (1.4%)	$390,000	$291,000	$121,000	
Environmental: construction compliance (2.1%)	$585,000	$436,000	$181,000	
PM: City project management (3.6%)	$1,003,000	$748,000	$311,000	
PM: other City departments (1.4%)	$390,000	$291,000	$121,000	
Subtotal delivery costs	**$7,327,000**	**$5,463,000**	**$2,272,000**	
Other Costs [(6)]				
Land acquisition	$0	$0	$0	
Environmental mitigation (2.1%)	$585,000	$436,000	$181,000	
Subtotal other costs	**$585,000**	**$436,000**	**$181,000**	
Total project cost	**$35,775,000**	**$26,671,000**	**$11,093,000**	**Grand Total**
Without FOG addition, other upgrades included	**$35,775,000**	**$0**	**$11,093,000**	**$46,868,000**

Table 6-2: Cost Summary for Upgrades Required for Phase II Conditions (1)				
Construction Cost Breakdown	**NCWRP Expansion (Pure Water)**	**FOG Addition**	**Other Recommended Improvements**	**See Note (3)**
With FOG addition and other upgrades (7)	**$32,184,000**	**$26,671,000**	**$11,093,000**	**$69,948,000**

(1) All numbers presented in the table are construction OPCs without the 40% contingency.

(2) Cost for FOG-receiving station derived from CH2M Hill report, contingency deducted from reported cost.

(3) The digester system total depends on whether FOG addition is selected.

(4) The project construction subtotal depends on whether FOG addition is selected.

(5) Fixed costs are per baseline budget or current Pure Water directive.

(6) Delivery and other costs based on the total construction cost.

(7) The total project cost excludes digester system costs related to NCWRP Expansion because the upgrades associated with FOG addition cover these operating conditions.

6.1 Construction Cost Breakdown

The construction cost breakdown represents the estimated cost of construction based on the current design documentation available for development of the OPC. These costs include direct costs as well as contractor overhead, insurance, bond cost, and profit markups. Further explanations of these cost components are included in the OPC reports in Appendix E.

6.2 Contingency

The AACEI recommended practice 10S-90 defines contingency as: An amount added to an estimate to allow for items, conditions, or events for which the state, occurrence, or effect is uncertain and that experience shows will likely result, in aggregate, in additional costs. Contingency is typically estimated using statistical analysis or judgment based on past asset or project experience.

Contingency usually excludes: (1) major scope changes such as changes in end product specification, capacities, building sizes, and location of the asset or project; (2) extraordinary events such as major strikes and natural disasters; (3) management reserves; and (4) escalation and currency effects.

Some of the items, conditions, or events for which the state, occurrence, and/or effect is uncertain include, but are not limited to, planning and estimating errors and omissions, minor price fluctuations (other than general escalation), design developments and changes within the scope, and variations in market and environmental conditions. Contingency is generally included in most estimates, and is expected to be expended.

6.3 Delivery and Other Costs

Delivery and other costs include estimates of costs for non-construction activities required to plan, design, and fully deliver the project to completion. The costs are estimated as an expected percentage of the total construction cost. Where actual costs are known based on awarded service contracts, or more definitive costs are established at the time of TM preparation, those fixed costs are included in the delivery and other cost breakdown.

7 Construction Schedule

A schedule for implementation of upgrades was developed in Microsoft Project format and is presented in Figure 7-1. Only one schedule was developed; it is not divided into phases and assumes that Phase II conditions, with FOG addition, will require implementation of all the described upgrades. The initial tasks following completion of this study include procurement of a design consultant and development of the 10% design documents. The schedule presented in the draft TM issued on May 6, 2016, used information available from other Pure Water documents on consultant procurement and contract award; this resulted in a duration of approximately 300 working days for procurement of the 10% design consultant and the final design consultant. In addition, upgrades to the thickening and dewatering centrifuges were expected to require the most time because of a long lead time on the machines. As a result, construction of MBC improvements lagged those at NCWRP by approximately 9 months.

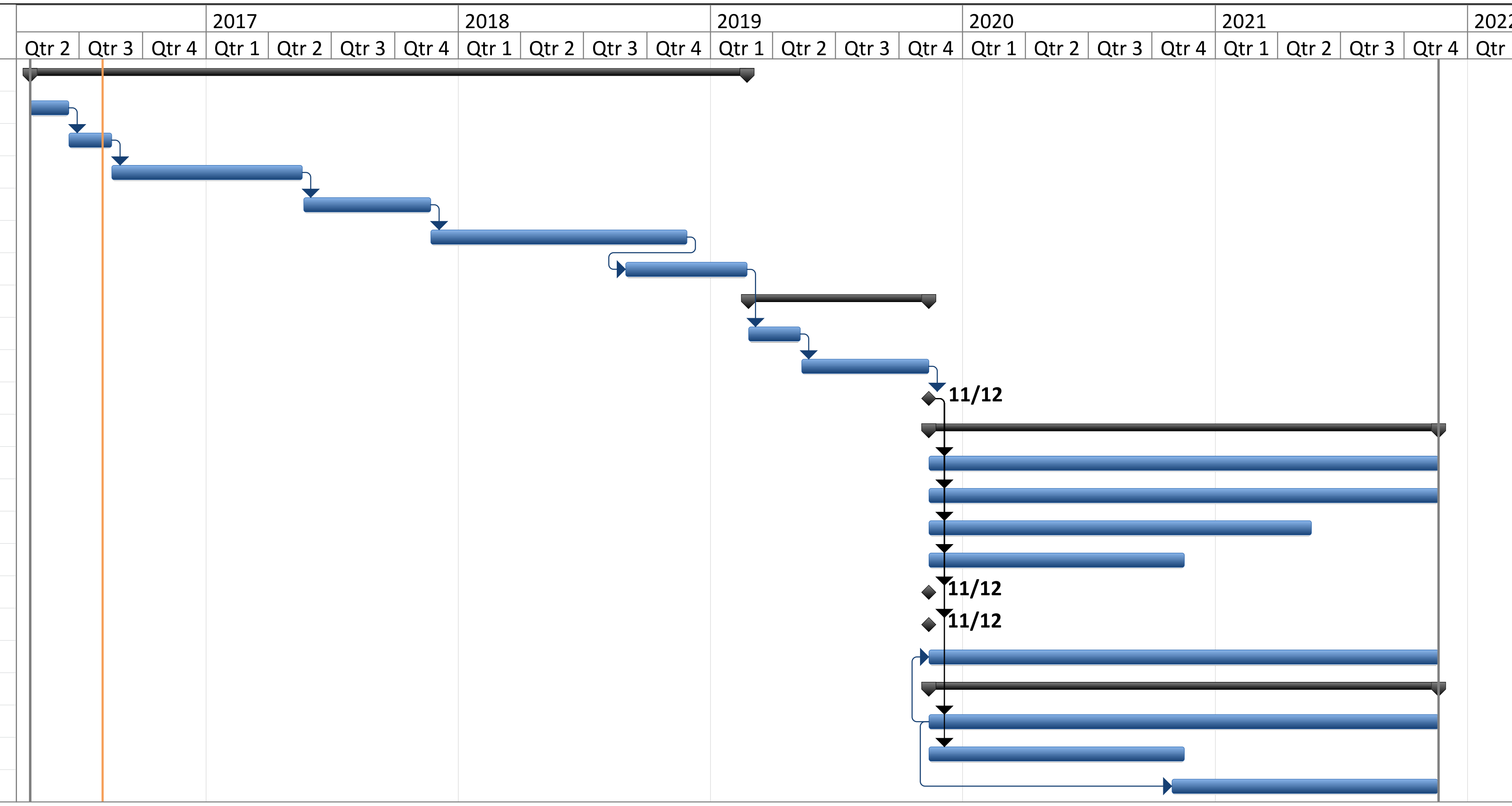
To better align construction of MBC improvements with the NCWRP construction schedule, the City agreed to accelerate the procurement of both design consultants as well as pre-purchase procurement of centrifuges. These decisions were made during a Draft TM review workshop, conducted on May 18, 2016, and are documented in the meeting summary log (refer to Appendix F). As a result of these changes, the MBC improvements construction is now on track and runs parallel with the NCWRP Expansion. Overall, the schedule was shortened by approximately 9 months, and currently has a project completion date of November 2021.

Procurement of a final design consultant, preparing the final design documents, and obtaining the necessary permits is the next step and is expected to require approximately 2 calendar years. This is followed by the bid advertisement, contractor selection, and bid award, which are expected to take just under 1 year. The final step is procurement of equipment, construction, commissioning, and placing facilities in operation. Construction of the new anaerobic digester, which requires extensive pre-stressed concrete work, is also expected to require approximately 2 calendar years. Systems such as odor control and chemical dosing do not require any upgrades or improvements and have been therefore listed as requiring zero days.

PROPOSED PROJECT SCHEDULE FOR IMPROVEMENTS AT MBC REQUIRED DUE TO NCWRP EXPANSION

FIGURE 7-1

ID	Task Name	Duration	Start	Finish
1	**Design**	**742 days**	**4/21/2016**	**2/22/2019**
2	Complete PDR(Study)	40 days	4/21/2016	6/15/2016
3	Procure 10% Designer	44 days	6/16/2016	8/16/2016
4	10% Design Development	198 days	8/17/2016	5/19/2017
5	Procure Final Designer	132 days	5/22/2017	11/21/2017
6	Final Design Development	265 days	11/22/2017	11/27/2018
7	Permitting	126 days	8/31/2018	2/22/2019
8	**Construction Bid and Award**	**187 days**	**2/25/2019**	**11/12/2019**
9	Advertise and Bid	55 days	2/25/2019	5/10/2019
10	Award Construction Contract	132 days	5/13/2019	11/12/2019
11	Contractor NTP	0 days	11/12/2019	11/12/2019
12	**Procure/Construct/Commissioning**	**528 days**	**11/12/2019**	**11/19/2021**
13	Grit Removal	528 days	11/13/2019	11/19/2021
14	Thickening Centrifuges	528 days	11/13/2019	11/19/2021
15	Digester Improvements without FOG	396 days	11/13/2019	5/19/2021
16	Centrate System	264 days	11/13/2019	11/16/2020
17	Odor Control (No Improvements)	0 days	11/12/2019	11/12/2019
18	Chemical Systems (No Improvements)	0 days	11/12/2019	11/12/2019
19	Extension of Utilities	528 days	11/13/2019	11/19/2021
20	**FOG Related & Other Improvements**	**528 days**	**11/13/2019**	**11/19/2021**
21	Digester Improvements with FOG	528 days	11/13/2019	11/19/2021
22	Dewatering Centrifuges	264 days	11/13/2019	11/16/2020
23	Waste Heat Utilization	275 days	10/30/2020	11/18/2021



8 Assumptions and Clarifications

8.1 Linear Extrapolations

The findings of this TM are based in large part on linear extrapolations from existing conditions. Without bench-scale or pilot testing in support of the TM, it is not possible to project the impact of second-order effects. For example, solids-dewatering efficiencies and polymer consumption for the existing dewatering centrifuges are based in part on the ability of the existing MBC digester to provide long HRTs and a high degree of solids stabilization. Assuming that higher solids loadings and shorter detention times reduce the efficiency of volatile solids reduction, these changes may adversely impact sludge dewaterability and polymer consumption in ways that are not possible to predict from existing data.

8.2 Required and Recommended Equipment

This TM describes required and recommended equipment for different existing unit processes throughout MBC. These required and recommended upgrades are not based on any evaluation of alternatives and selection of a recommended alternative or best apparent alternative. At all times, the required equipment is listed based on what is already installed, and based on providing a systematic expansion of what is already in place. This TM does not rule out consideration of other alternatives based on a detailed alternatives analysis at a future point in the design process.

8.3 Principal Items of Equipment

This TM is confined to principal items of process equipment within a given unit process. Principal items are defined as those that have a direct impact on the production capability of MBC. This impact is due either to the increase in hydraulic throughput contributed by a principal item of equipment, such as a sludge feed pump to a centrifuge, or to an increase in treatment capacity, for example, a digester HEX. Transfer pumping systems or routine drainage systems are not considered.

8.4 Operations Optimization Project

This TM assumes that none of the recommended operational changes in the subject Draft Operations Optimization Study have been adopted by the City.

8.5 CEPT and Raw Solids

This TM does not address the potential consequences of a change in pH of raw solids as a result of the transition to CEPT at NCWRP. Impacts of sludge pH on digester operations are not factored into this assessment.

8.6 Dewatered Sludge Cake-Handling Facilities

This TM does not assess any impacts on facilities at MBC downstream of the dewatering centrifuges: dewatered sludge cake hoppers, live bottoms, cake pumps, and silos.

8.7 Raw-Solids-Receiving Tanks

This TM does not assess any impacts on the raw-solids-receiving tanks themselves. With a substantial increase in raw sludge flows, the response time before the storage tanks begin to overflow will be reduced by a factor of 5. In addition, it is doubtful that the existing 10-inch-diameter overflow lines have the hydraulic capacity to handle the

Phase II maximum flow of 6.55 mgd. Similarly, rapidly rising level will have an impact on the rate of displacement of foul air to the OCS. These impacts, and related costs, are not included in this assessment.

Impacts on the plant drain and wastewater pump station due to the storage tank overflow system are addressed in the Section 4.8 regarding utilities extensions.

8.8 Thickening Centrifuge Sizing and Selection

The analysis in this TM is based on the assumption that it will be possible to configure the six Alfa Laval Aldec G3-165 centrifuges within the existing space available without having to resort to extensive building modifications or, worse yet, constructing an entirely new building. The cost estimating in this TM is predicated on the assumption that only equipment-specific structural modifications will be needed to anchor and restrain the existing centrifuges.

The main challenge in sizing the future thickening centrifuges is that MBC currently runs only one centrifuge, and there is no documented history of how plant operations would run multiple thickening centrifuges if it were required. In projecting how MBC would run multiple thickening centrifuges, the project team relied on the information available for the existing dewatering centrifuges where MBC typically runs between four and five machines simultaneously.

The firm capacity of each thickening centrifuge is based on applying a 20% de-rating to the capacity of the thickening centrifuges. This assumption results in a firm capacity of 1,168 gpm for each proposed thickening centrifuge. The firm capacity of the proposed thickening centrifuge system is based on the assumption that four centrifuges run continuously (7 days per week, 24 hours per day) and two centrifuges are readily available as backup units.

The 20% de-rating assumption for thickening centrifuge is derived from typical operating practice at MBC for the dewatering centrifuges where multiple units typically run at a margin below their rated capacity. The existing dewatering centrifuges are rated for 300 gpm, but MBC staff typically operate them at 225 gpm.

8.9 Sequencing and Timing of Construction

MBC is currently underutilized relative to its firm operating capacity. This condition allows O&M staff latitude in performing retrofits and upgrades while maintaining plant operations. This assessment assumes that any upgrades and modifications at MBC will occur in advance of any commissioning efforts associated with NCPWF and NCWRP.

8.10 Food Waste

The discussion of FOG in this TM is based on the prior work done by CH2M Hill (39). No effort has been made to update this work to include the effects of Assembly Bill 1826, which would require the separate handling of commercial food waste from facilities generating more than a specified limit.

9 High- and Low-Flow Wasting Scenarios: Maximum Day Conditions

9.1 High- and Low-Flow Wasting Scenarios

This TM assumes a conservative, high-flow biosolids wasting scenario with wasting of mixed liquor and primary sludge at 0.5% TS concentration, which results in a flow of 6.55 mgd from NCWRP to MBC under Phase II peak day, maximum NPR demand conditions. These assumptions result in a more conservative approach to sizing unit processes at MBC for raw solids handling.

Because of the hydraulic limitations of the 16-inch-diameter blended biosolids pipeline and the capacity of pumps at the existing pump station, the NCWRP Expansion 10% EDR (32) proposes to cap the raw solids flow at 3.9 mgd instead of 6.55 mgd with approximately the same mass solids loading. This will be achieved by allowing the solids concentration to increase to 0.92% by surface wasting RAS and primary sludge.

9.2 Sizing and Cost Implications

The OPC presented in Section 6 is based on the conservative approach to solids wasting in the NCWRP primary and secondary treatment processes. Based on this approach, the required improvements will provide sufficient capacity that would be required at MBC to handle the higher average and peak flows.

If the final design consultant for the NCWRP Expansion elects to design the NCWRP Expansion based on the restrictions of the 16-inch-diameter raw solids force main and upgrade MBC according to the lower peak flow of 3.9 mgd (but with the same solids mass loading), the scale of upgrades required at MBC would be reduced. The greatest reduction would be experienced by the three unit processes described below.

9.2.1 Grit Removal Facilities

Because of the slightly reduced flow, it is anticipated that only one additional teacup will be required instead of two. The building expansion required will be smaller because only one additional teacup and auxiliary equipment will need to be housed.

8.2.2 Raw Solids Thickening Facilities

A peak flow of 3.9 mgd of raw solids under Phase II peak-day conditions theoretically allows the existing thickening centrifuges to handle the flow. Each of the existing centrifuges has a capacity of 750 gpm. Four of the existing centrifuges could each handle 1 mgd of biosolids (694 gpm). Addition of a sixth new centrifuge would allow for two backup units with four units in operation.

The weakness in the hydraulic loading approach is that it does not account for potential solids-handling limitations in the existing thickening centrifuges. The existing thickening centrifuges were designed to handle solids concentrations between 0.33% and 0.5%. This concentration equates to a maximum design solids input of 45,000 lb/d. MBC has operated a thickening centrifuge at 37,000 lb/d on average, and during the maximum month, has exceeded the design capacity by 18% with 53,000 lb/d. Under the proposed scenario with 1 mgd per centrifuge, each existing unit would receive 74,000 lb/d, an increase of 64% beyond the design maximum.

For planning purposes, the conservative approach entails budgeting for six new thickening centrifuges specifically designed for higher solids concentrations of 0.92% (3.9 mgd containing 298,000 lb/d of solids based on (32) projections). The work in this TM is based on discussions with Alfa Laval, and the Aldec G3-165 frame size is used for flows as low as 500 gpm. As a result, no savings would be associated with selecting a smaller centrifuge from the standpoint of a centrifuge frame design, but potential savings may come from smaller drive motors, backdrive motors, and VFD components.

9.2.2 Centrate Pump Station

The existing centrate pumps are adequate for handling the projected flows. However, the fourth centrate pump will be required and must be installed prior to Phase II.

9.2.3 Potential Cost Reductions

The outlined potential reduction in the number, or in the individual capacity, of equipment components for the above facilities may result in a reduction in the construction and delivery costs for upgrades to the subject facilities. Table 9-1 summarizes the results of this projection. For thickening centrifuges, the estimated 10% reduction in purchase price is a result of smaller main drive motors, backdrive motors, and VFD components. In addition, there is a savings associated with refurbishing of the existing sludge feed pumps in lieu of providing new, larger pumps. This summary does not include a detailed analysis of potential costs savings associated with the low biosolids-wasting scenario to the level of cost analysis presented in the TM (Class 5 estimate), but a high-level, order-of-magnitude assessment of potential savings (Table 9-1) indicates potential cost reductions in the Phase II OPC.

Table 9-1: Potential Cost Reductions

Facility/System	Potential Construction Cost Savings	Potential Total Project Cost Savings
Grit removal	$1.3M	$2.6M
Raw solids thickening	$1.4M	$2.8M
Centrate pump station	$0.7M	$1.3M
Total	$3.4M	$6.7M

Appendix A: References

Appendix A: References

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SOURCES:

The following information was made available via City Staff and CH2M-Hill Inc. for the Operations Optimization Project:

MBC Source List		
Document Name	**File Name**	**File Type**
City of San Diego Metropolitan Wastewater Department MBC Energy Conservation Study; MWWD Energy Audit Committee, June 2006	2006063--MBC-Report-FINAL	PDF
City of San Diego Metropolitan Biosolids Center Odor Control Modifications Preliminary Assessment Report (Final); Brown and Caldwell, November 2003	MBC - Ara94ChemScrubbers Bypass Recomd_03272013	PDF
MBC Process Evaluation Technical Memorandum No. 1: Developing Selection Criteria and Short Listing of Alternatives (Final), Brown and Caldwell, June 30, 2009	S00953.FINAL-MBC Process Evaluation - TM1	PDF
Metro Biosolids Center Process	FLOWCHARTS PDF 2014 Overview	PDF
Metropolitan Biosolids Center Process Flow Diagram Sampling Point/Analytical Requirements	FLOWCHARTS PDF 2014 Sampling	PDF
Metro Biosolids Center Process	MBC Process	PDF
Metro Biosolids Center Site Map	SITEMAPSPDF_2014	PDF
MBC Fiesta Island Replacement Project As-Built Drawings, Metcalf and Eddy.	MBC Drawings file folder wtih Multiple PDF's organized into the following seven sub-folders: 27328-D, 27329-D, 27330-D, 27331-D, 27332-D, 27333-D, and 273344-D	PDF
City of San Diego Wastewater Operations Management Network (COMNET) Metropolitan Biosolids Center, CIP No. 42-911.04 Revision 1.1, Westinghouse Process Control Division Control Control Strategies, July 2012	Control Strategies File Folder with multiple PDF's	PDF
North City Anaerobic Digestion	MBC Process Data	EXCEL
MBC 5+HP Asset Inventory Record	Copy of MBC 5+ HP ASSET INVENTORY RECORD REV 1	EXCEL
SDGE Invoices for MBC Facility (5244 Convoy St) and MWWD (5250 Convoy St B), July 2013 to June 2014	Multiple PDF's	PDF
MBC SDGE Electricity and Gas Account Data, January 2013 to June 2014	MBC SDGE Elec and Gas account data	EXCEL
MBC Electricity, Hot Water, Chilled Water, and Processed Gas Purchases, April 2013 to March 2014	Multiple Excel Files	EXCEL
MBC Generation from Cogen, CY 2012 through	MBC Generation CY2012 thru May	EXCEL

MBC Source List		
Document Name	**File Name**	**File Type**
May 2014	2014	
MBC Grit and Sludge Data, January 2012 to April 2014	Optimization Grit and Sludge	EXCEL
San Diego County Pollution Control District Startup Authorization for Digester Flares, Date of Issuance, May 5, 2014	Flares Digester SA_issued May 2014	PDF
County of San Diego Air Pollution Control District Permit to Operate for Area 94: Expires July 31, 2015	MBC_Area_94_exp_July 2015	PDF
County of San Diego Air Pollution Control District Permit to Operate for Areas 60, 76, and 86: Expires July 31, 2015	MBC_Areas_60_76_86_exp_July 2015	PDF

Appendix B: Phase I Scenario Modeling Results

TABLE B1 - SCENARIO A.1

Scenario A.1: Phase I Loads and Flows at 52% VSS Destruction in Digesters with no FOG addition.

	MIR AT AADF			MIR AT PEAK DAY FLOW		
	MIN NPR	BASE NPR	MAX NPR	MIN NPR	BASE NPR	MAX NPR
RECEIVING TANK IN						
RECEIVING TANK OUT						
TEACUPS IN						
TEACUPS OUT						
TC INPUT						
Flow, mgd	1.88	2.45	2.90	2.87	3.75	4.43
TSS, lb/day	78331	102236	124597	125330	163577	199355
VSS, lb/day	59607	77800	94819	95372	124481	151710
TBOD, lb/day	49405	64604	78824	75589	98845	120600
TC CENTRATE						
Flow, mgd	1.71	2.24	2.64	2.62	3.42	4.03
TSS, lb/day	7833	10224	12460	12533	16358	19936
VSS, lb/day	5961	7780	9482	9537	12448	15171
TBOD, lb/day	4940	6460	7882	7559	9884	12060
TC OUTPUT						
SCREENS IN						
SCREENS OUT						
DIGESTER IN						
Flow, mgd	0.16	0.21	0.26	0.25	0.33	0.40
TSS, lb/day	70498	92012	112137	112797	147220	179420
VSS, lb/day	53647	70020	85337	85834	112033	136539
TBOD, lb/day	44464	58144	70941	68030	88960	108540
DIGESTER OUT						
Flow, mgd	0.16	0.21	0.26	0.25	0.33	0.40
TSS, lb/day	42602	55602	67762	68163	88963	108420
VSS, lb/day	25750	33610	40962	41201	53776	65539
TBOD, lb/day	20009	26165	31924	30614	40032	48843

TABLE B1 - SCENARIO A.1

Scenario A.1: Phase I Loads and Flows at 52% VSS Destruction in Digesters with no FOG addition.

	MIR AT AADF			MIR AT PEAK DAY FLOW		
	MIN NPR	BASE NPR	MAX NPR	MIN NPR	BASE NPR	MAX NPR
PLWTP DIGESTED SOLIDS						
Flow, mgd	1.35	1.29	1.24	1.86	1.78	1.71
TSS, lb/day	307359	294284	282021	424155	406112	389189
VSS, lb/day	151210	144959	139110	208670	200043	191972
TBOD, lb/day	60304	57928	55707	83219	79941	76875
DIGESTED SOLIDS STORAGE IN						
DIGESTED SOLIDS STORAGE OUT						
DW CENTRIFUGE IN						
Flow, mgd	1.51	1.50	1.50	2.11	2.10	2.09
TSS, lb/day	349961	349886	349783	489945	489840	489696
VSS, lb/day	176960	178569	180072	247744	249996	252101
TBOD, lb/day	80313	84093	87630	112438	117731	122682
DW CENTRATE						
Flow, mgd	1.38	1.37	1.36	1.93	1.92	1.91
TSS, lb/day	17498	17494	17489	24497	24492	24485
VSS, lb/day	8848	8928	9004	12387	12500	12605
TBOD, lb/day	12891	13097	13290	18048	18336	18606
DW BIOSOLIDS SILOS IN						
DW BIOSOLIDS SILOS OUT						
Flow, mgd	0.133	0.133	0.133	0.186	0.186	0.186

TABLE B2 - SCENARIO A.2

Scenario A.2: Phase I Loads and Flows at 46% VSS Destruction in Digesters with no FOG addition.

	MIR AT AADF			MIR AT PEAK DAY FLOW		
	MIN NPR	BASE NPR	MAX NPR	MIN NPR	BASE NPR	MAX NPR
RECEIVING TANK IN						
RECEIVING TANK OUT						
TEACUPS IN						
TEACUPS OUT						
TC INPUT						
Flow, mgd	1.88	2.45	2.90	2.87	3.75	4.43
TSS, lb/day	78331	102236	124597	125330	163577	199355
VSS, lb/day	59607	77800	94819	95372	124481	151710
TBOD, lb/day	49405	64604	78824	75589	98845	120600
TC CENTRATE						
Flow, mgd	1.71	2.24	2.64	2.62	3.42	4.03
TSS, lb/day	7833	10224	12460	12533	16358	19936
VSS, lb/day	5961	7780	9482	9537	12448	15171
TBOD, lb/day	4940	6460	7882	7559	9884	12060
TC OUTPUT						
SCREENS IN						
SCREENS OUT						
DIGESTER IN						
Flow, mgd	0.16	0.21	0.26	0.25	0.33	0.40
TSS, lb/day	70498	92012	112137	112797	147220	179420
VSS, lb/day	53647	70020	85337	85834	112033	136539
TBOD, lb/day	44464	58144	70941	68030	88960	108540
DIGESTER OUT						
Flow, mgd	0.16	0.21	0.26	0.25	0.33	0.40
TSS, lb/day	45821	59803	72882	73313	95685	116612
VSS, lb/day	28969	37811	46082	46351	60498	73731
TBOD, lb/day	20009	26165	31924	30614	40032	48843

TABLE B2 - SCENARIO A.2

Scenario A.2: Phase I Loads and Flows at 46% VSS Destruction in Digesters with no FOG addition.

	MIR AT AADF			MIR AT PEAK DAY FLOW		
	MIN NPR	BASE NPR	MAX NPR	MIN NPR	BASE NPR	MAX NPR
PLWTP DIGESTED SOLIDS						
Flow, mgd	1.35	1.29	1.24	1.86	1.78	1.71
TSS, lb/day	307449	294403	282165	424280	406276	389388
VSS, lb/day	151264	145030	139197	208745	200141	192092
TBOD, lb/day	60304	57929	55707	83220	79942	76876
DIGESTED SOLIDS STORAGE IN						
DIGESTED SOLIDS STORAGE OUT						
DW CENTRIFUGE IN						
Flow, mgd	1.51	1.50	1.50	2.11	2.10	2.10
TSS, lb/day	353270	354205	355047	494578	495888	497066
VSS, lb/day	180234	182841	185279	252327	255977	259391
TBOD, lb/day	80313	84094	87631	112438	117731	122683
DW CENTRATE						
Flow, mgd	1.38	1.37	1.36	1.93	1.92	1.91
TSS, lb/day	17664	17710	17752	24729	24794	24853
VSS, lb/day	9012	9142	9264	12616	12799	12970
TBOD, lb/day	12894	13101	13294	18051	18341	18612
DW BIOSOLIDS SILOS IN						
DW BIOSOLIDS SILOS OUT						
Flow, mgd	0.134	0.135	0.135	0.188	0.189	0.189

TABLE B3 - SCENARIO B.1

Scenario B.1: Phase I Loads and Flows at 52% VSS Destruction in Digesters with FOG addition without Lystek

	MIR AT AADF			MIR AT PEAK DAY FLOW		
	MIN NPR	BASE NPR	MAX NPR	MIN NPR	BASE NPR	MAX NPR
RECEIVING TANK IN						
RECEIVING TANK OUT						
TEACUPS IN						
TEACUPS OUT						
TC INPUT						
Flow, mgd	1.88	2.45	2.90	2.87	3.75	4.43
TSS, lb/day	78331	102236	124597	125330	163577	199355
VSS, lb/day	59607	77800	94819	95372	124481	151710
TBOD, lb/day	49405	64604	78824	75589	98845	120600
TC CENTRATE						
Flow, mgd	1.71	2.24	2.64	2.62	3.42	4.03
TSS, lb/day	7833	10224	12460	12533	16358	19936
VSS, lb/day	5961	7780	9482	9537	12448	15171
TBOD, lb/day	4940	6460	7882	7559	9884	12060
FOG ADDITION						
Flow, mgd	0.06	0.06	0.06	0.06	0.06	0.06
TSS, lb/day	30024	30024	30024	30024	30024	30024
VSS, lb/day	27922	27922	27922	27922	27922	27922
TBOD, lb/day	50440	50440	50440	50440	50440	50440
TC OUTPUT						
SCREENS IN						
SCREENS OUT						
Flow, mgd	0.16	0.21	0.26	0.25	0.33	0.40
TSS, lb/day	70498	92012	112137	112797	147220	179420
VSS, lb/day	53647	70020	85337	85834	112033	136539
TBOD, lb/day	44464	58144	70941	68030	88960	108540
DIGESTER IN						
Flow, mgd	0.22	0.27	0.32	0.31	0.39	0.46
TSS, lb/day	100522	122036	142161	142821	177244	209444
VSS, lb/day	81569	97943	113259	113757	139955	164461
TBOD, lb/day	94905	108584	121382	118471	139401	158980

TABLE B3 - SCENARIO B.1

Scenario B.1: Phase I Loads and Flows at 52% VSS Destruction in Digesters with FOG addition without Lystek

	MIR AT AADF			MIR AT PEAK DAY FLOW		
	MIN NPR	BASE NPR	MAX NPR	MIN NPR	BASE NPR	MAX NPR
DIGESTER OUT						
Flow, mgd	0.22	0.27	0.32	0.31	0.39	0.46
TSS, lb/day	44704	57703	69864	83667	104467	123924
VSS, lb/day	39153	47013	54364	54603	67178	78941
TBOD, lb/day	42707	48863	54622	53312	62730	71541
PLWTP DIGESTED SOLIDS						
Flow, mgd	1.35	1.29	1.24	1.86	1.78	1.71
TSS, lb/day	307441	294366	282103	424268	406225	389302
VSS, lb/day	151246	144995	139146	208719	200093	192022
TBOD, lb/day	60309	57934	55712	83227	79949	76883
DIGESTED SOLIDS STORAGE IN						
DIGESTED SOLIDS STORAGE OUT						
DW CENTRIFUGE IN						
Flow, mgd	1.57	1.56	1.56	2.17	2.17	2.17
TSS, lb/day	352144	352069	351967	507935	510692	513226
VSS, lb/day	190399	192007	193511	263323	267271	270963
TBOD, lb/day	103016	106797	110334	136539	142679	148424
DW CENTRATE						
Flow, mgd	1.44	1.43	1.42	2.01	2.00	1.99
TSS, lb/day	17607	17603	17598	24650	24645	24638
VSS, lb/day	9520	9600	9676	13328	13441	13546
TBOD, lb/day	12929	13135	13328	18101	18389	18659
DW BIOSOLIDS SILOS IN						
DW BIOSOLIDS SILOS OUT						
Flow, mgd	0.134	0.134	0.134	0.187	0.187	0.187

TABLE B4 - SCENARIO B.1

Scenario B.2: Phase I Loads and Flows at 46% VSS Destruction in Digesters with FOG addition without Lystek

	MIR AT AADF			MIR AT PEAK DAY FLOW		
	MIN NPR	BASE NPR	MAX NPR	MIN NPR	BASE NPR	MAX NPR
RECEIVING TANK IN						
RECEIVING TANK OUT						
TEACUPS IN						
TEACUPS OUT						
TC INPUT						
Flow, mgd	1.88	2.45	2.90	2.87	3.75	4.43
TSS, lb/day	78331	102236	124597	125330	163577	199355
VSS, lb/day	59607	77800	94819	95372	124481	151710
TBOD, lb/day	49405	64604	78824	75589	98845	120600
TC CENTRATE						
Flow, mgd	1.71	2.24	2.64	2.62	3.42	4.03
TSS, lb/day	7833	10224	12460	12533	16358	19936
VSS, lb/day	5961	7780	9482	9537	12448	15171
TBOD, lb/day	4940	6460	7882	7559	9884	12060
FOG ADDITION						
Flow, mgd	0.06	0.06	0.06	0.06	0.06	0.06
TSS, lb/day	30024	30024	30024	30024	30024	30024
VSS, lb/day	27922	27922	27922	27922	27922	27922
TBOD, lb/day	50440	50440	50440	50440	50440	50440
TC OUTPUT						
SCREENS IN						
SCREENS OUT						
Flow, mgd	0.16	0.21	0.26	0.25	0.33	0.40
TSS, lb/day	70498	92012	112137	112797	147220	179420
VSS, lb/day	53647	70020	85337	85834	112033	136539
TBOD, lb/day	44464	58144	70941	68030	88960	108540
DIGESTER IN						
Flow, mgd	0.22	0.27	0.32	0.31	0.39	0.46
TSS, lb/day	100522	122036	142161	142821	177244	209444
VSS, lb/day	81569	97943	113259	113757	139955	164461
TBOD, lb/day	44464	58144	70941	118471	139401	158980

TABLE B4 - SCENARIO B.1

Scenario B.2: Phase I Loads and Flows at 46% VSS Destruction in Digesters with FOG addition without Lystek

	MIR AT AADF			MIR AT PEAK DAY FLOW		
	MIN NPR	BASE NPR	MAX NPR	MIN NPR	BASE NPR	MAX NPR
DIGESTER OUT						
Flow, mgd	0.22	0.27	0.32	0.31	0.39	0.46
TSS, lb/day	47922	61905	74984	90493	112864	133792
VSS, lb/day	44047	52889	61160	61429	75576	88809
TBOD, lb/day	42707	48863	54622	53312	62730	71541
PLWTP DIGESTED SOLIDS						
Flow, mgd	1.35	1.29	1.24	1.86	1.78	1.71
TSS, lb/day	307531	294484	282247	424393	406389	389501
VSS, lb/day	151301	145066	139233	208795	200191	192142
TBOD, lb/day	60310	57935	55713	83227	79950	76884
DIGESTED SOLIDS STORAGE IN						
DIGESTED SOLIDS STORAGE OUT						
DW CENTRIFUGE IN						
Flow, mgd	1.57	1.56	1.56	2.17	2.17	2.17
TSS, lb/day	355454	356389	357231	514886	519253	523292
VSS, lb/day	195348	197955	200393	270223	275767	280951
TBOD, lb/day	103017	106798	110334	136539	142680	148425
DW CENTRATE						
Flow, mgd	1.44	1.43	1.42	2.01	2.00	1.99
TSS, lb/day	17773	17819	17862	24882	24947	25006
VSS, lb/day	9767	9898	10020	13674	13857	14028
TBOD, lb/day	12932	13139	13332	18104	18394	18665
DW BIOSOLIDS SILOS IN						
DW BIOSOLIDS SILOS OUT						
Flow, mgd	0.135	0.136	0.136	0.189	0.190	0.190

TABLE B5 - SCENARIO C.1

Scenario C.1: Phase I Loads and Flows at 65% VSS Destruction in Digesters with FOG addition and Lystek process.

	MIR AT AADF			MIR AT PEAK DAY FLOW		
	MIN NPR	BASE NPR	MAX NPR	MIN NPR	BASE NPR	MAX NPR
RECEIVING TANK IN						
RECEIVING TANK OUT						
TEACUPS IN						
TEACUPS OUT						
TC INPUT						
Flow, mgd	1.88	2.45	2.90	2.87	3.75	4.43
TSS, lb/day	78331	102236	124597	125330	163577	199355
VSS, lb/day	59607	77800	94819	95372	124481	151710
TBOD, lb/day	49405	64604	78824	75589	98845	120600
TC CENTRATE						
Flow, mgd	1.71	2.24	2.64	2.62	3.42	4.03
TSS, lb/day	7833	10224	12460	12533	16358	19936
VSS, lb/day	5961	7780	9482	9537	12448	15171
TBOD, lb/day	4940	6460	7882	7559	9884	12060
FOG ADDITION						
Flow, mgd	0.06	0.06	0.06	0.06	0.06	0.06
TSS, lb/day	30024	30024	30024	30024	30024	30024
VSS, lb/day	27922	27922	27922	27922	27922	27922
TBOD, lb/day	50440	50440	50440	50440	50440	50440
TC OUTPUT						
SCREENS IN						
SCREENS OUT						
Flow, mgd	0.16	0.21	0.26	0.25	0.33	0.40
TSS, lb/day	70498	92012	112137	112797	147220	179420
VSS, lb/day	53647	70020	85337	85834	112033	136539
TBOD, lb/day	44464	58144	70941	68030	88960	108540
DIGESTER IN						
Flow, mgd	0.22	0.27	0.32	0.31	0.39	0.46
TSS, lb/day	100522	122036	142161	142821	177244	209444
VSS, lb/day	81569	97943	113259	113757	139955	164461
TBOD, lb/day	44464	58144	70941	118471	139401	158980

TABLE B5 - SCENARIO C.1

Scenario C.1: Phase I Loads and Flows at 65% VSS Destruction in Digesters with FOG addition and Lystek process.

	MIR AT AADF			MIR AT PEAK DAY FLOW		
	MIN NPR	BASE NPR	MAX NPR	MIN NPR	BASE NPR	MAX NPR
DIGESTER OUT						
Flow, mgd	0.22	0.27	0.32	0.31	0.39	0.46
TSS, lb/day	37729	48601	58770	68879	86273	102544
VSS, lb/day	28549	34280	39641	39815	48984	57561
TBOD, lb/day	42707	48863	54622	53312	62730	71541
PLWTP DIGESTED SOLIDS						
Flow, mgd	1.35	1.29	1.24	1.86	1.78	1.71
TSS, lb/day	307244	294110	281790	423997	405871	388870
VSS, lb/day	151128	144840	138958	208556	199880	191762
TBOD, lb/day	60308	57933	55711	83226	79948	76881
DIGESTED SOLIDS STORAGE IN						
DIGESTED SOLIDS STORAGE OUT						
DW CENTRIFUGE IN						
Flow, mgd	1.57	1.56	1.55	2.17	2.17	2.17
TSS, lb/day	344974	342710	340560	492876	492144	491414
VSS, lb/day	179677	179120	178599	248371	248864	249324
TBOD, lb/day	103015	106796	110332	136537	142678	148422
DW CENTRATE						
Flow, mgd	1.44	1.43	1.43	2.01	2.00	2.00
TSS, lb/day	17249	17136	17028	24148	23990	23839
VSS, lb/day	8984	8956	8930	12577	12538	12502
TBOD, lb/day	12923	13128	13319	18092	18379	18646
DW BIOSOLIDS SILOS IN						
DW BIOSOLIDS SILOS OUT						
Flow, mgd	0.131	0.130	0.129	0.184	0.182	0.181

TABLE B6 - SCENARIO C.2

Scenario C.2: Phase I Loads and Flows at 57.5% VSS Destruction in Digesters with FOG addition and Lystek process.

	MIR AT AADF			MIR AT PEAK DAY FLOW		
	MIN NPR	BASE NPR	MAX NPR	MIN NPR	BASE NPR	MAX NPR
RECEIVING TANK IN						
RECEIVING TANK OUT						
TEACUPS IN						
TEACUPS OUT						
TC INPUT						
Flow, mgd	1.88	2.45	2.90	2.87	3.75	4.43
TSS, lb/day	78331	102236	124597	125330	163577	199355
VSS, lb/day	59607	77800	94819	95372	124481	151710
TBOD, lb/day	49405	64604	78824	75589	98845	120600
TC CENTRATE						
Flow, mgd	1.71	2.24	2.64	2.62	3.42	4.03
TSS, lb/day	7833	10224	12460	12533	16358	19936
VSS, lb/day	5961	7780	9482	9537	12448	15171
TBOD, lb/day	4940	6460	7882	7559	9884	12060
FOG ADDITION						
Flow, mgd	0.06	0.06	0.06	0.06	0.06	0.06
TSS, lb/day	30024	30024	30024	30024	30024	30024
VSS, lb/day	27922	27922	27922	27922	27922	27922
TBOD, lb/day	50440	50440	50440	50440	50440	50440
TC OUTPUT						
SCREENS IN						
SCREENS OUT						
Flow, mgd	0.16	0.21	0.26	0.25	0.33	0.40
TSS, lb/day	70498	92012	112137	112797	147220	179420
VSS, lb/day	53647	70020	85337	85834	112033	136539
TBOD, lb/day	44464	58144	70941	68030	88960	108540
DIGESTER IN						
Flow, mgd	0.22	0.27	0.32	0.31	0.39	0.46
TSS, lb/day	100522	122036	142161	142821	177244	209444
VSS, lb/day	81569	97943	113259	113757	139955	164461
TBOD, lb/day	44464	58144	70941	118471	139401	158980

TABLE B6 - SCENARIO C.2

Scenario C.2: Phase I Loads and Flows at 57.5% VSS Destruction in Digesters with FOG addition and Lystek process.

	MIR AT AADF			MIR AT PEAK DAY FLOW		
	MIN NPR	BASE NPR	MAX NPR	MIN NPR	BASE NPR	MAX NPR
DIGESTER OUT						
Flow, mgd	0.22	0.27	0.32	0.31	0.39	0.46
TSS, lb/day	41753	53852	65170	77411	96770	114879
VSS, lb/day	34667	41626	48135	48347	59481	69896
TBOD, lb/day	42707	48863	54622	53312	62730	71541
PLWTP DIGESTED SOLIDS						
Flow, mgd	1.35	1.29	1.24	1.86	1.78	1.71
TSS, lb/day	307353	294258	281970	424148	406075	389119
VSS, lb/day	151193	144929	139067	208647	200003	191912
TBOD, lb/day	60309	57934	55712	83227	79948	76882
DIGESTED SOLIDS STORAGE IN						
DIGESTED SOLIDS STORAGE OUT						
DW CENTRIFUGE IN						
Flow, mgd	1.57	1.56	1.56	2.17	2.17	2.17
TSS, lb/day	349106	348110	347141	501558	502845	503998
VSS, lb/day	185860	186555	187202	256994	259484	261808
TBOD, lb/day	103016	106797	110333	136538	142679	148423
DW CENTRATE						
Flow, mgd	1.44	1.43	1.42	2.01	2.00	1.99
TSS, lb/day	17455	17405	17357	24437	24368	24300
VSS, lb/day	9293	9328	9360	13010	13059	13104
TBOD, lb/day	12926	13132	13324	18097	18385	18654
DW BIOSOLIDS SILOS IN						
DW BIOSOLIDS SILOS OUT						
Flow, mgd	0.133	0.132	0.132	0.186	0.185	0.185

Appendix C: Phase II Scenario Modeling Results

TABLE C1- SCENARIO A.1

Scenario A.1: Phase II Loads and Flows at 52% VSS Destruction in Digesters with no FOG addition.

	MIR AT AADF			MIR AT PEAK DAY FLOW		
	MIN NPR	BASE NPR	MAX NPR	MIN NPR	BASE NPR	MAX NPR
RECEIVING TANK IN						
RECEIVING TANK OUT						
TEACUPS IN						
TEACUPS OUT						
TC INPUT						
Flow, mgd	3.29	3.87	4.28	5.04	5.92	6.55
TSS, lb/day	137352	161288	183930	219763	258061	294288
VSS, lb/day	104520	122737	139969	167232	196379	223950
TBOD, lb/day	86630	101849	116246	132544	155830	177856
TC CENTRATE						
Flow, mgd	3.01	3.53	3.89	4.60	5.40	5.96
TSS, lb/day	13735	16129	18393	21976	25806	29429
VSS, lb/day	10452	12274	13997	16723	19638	22395
TBOD, lb/day	8663	10185	11625	13254	15583	17786
TC OUTPUT						
SCREENS IN						
SCREENS OUT						
DIGESTER IN						
Flow, mgd	0.29	0.34	0.39	0.44	0.52	0.59
TSS, lb/day	123617	145159	165537	197787	232255	264859
VSS, lb/day	94068	110463	125972	150509	176741	201555
TBOD, lb/day	77967	91664	104621	119290	140247	160070
DIGESTER OUT						
Flow, mgd	0.28	0.33	0.38	0.44	0.52	0.59
TSS, lb/day	74701	87718	100032	119522	140349	160050
VSS, lb/day	45153	53022	60466	72244	84836	96746
TBOD, lb/day	35085	41249	47079	53680	63111	72032

TABLE C1- SCENARIO A.1

Scenario A.1: Phase II Loads and Flows at 52% VSS Destruction in Digesters with no FOG addition.

	MIR AT AADF			MIR AT PEAK DAY FLOW		
	MIN NPR	BASE NPR	MAX NPR	MIN NPR	BASE NPR	MAX NPR
PLWTP DIGESTED SOLIDS						
Flow, mgd	1.26	1.20	1.15	1.74	1.66	1.59
TSS, lb/day	287856	274766	262341	397242	379176	362031
VSS, lb/day	141464	135205	129284	195220	186582	178411
TBOD, lb/day	56856	54478	52228	78461	75179	72075
DIGESTED SOLIDS STORAGE IN						
DIGESTED SOLIDS STORAGE OUT						
DW CENTRIFUGE IN						
Flow, mgd	1.55	1.54	1.53	2.16	2.15	2.15
TSS, lb/day	362558	362484	362373	507581	507477	507322
VSS, lb/day	186617	188227	189750	261263	263518	265650
TBOD, lb/day	91941	95727	99308	128718	134018	139031
DW CENTRATE						
Flow, mgd	1.41	1.40	1.39	1.97	1.96	1.95
TSS, lb/day	18128	18124	18119	25379	25374	25366
VSS, lb/day	9331	9411	9488	13063	13176	13283
TBOD, lb/day	13813	14019	14215	19338	19627	19901
DW BIOSOLIDS SILOS IN						
DW BIOSOLIDS SILOS OUT						
Flow, mgd	0.138	0.138	0.138	0.193	0.193	0.193

TABLE C2 - SCENARIO A.2

Scenario A.2: Phase II Loads and Flows at 46% VSS Destruction in Digesters with no FOG addition.

	MIR AT AADF			MIR AT PEAK DAY FLOW		
	MIN NPR	BASE NPR	MAX NPR	MIN NPR	BASE NPR	MAX NPR
RECEIVING TANK IN						
RECEIVING TANK OUT						
TEACUPS IN						
TEACUPS OUT						
TC INPUT						
Flow, mgd	3.29	3.87	4.28	5.04	5.92	6.55
TSS, lb/day	137352	161288	183930	219763	258061	294288
VSS, lb/day	104520	122737	139969	167232	196379	223950
TBOD, lb/day	86630	101849	116246	132544	155830	177856
TC CENTRATE						
Flow, mgd	3.01	3.53	3.89	4.60	5.40	5.96
TSS, lb/day	13735	16129	18393	21976	25806	29429
VSS, lb/day	10452	12274	13997	16723	19638	22395
TBOD, lb/day	8663	10185	11625	13254	15583	17786
TC OUTPUT						
SCREENS IN						
SCREENS OUT						
DIGESTER IN						
Flow, mgd	0.29	0.34	0.39	0.44	0.52	0.59
TSS, lb/day	123617	145159	165537	197787	232255	264859
VSS, lb/day	94068	110463	125972	150509	176741	201555
TBOD, lb/day	77967	91664	104621	119290	140247	160070
DIGESTER OUT						
Flow, mgd	0.28	0.33	0.38	0.44	0.52	0.59
TSS, lb/day	80346	94346	107590	128553	150954	172144
VSS, lb/day	50797	59650	68025	81275	95440	108840
TBOD, lb/day	35085	41249	47079	53680	63111	72032

TABLE C2 - SCENARIO A.2

Scenario A.2: Phase II Loads and Flows at 46% VSS Destruction in Digesters with no FOG addition.

	MIR AT AADF			MIR AT PEAK DAY FLOW		
	MIN NPR	BASE NPR	MAX NPR	MIN NPR	BASE NPR	MAX NPR
PLWTP DIGESTED SOLIDS						
Flow, mgd	1.26	1.21	1.15	1.74	1.66	1.59
TSS, lb/day	288015	274952	262554	397461	379434	362325
VSS, lb/day	141560	135317	129412	195352	186738	178588
TBOD, lb/day	56857	54479	52229	78462	75181	72076
DIGESTED SOLIDS STORAGE IN						
DIGESTED SOLIDS STORAGE OUT						
DW CENTRIFUGE IN						
Flow, mgd	1.55	1.54	1.53	2.17	2.16	2.15
TSS, lb/day	368361	369298	370144	515705	517018	518202
VSS, lb/day	192356	194967	197437	269299	272954	276411
TBOD, lb/day	91942	95728	99309	128719	134019	139032
DW CENTRATE						
Flow, mgd	1.41	1.40	1.39	1.97	1.96	1.95
TSS, lb/day	18418	18465	18507	25785	25851	25910
VSS, lb/day	9618	9748	9872	13465	13648	13821
TBOD, lb/day	13818	14025	14221	19345	19635	19909
DW BIOSOLIDS SILOS IN						
DW BIOSOLIDS SILOS OUT						
Flow, mgd	0.140	0.140	0.141	0.196	0.197	0.197

TABLE C3 - SCENARIO B.1

Scenario B.1: Phase II Loads and Flows at 52% VSS Destruction in Digesters with FOG addition without Lystek

	MIR AT AADF			MIR AT PEAK DAY FLOW		
	MIN NPR	BASE NPR	MAX NPR	MIN NPR	BASE NPR	MAX NPR
RECEIVING TANK IN						
RECEIVING TANK OUT						
TEACUPS IN						
TEACUPS OUT						
TC INPUT						
Flow, mgd	3.29	3.87	4.28	5.04	5.92	6.55
TSS, lb/day	137352	161288	183930	219763	258061	294288
VSS, lb/day	104520	122737	139969	167232	196379	223950
TBOD, lb/day	86630	101849	116246	132544	155830	177856
TC CENTRATE						
Flow, mgd	3.01	3.53	3.89	4.60	5.40	5.96
TSS, lb/day	13735	16129	18393	21976	25806	29429
VSS, lb/day	10452	12274	13997	16723	19638	22395
TBOD, lb/day	8663	10185	11625	13254	15583	17786
FOG ADDITION						
Flow, mgd	0.06	0.06	0.06	0.06	0.06	0.06
TSS, lb/day	30024	30024	30024	30024	30024	30024
VSS, lb/day	27922	27922	27922	27922	27922	27922
TBOD, lb/day	50440	50440	50440	50440	50440	50440
TC OUTPUT						
SCREENS IN						
SCREENS OUT						
Flow, mgd	0.29	0.34	0.39	0.44	0.52	0.59
TSS, lb/day	123617	145159	165537	197787	232255	264859
VSS, lb/day	94068	110463	125972	150509	176741	201555
TBOD, lb/day	77967	91664	104621	119290	140247	160070
DIGESTER IN						
Flow, mgd	0.35	0.40	0.45	0.50	0.58	0.65
TSS, lb/day	153641	175183	195561	227811	262279	294883
VSS, lb/day	121990	138386	153894	178431	204664	229477
TBOD, lb/day	128407	142105	155061	169730	190687	210510

TABLE C3 - SCENARIO B.1

Scenario B.1: Phase II Loads and Flows at 52% VSS Destruction in Digesters with FOG addition without Lystek

	MIR AT AADF			MIR AT PEAK DAY FLOW		
	MIN NPR	BASE NPR	MAX NPR	MIN NPR	BASE NPR	MAX NPR
DIGESTER OUT						
Flow, mgd	0.34	0.39	0.44	0.50	0.58	0.65
TSS, lb/day	76803	89820	102133	135027	155854	175555
VSS, lb/day	58555	66425	73869	85647	98239	110149
TBOD, lb/day	57783	63947	69778	76378	85809	94730
PLWTP DIGESTED SOLIDS						
Flow, mgd	1.26	1.20	1.15	1.74	1.66	1.59
TSS, lb/day	287938	274847	262423	397355	379289	362144
VSS, lb/day	141500	135241	129320	195270	186632	178461
TBOD, lb/day	56862	54483	52234	78469	75187	72083
DIGESTED SOLIDS STORAGE IN						
DIGESTED SOLIDS STORAGE OUT						
DW CENTRIFUGE IN						
Flow, mgd	1.61	1.60	1.59	2.24	2.24	2.24
TSS, lb/day	364741	364667	364557	532381	535143	537699
VSS, lb/day	200055	201666	203189	280917	284871	288610
TBOD, lb/day	114645	118431	122012	154848	160996	166813
DW CENTRATE						
Flow, mgd	1.47	1.46	1.45	2.06	2.05	2.04
TSS, lb/day	18237	18233	18228	25532	25527	25519
VSS, lb/day	10003	10083	10159	14004	14117	14223
TBOD, lb/day	13851	14057	14253	19391	19680	19954
DW BIOSOLIDS SILOS IN						
DW BIOSOLIDS SILOS OUT						
Flow, mgd	0.139	0.139	0.139	0.194	0.194	0.194

TABLE C4 - SCENARIO B.2

Scenario B.2: Phase II Loads and Flows at 46% VSS Destruction in Digesters with FOG addition without Lystek

	MIR AT AADF			MIR AT PEAK DAY FLOW		
	MIN NPR	BASE NPR	MAX NPR	MIN NPR	BASE NPR	MAX NPR
RECEIVING TANK IN						
RECEIVING TANK OUT						
TEACUPS IN						
TEACUPS OUT						
TC INPUT						
Flow, mgd	3.29	3.87	4.28	5.04	5.92	6.55
TSS, lb/day	137352	161288	183930	219763	258061	294288
VSS, lb/day	104520	122737	139969	167232	196379	223950
TBOD, lb/day	86630	101849	116246	132544	155830	177856
TC CENTRATE						
Flow, mgd	3.01	3.53	3.89	4.60	5.40	5.96
TSS, lb/day	13735	16129	18393	21976	25806	29429
VSS, lb/day	10452	12274	13997	16723	19638	22395
TBOD, lb/day	8663	10185	11625	13254	15583	17786
FOG ADDITION						
Flow, mgd	0.06	0.06	0.06	0.06	0.06	0.06
TSS, lb/day	30024	30024	30024	30024	30024	30024
VSS, lb/day	27922	27922	27922	27922	27922	27922
TBOD, lb/day	50440	50440	50440	50440	50440	50440
TC OUTPUT						
SCREENS IN						
SCREENS OUT						
Flow, mgd	0.29	0.34	0.39	0.44	0.52	0.59
TSS, lb/day	123617	145159	165537	197787	232255	264859
VSS, lb/day	94068	110463	125972	150509	176741	201555
TBOD, lb/day	77967	91664	104621	119290	140247	160070
DIGESTER IN						
Flow, mgd	0.35	0.40	0.45	0.50	0.58	0.65
TSS, lb/day	153641	175183	195561	227811	262279	294883
VSS, lb/day	121990	138386	153894	178431	204664	229477
TBOD, lb/day	77967	91664	104621	169730	190687	210510

TABLE C4 - SCENARIO B.2

Scenario B.2: Phase II Loads and Flows at 46% VSS Destruction in Digesters with FOG addition without Lystek

	MIR AT AADF			MIR AT PEAK DAY FLOW		
	MIN NPR	BASE NPR	MAX NPR	MIN NPR	BASE NPR	MAX NPR
DIGESTER OUT						
Flow, mgd	0.34	0.39	0.44	0.50	0.58	0.65
TSS, lb/day	82447	96448	109692	145733	168133	189324
VSS, lb/day	65875	74728	83103	96353	110518	123918
TBOD, lb/day	57783	63947	69778	76378	85809	94730
PLWTP DIGESTED SOLIDS						
Flow, mgd	1.26	1.21	1.15	1.74	1.66	1.59
TSS, lb/day	288097	275034	262636	397574	379547	362438
VSS, lb/day	141596	135353	129448	195402	186787	178638
TBOD, lb/day	56862	54484	52235	78470	75188	72084
DIGESTED SOLIDS STORAGE IN						
DIGESTED SOLIDS STORAGE OUT						
DW CENTRIFUGE IN						
Flow, mgd	1.61	1.60	1.59	2.24	2.24	2.24
TSS, lb/day	370544	371482	372328	543307	547681	551762
VSS, lb/day	207470	210081	212551	291755	297306	302556
TBOD, lb/day	114646	118431	122012	154849	160997	166814
DW CENTRATE						
Flow, mgd	1.47	1.46	1.45	2.05	2.04	2.03
TSS, lb/day	18527	18574	18616	25938	26004	26063
VSS, lb/day	10374	10504	10628	14523	14706	14879
TBOD, lb/day	13855	14063	14259	19398	19688	19962
DW BIOSOLIDS SILOS IN						
DW BIOSOLIDS SILOS OUT						
Flow, mgd	0.141	0.141	0.142	0.197	0.198	0.198

TABLE C5 - SCENARIO C.1

Scenario C.1: Phase II Loads and Flows at 65% VSS Destruction in Digesters with FOG addition and Lystek process.

	MIR AT AADF			MIR AT PEAK DAY FLOW		
	MIN NPR	BASE NPR	MAX NPR	MIN NPR	BASE NPR	MAX NPR
RECEIVING TANK IN						
RECEIVING TANK OUT						
TEACUPS IN						
TEACUPS OUT						
TC INPUT						
Flow, mgd	3.29	3.87	4.28	5.04	5.92	6.55
TSS, lb/day	137352	161288	183930	219763	258061	294288
VSS, lb/day	104520	122737	139969	167232	196379	223950
TBOD, lb/day	86630	101849	116246	132544	155830	177856
TC CENTRATE						
Flow, mgd	3.01	3.53	3.89	4.60	5.40	5.96
TSS, lb/day	13735	16129	18393	21976	25806	29429
VSS, lb/day	10452	12274	13997	16723	19638	22395
TBOD, lb/day	8663	10185	11625	13254	15583	17786
FOG ADDITION						
Flow, mgd	0.06	0.06	0.06	0.06	0.06	0.06
TSS, lb/day	30024	30024	30024	30024	30024	30024
VSS, lb/day	27922	27922	27922	27922	27922	27922
TBOD, lb/day	50440	50440	50440	50440	50440	50440
TC OUTPUT						
SCREENS IN						
SCREENS OUT						
Flow, mgd	0.29	0.34	0.39	0.44	0.52	0.59
TSS, lb/day	123617	145159	165537	197787	232255	264859
VSS, lb/day	94068	110463	125972	150509	176741	201555
TBOD, lb/day	77967	91664	104621	119290	140247	160070
DIGESTER IN						
Flow, mgd	0.35	0.40	0.45	0.50	0.58	0.65
TSS, lb/day	153641	175183	195561	227811	262279	294883
VSS, lb/day	121990	138386	153894	178431	204664	229477
TBOD, lb/day	77967	91664	104621	169730	190687	210510

TABLE C5 - SCENARIO C.1

Scenario C.1: Phase II Loads and Flows at 65% VSS Destruction in Digesters with FOG addition and Lystek process.

	MIR AT AADF			MIR AT PEAK DAY FLOW		
	MIN NPR	BASE NPR	MAX NPR	MIN NPR	BASE NPR	MAX NPR
DIGESTER OUT						
Flow, mgd	0.34	0.39	0.44	0.50	0.58	0.65
TSS, lb/day	64574	75460	85757	111831	129247	145723
VSS, lb/day	42697	48435	53863	62451	71632	80317
TBOD, lb/day	57783	63947	69778	76378	85809	94730
PLWTP DIGESTED SOLIDS						
Flow, mgd	1.26	1.20	1.15	1.74	1.66	1.59
TSS, lb/day	287594	274443	261962	396879	378731	361507
VSS, lb/day	141292	134997	129042	194984	186296	178078
TBOD, lb/day	56860	54482	52232	78467	75185	72080
DIGESTED SOLIDS STORAGE IN						
DIGESTED SOLIDS STORAGE OUT						
DW CENTRIFUGE IN						
Flow, mgd	1.61	1.60	1.59	2.24	2.24	2.24
TSS, lb/day	352168	349902	347719	508710	507978	507230
VSS, lb/day	183989	183432	182905	257434	257928	258395
TBOD, lb/day	114644	118429	122010	154846	160994	166810
DW CENTRATE						
Flow, mgd	1.47	1.46	1.46	2.06	2.05	2.04
TSS, lb/day	17608	17495	17386	24652	24493	24340
VSS, lb/day	9199	9172	9145	12879	12840	12803
TBOD, lb/day	13841	14045	14239	19377	19663	19934
DW BIOSOLIDS SILOS IN						
DW BIOSOLIDS SILOS OUT						
Flow, mgd	0.134	0.133	0.132	0.187	0.186	0.185

TABLE C6 - SCENARIO C.2

Scenario C.2: Phase II Loads and Flows at 57.5% VSS Destruction in Digesters with FOG addition and Lystek process.

	MIR AT AADF			MIR AT PEAK DAY FLOW		
	MIN NPR	BASE NPR	MAX NPR	MIN NPR	BASE NPR	MAX NPR
RECEIVING TANK IN						
RECEIVING TANK OUT						
TEACUPS IN						
TEACUPS OUT						
TC INPUT						
Flow, mgd	3.29	3.87	4.28	5.04	5.92	6.55
TSS, lb/day	137352	161288	183930	219763	258061	294288
VSS, lb/day	104520	122737	139969	167232	196379	223950
TBOD, lb/day	86630	101849	116246	132544	155830	177856
TC CENTRATE						
Flow, mgd	3.01	3.53	3.89	4.60	5.40	5.96
TSS, lb/day	13735	16129	18393	21976	25806	29429
VSS, lb/day	10452	12274	13997	16723	19638	22395
TBOD, lb/day	8663	10185	11625	13254	15583	17786
FOG ADDITION						
Flow, mgd	0.06	0.06	0.06	0.06	0.06	0.06
TSS, lb/day	30024	30024	30024	30024	30024	30024
VSS, lb/day	27922	27922	27922	27922	27922	27922
TBOD, lb/day	50440	50440	50440	50440	50440	50440
TC OUTPUT						
SCREENS IN						
SCREENS OUT						
Flow, mgd	0.29	0.34	0.39	0.44	0.52	0.59
TSS, lb/day	123617	145159	165537	197787	232255	264859
VSS, lb/day	94068	110463	125972	150509	176741	201555
TBOD, lb/day	77967	91664	104621	119290	140247	160070
DIGESTER IN						
Flow, mgd	0.35	0.40	0.45	0.50	0.58	0.65
TSS, lb/day	153641	175183	195561	227811	262279	294883
VSS, lb/day	121990	138386	153894	178431	204664	229477
TBOD, lb/day	77967	91664	104621	169730	190687	210510

TABLE C6 - SCENARIO C.2

Scenario C.2: Phase II Loads and Flows at 57.5% VSS Destruction in Digesters with FOG addition and Lystek process.

	MIR AT AADF			MIR AT PEAK DAY FLOW		
	MIN NPR	BASE NPR	MAX NPR	MIN NPR	BASE NPR	MAX NPR
DIGESTER OUT						
Flow, mgd	0.34	0.39	0.44	0.50	0.58	0.65
TSS, lb/day	71629	83744	95205	125213	144597	162934
VSS, lb/day	51846	58814	65405	75833	86982	97528
TBOD, lb/day	57783	63947	69778	76378	85809	94730
PLWTP DIGESTED SOLIDS						
Flow, mgd	1.26	1.20	1.15	1.74	1.66	1.59
TSS, lb/day	287792	274676	262228	397154	379053	361875
VSS, lb/day	141412	135138	129202	195149	186490	178299
TBOD, lb/day	56861	54483	52233	78468	75186	72082
DIGESTED SOLIDS STORAGE IN						
DIGESTED SOLIDS STORAGE OUT						
DW CENTRIFUGE IN						
Flow, mgd	1.61	1.60	1.59	2.24	2.24	2.24
TSS, lb/day	359422	358421	357433	522367	523650	524808
VSS, lb/day	193258	193952	194607	270982	273472	275827
TBOD, lb/day	114644	118430	122011	154847	160995	166811
DW CENTRATE						
Flow, mgd	1.47	1.46	1.46	2.06	2.05	2.04
TSS, lb/day	17971	17921	17872	25160	25089	25020
VSS, lb/day	9663	9698	9730	13528	13577	13623
TBOD, lb/day	13846	14052	14247	19385	19673	19945
DW BIOSOLIDS SILOS IN						
DW BIOSOLIDS SILOS OUT						
Flow, mgd	0.137	0.136	0.136	0.191	0.191	0.190

Appendix D: Load Lists

APPENDIX D - TABLE 1: RAW SOLIDS PUMPING AND GRIT

MBC CAPACITY ASSESSMENT - PROJECTED LOAD MODIFICATIONS

REVISION			**1**															
DRIVEN EQUIPMENT								NOTES	480 V LOAD - AC MOTORS						MOTOR CONTROL			
TAG		DWG	DRIVEN EQUIPMENT NAME	EQUIPMENT STATUS					CONNECTED		MAX RUNNING		DUTY CYCLE		SPEED			ELECTRICAL WORK REQUIRED
NUMBER(S)		NUMBER		EXISTING MCC NAME	EXISTING TO DEMO	EXISTING TO REMAIN	**PROPOSED LOAD**		HP	KW/ KVA	HP	KW/ KVA	CONT	INT/ VAR	CONSTANT SPEED	VARIABLE VFD	BYPASS CONTACTOR	
73-	P-21	60-E-11	RAW SOLIDS PUMP 1	60MCC001	X				-60				CONT			X		DEMO EXIST CB, ISO XFR, HARMONIC FILTER, VFD, DS, FDR
73-	P-22	60-E-12	RAW SOLIDS PUMP 2	60MCC002	X				-60				CONT			X		DEMO EXIST CB, ISO XFR, HARMONIC FILTER, VFD, DS, FDR
73-	P-23	60-E-13	RAW SOLIDS PUMP 3	60MCC003	X				-60									DEMO EXIST CB, ISO XFR, HARMONIC FILTER, VFD, DS, FDR
73-	**P-21**	**60-E-11**	**RAW SOLIDS PUMP 1 (LEAD)**	**60MCC001**			**X**		**200**				**CONT**			**X**		**INSTALL NEW CB, ISO XFR, VFD, HARMONIC FILTER, DS, FDR (NOTE 3)**
73-	**P-22**	**60-E-12**	**RAW SOLIDS PUMP 2 (LAG)**	**60MCC002**			**X**		**200**				**CONT**			**X**		**INSTALL NEW CB, ISO XFR, VFD, HARMONIC FILTER, DS, FDR (NOTE 3)**
73-	**P-23**	**60-E-13**	**RAW SOLIDS PUMP 3 (STANDBY)**	**60MCC003**			**X**		**200**				**CONT**			**X**		**INSTALL NEW CB, ISO XFR, VFD, HARMONIC FILTER, DS, FDR (NOTE 3)**
	NOTES																	
	1	EX. HP'S TAKEN FROM SINGLE LINE - NOT FIELD VERIFIED																
	2	HP'S FOR A VFD-DRIVEN MOTOR ARE LISTED WITH THE EQUIPMENT																
	3	FIELD-VERIFY SPACE FOR NEW EQUIPMENT.																

APPENDIX D - TABLE 2: SLUDGE THICKENING SYSTEM

MBC CAPACITY ASSESSMENT - PROJECTED LOAD MODIFICATIONS

REVISION		1														
		DRIVEN EQUIPMENT				NOTES	480 V LOAD - AC MOTORS						MOTOR CONTROL			
TAG	DWG	DRIVEN EQUIPMENT NAME	EQUIPMENT STATUS				CONNECTED		MAX RUNNING		DUTY CYCLE		SPEED			ELECTRICAL WORK REQUIRED
NUMBER(S)	NUMBER		EXISTING MCC NAME	EXISTING TO DEMO	PROPOSED LOAD		HP	KW/ KVA	HP	KW/ KVA	CONT	INT/ VAR	CONSTANT SPEED	VARIABLE VFD	BYPASS CONTACTOR	
76- P-11	76-E-11	THICKENING CENTRIFUGE SLUDGE FEED PUMP 1	76MCC76A01	X			-50				CONT			X	NO	
76- P-12	76-E-11	THICKENING CENTRIFUGE SLUDGE FEED PUMP 2	76MCC76A01	X			-50				CONT			X	NO	
76- P-13	76-E-18	THICKENING CENTRIFUGE SLUDGE FEED PUMP 3	76MCC76D02	X			-50				CONT			X	NO	
76- P-14	76-E-12	THICKENING CENTRIFUGE SLUDGE FEED PUMP 4	76MCC76A02	X			-50				CONT			X	NO	
76- P-15	76-E-17	THICKENING CENTRIFUGE SLUDGE FEED PUMP 5	76MCC76D01	X			-50				CONT			X	NO	
76- VFD-11	76-E-11	THICKENING CENTRIFUGE SLUDGE FEED PUMP 1 VFD	76MCC76A01	X												DEMO EXIST ISO XFR, HARMONIC FILTER, VFD
76- VFD-12	76-E-11	THICKENING CENTRIFUGE SLUDGE FEED PUMP 2 VFD	76MCC76A01	X												DEMO EXIST ISO XFR, HARMONIC FILTER, VFD
76- VFD-13	76-E-18	THICKENING CENTRIFUGE SLUDGE FEED PUMP 3 VFD	76MCC76D02	X												DEMO EXIST ISO XFR, HARMONIC FILTER, VFD
76- VFD-14	76-E-12	THICKENING CENTRIFUGE SLUDGE FEED PUMP 4 VFD	76MCC76A02	X												DEMO EXIST ISO XFR, HARMONIC FILTER, VFD
76- VFD-15	76-E-17	THICKENING CENTRIFUGE SLUDGE FEED PUMP 5 VFD	76MCC76D01	X												DEMO EXIST ISO XFR, HARMONIC FILTER, VFD
76- P-11A	76-E-11	**THICKENING CENTRIFUGE SLUDGE FEED PUMP 1A**	**76MCC76A01**		**X**		**60**		**60**		CONT			X	NO	
76- P-12A	76-E-11	**THICKENING CENTRIFUGE SLUDGE FEED PUMP 2A**	**76MCC76A01**		**X**		**60**		**60**		CONT			X	NO	
76- P-13A	76-E-18	**THICKENING CENTRIFUGE SLUDGE FEED PUMP 3A**	**76MCC76D02**		**X**		**60**		**60**		CONT			X	NO	
76- P-14A	76-E-12	**THICKENING CENTIFUGE SLUDGE FEED PUMP 4A**	**76MCC76A02**		**X**		**60**		**60**		CONT			X	NO	
76- P-15A	76-E-17	**THICKENING CENTRIFUGE SLUDGE FEED PUMP 5A**	**76MCC76D01**		**X**		**60**		**60**		CONT			X	NO	
76- P-16	**76-E-17**	**THICKENING CENTRIFUGE D SLUDGE FEED PUMP 6**	**76MCC76D01**		**X**	NOTE 3	**60**		**60**		CONT			X	NO	
76- VFD-11A	76-E-11	**THICKENING CENTRIFUGE SLUDGE FEED PUMP 1A VFD**	**76MCC76A01**		**X**											**INSTALL NEW ISO XFR, HARMONIC FILTER, VFD (NOTE 7)**
76- VFD-12A	76-E-11	**THICKENING CENTRIFUGE SLUDGE FEED PUMP 2A VFD**	**76MCC76A01**		**X**											**INSTALL NEW ISO XFR, HARMONIC FILTER, VFD (NOTE 7)**
76- VFD-13A	76-E-18	**THICKENING CENTRIFUGE SLUDGE FEED PUMP 3A VFD**	**76MCC76D02**		**X**											**INSTALL NEW ISO XFR, HARMONIC FILTER, VFD (NOTE 7)**
76- VFD-14A	76-E-12	**THICKENING CENTIFUGE SLUDGE FEED PUMP 4A VFD**	**76MCC76A02**		**X**											**INSTALL NEW ISO XFR, HARMONIC FILTER, VFD (NOTE 7)**
76- VFD-15A	76-E-17	**THICKENING CENTRIFUGE SLUDGE FEED PUMP 5A VFD**	**76MCC76D01**		**X**											**INSTALL NEW ISO XFR, HARMONIC FILTER, VFD (NOTE 7)**
76- VFD-16	**76-E-17**	**THICKENING CENTRIFUGE D SLUDGE FEED PUMP 6 VFD**	**76MCC76D01**		**X**	NOTE 3										**INSTALL NEW CB, ISO XFR, HARMONIC FILTER, VFD, DISCONNECT, CONDUIT, FEEDER (NOTE 7)**
76- P-21	76-E-11	TC POLYMER FEED PUMP 1	76MCC76A01	X			-5				CONT			X	NO	
76- P-22	76-E-17	TC POLYMER FEED PUMP 2	76MCC76D01	X			-5				CONT			X	NO	
76- P-23	76-E-12	TC POLYMER FEED PUMP 3	76MCC76A02	X			-5				CONT			X	NO	
76- P-24	76-E-18	TC POLYMER FEED PUMP 4	76MCC76D02	X			-5				CONT			X	NO	
76- P-25	76-E-17	TC POLYMER FEED PUMP 5	76MCC76D01	X			-5				CONT			X	NO	
76- VFD-21	76-E-11	TC POLYMER FEED PUMP 1 VFD	76MCC76A01	X							CONT					
76- VFD-22	76-E-17	TC POLYMER FEED PUMP 2 VFD	76MCC76D01	X							CONT					
76- VFD-23	76-E-12	TC POLYMER FEED PUMP 3 VFD	76MCC76A02	X							CONT					
76- VFD-24	76-E-18	TC POLYMER FEED PUMP 4 VFD	76MCC76D02	X							CONT					
76- VFD-25	76-E-17	TC POLYMER FEED PUMP 5 VFD	76MCC76D01	X							CONT					
76- P-21A	**76-E-11**	**TC POLYMER FEED PUMP 1A**	**76MCC76A01**		**X**		**5**		***5***		**CONT**			**X**	**NO**	
76- P-22A	**76-E-17**	**TC POLYMER FEED PUMP 2A**	**76MCC76D01**		**X**		**5**		***5***		**CONT**			**X**	**NO**	
76- P-23A	**76-E-12**	**TC POLYMER FEED PUMP 3A**	**76MCC76A02**		**X**		**5**		***5***		**CONT**			**X**	**NO**	
76- P-24A	**76-E-18**	**TC POLYMER FEED PUMP 4A**	**76MCC76D02**		**X**		**5**		***5***		**CONT**			**X**	**NO**	
76- P-25A	**76-E-17**	**TC POLYMER FEED PUMP 5A**	**76MCC76D01**		**X**		**5**		***5***		**CONT**			**X**	**NO**	
76- P-26	**76-E-17**	**TC POLYMER FEED PUMP 6**	**76MCC76D01**		**X**		**5**		***5***		**CONT**			**X**	**NO**	
76- VFD-21A	**76-E-11**	**TC POLYMER FEED PUMP 1A VFD**	**76MCC76A01**		**X**						**CONT**			**X**	**NO**	**RECOMMEND NEW ISO XFR, HARMONIC FILTER, VFD, DISCONNECT, FEEDER (NOTE 7)**
76- VFD-22A	**76-E-17**	**TC POLYMER FEED PUMP 2A VFD**	**76MCC76D01**		**X**						**CONT**			**X**	**NO**	**RECOMMEND NEW ISO XFR, HARMONIC FILTER, VFD, DISCONNECT, FEEDER (NOTE 7)**
76- VFD-23A	**76-E-12**	**TC POLYMER FEED PUMP 3A VFD**	**76MCC76A02**		**X**						**CONT**			**X**	**NO**	**RECOMMEND NEW ISO XFR, HARMONIC FILTER, VFD, DISCONNECT, FEEDER (NOTE 7)**
76- VFD-24A	**76-E-18**	**TC POLYMER FEED PUMP 4A VFD**	**76MCC76D02**		**X**						**CONT**			**X**	**NO**	**RECOMMEND NEW ISO XFR, HARMONIC FILTER, VFD, DISCONNECT, FEEDER (NOTE 7)**
76- VFD-25A	**76-E-17**	**TC POLYMER FEED PUMP 5A VFD**	**76MCC76D01**		**X**						**CONT**			**X**	**NO**	**RECOMMEND NEW ISO XFR, HARMONIC FILTER, VFD, DISCONNECT, FEEDER (NOTE 7)**
76- P-26	**76-E-17**	**TC POLYMER FEED PUMP 6 VFD**	**76MCC76D01**		**X**						**CONT**			**X**	**NO**	**INSTALL NEW CB, ISO XFR, HARMONIC FILTER, VFD, DISCONNECT, CONDUIT, FEEDER (NOTE 7)**
76- TC-1	SI-E-25	THICKENING CENTRIFUGE 1 MAIN DRIVE	76USSA			NOTE 4	-300									DEMO EXIST REACTOR, VFD
		TC1 BACKDRIVE	76USSA			NOTE 4	-60									DEMO EXIST REACTOR, VFD
76- TC-2	SI-E-25	THICKENING CENTRIFUGE 2	76USSA			NOTE 4	-300									DEMO EXIST REACTOR, VFD
		TC2 BACKDRIVE	76USSA			NOTE 4	-60									DEMO EXIST REACTOR, VFD
76- TC-3	SI-E-32	THICKENING CENTRIFUGE 3	76USSD			NOTE 4	-300									DEMO EXIST REACTOR, VFD
		TC3 BACKDRIVE	76USSD			NOTE 4	-60									DEMO EXIST REACTOR, VFD
76- TC-4	SI-E-26	THICKENING CENTRIFUGE 4	76USSA			NOTE 4	-300									DEMO EXIST REACTOR, VFD
		TC4 BACKDRIVE	76USSA			NOTE 4	-60									DEMO EXIST REACTOR, VFD
76- TC-5	SI-E-31	THICKENING CENTRIFUGE 5	76USSD			NOTE 4	-300									DEMO EXIST REACTOR, VFD
		TC5 BACKDRIVE	76USSD			NOTE 4	-60									
76- TC-1A	**SI-E-25**	**THICKENING CENTRIFUGE 1A MAIN DRIVE**	**76USSA**			**NOTE 5**	**350**									**INSTALL NEW CENTRIFUGE DRIVE (NOTE 7)**
		TC1A BACKDRIVE	**76USSA**			**NOTE 5**	**40**									**INSTALL NEW CENTRIFUGE DRIVE (NOTE 7)**
76- TC-2A	**SI-E-25**	**THICKENING CENTRIFUGE 2A**	**76USSA**			**NOTE 5**	**350**									**INSTALL NEW CENTRIFUGE DRIVE (NOTE 7)**
		TC2A BACKDRIVE	**76USSA**			**NOTE 5**	**40**									**INSTALL NEW CENTRIFUGE DRIVE (NOTE 7)**
76- TC-3A	**SI-E-32**	**THICKENING CENTRIFUGE 3A**	**76USSD**			**NOTE 5**	**350**									**INSTALL NEW CENTRIFUGE DRIVE (NOTE 7)**
		TC3A BACKDRIVE	**76USSD**			**NOTE 5**	**40**									**INSTALL NEW CENTRIFUGE DRIVE (NOTE 7)**
76- TC-4A	**SI-E-26**	**THICKENING CENTRIFUGE 4A**	**76USSA**			**NOTE 5**	**350**									**INSTALL NEW CENTRIFUGE DRIVE (NOTE 7)**
		TC4A BACKDRIVE	**76USSA**			**NOTE 5**	**40**									**INSTALL NEW CENTRIFUGE DRIVE (NOTE 7)**
76- TC-5A	**SI-E-31**	**THICKENING CENTRIFUGE 5A**	**76USSD**			**NOTE 5**	**350**									**INSTALL NEW CENTRIFUGE DRIVE (NOTE 7)**
		TC5A BACKDRIVE	**76USSD**			**NOTE 5**	**40**									**INSTALL NEW CENTRIFUGE DRIVE (NOTE 7)**
76- TC-6	**SI-E-31**	**THICKENING CENTRIFUGE 6**	**76USSD**			**NOTE 5**	**350**									**INSTALL NEW CENTRIFUGE DRIVE (NOTE 7)**
		TC6BACKDRIVE	**76USSD**			**NOTE 5**	**40**									**INSTALL NEW CENTRIFUGE DRIVE (NOTE 7)**
76- P-31A	76-E-11	THICKENED SLUDGE DIGESTER FEED PUMP 1A	76MCC76A01	X		NOTE 6	-20					INT	X			DEMO EXIST STARTER, FEEDER
76- P-32A	76-E-18	THICKENED SLUDGE DIGESTER FEED PUMP 2A	76MCC76D02	X		NOTE 6	-20					INT	X			DEMO EXIST STARTER, FEEDER
76- P-33A	76-E-12	THICKENED SLUDGE DIGESTER FEED PUMP 3A	76MCC76A02	X		NOTE 6	-20					INT	X			DEMO EXIST STARTER, FEEDER
76- P-31B	76-E-11	**THICKENED SLUDGE DIGESTER FEED PUMP 1B**	**76MCC76A01**		**X**		**25**					**INT**	**X**			**INSTALL NEW STARTER, FEEDER (NOTE 7)**
76- P-32B	76-E-18	**THICKENED SLUDGE DIGESTER FEED PUMP 2B**	**76MCC76D02**		**X**		**25**					**INT**	**X**			**INSTALL NEW STARTER, FEEDER (NOTE 7)**

APPENDIX D - TABLE 2: SLUDGE THICKENING SYSTEM

MBC CAPACITY ASSESSMENT - PROJECTED LOAD MODIFICATIONS

REVISION 1

DRIVEN EQUIPMENT						NOTES	480 V LOAD - AC MOTORS						MOTOR CONTROL			
TAG	DWG	DRIVEN EQUIPMENT NAME	EQUIPMENT STATUS				CONNECTED		MAX RUNNING		DUTY CYCLE		SPEED			ELECTRICAL WORK REQUIRED
NUMBER(S)	NUMBER		EXISTING MCC NAME	EXISTING TO DEMO	**PROPOSED LOAD**		HP	KW/ KVA	HP	KW/ KVA	CONT	INT/ VAR	CONSTANT SPEED	VARIABLE VFD	BYPASS CONTACTOR	
76- P-33B	76-E-12	**THICKENED SLUDGE DIGESTER FEED PUMP 3B**	**76MCC76A02**		**X**		**25**					**INT**	**X**			**INSTALL NEW STARTER, FEEDER (NOTE 7)**
76- P-34	**76-E-18**	**THICKENED SLUDGE DIGESTER FEED PUMP 4**	**76MCC76D01**		**X**		**25**					**INT**	**X**			**INSTALL NEW STARTER, FEEDER (NOTE 7)**

NOTES

1. EX. HP'S TAKEN FROM SINGLE LINE - NOT FIELD VERIFIED
2. HP'S FOR A VFD-DRIVEN MOTOR ARE LISTED WITH THE EQUIPMENT
3. SPACE AVAILABLE IN ORIGINAL MCC FOR UNIT NO. 6
4. 300 HP MAIN DRIVE AND 60 HP BACKDRIVE FIELD VERIFIED
5. BASED ON ALDEC G3-165 DATA SHEET PROVIDED BY COOMBS HOPKINS
6. ORIGINAL PUMPS HAVE ALREADY BEEN REPLACED ONCE. ORIGINAL 10 HP'S ARE NOW 20 HP'S
7. FIELD-VERIFY SPACE FOR NEW EQUIPMENT.

APPENDIX D - TABLE 3: DIGESTER FOG OR LYSTEK OPTION																		
MBC CAPACITY ASSESSMENT - PROJECTED LOAD MODIFICATIONS																		
REVISION			1															
DRIVEN EQUIPMENT								NOTES	480 V LOAD - AC MOTORS						MOTOR CONTROL			
TAG		DWG	DRIVEN EQUIPMENT NAME	EQUIPMENT STATUS					CONNECTED		MAX RUNNING		DUTY CYCLE		SPEED			ELECTRICAL WORK REQUIRED
NUMBER(S)		NUMBER		EXISTING	EXISTING	EXISTING	**PROPOSED**		HP	KW/	HP	KW/	CONT	INT/	CONSTANT	VARIABLE	BYPASS	
				MCC NAME	TO DEMO	TO REMAIN	**LOAD**			KVA		KVA		VAR	SPEED	VFD	CONTACTOR	
80-	C-01	80-E-11	BIOGAS COMPRESSOR 1	80MCC8001	X				-20				CONT		X			DEMO EXIST STARTER, FDR. RECOMMEND DEMO DS
80-	C-02	80-E-14	BIOGAS COMPRESSOR 2	80MCC8004	X				-20				CONT		X			DEMO EXIST STARTER, FDR. RECOMMEND DEMO DS
80-	**C-03**	**80-E-11**	**BIOGAS COMPRESSOR 1**	**80MCC8001**			**X**		**60**		**60**		**CONT**		**X**			**INSTALL NEW STARTER, FDR. RECOMMEND REPLACE DS**
80-	**C-04**	**80-E-14**	**BIOGAS COMPRESSOR 2**	**80MCC8004**			**X**		**60**		**60**		**CONT**		**X**			**INSTALL NEW STARTER, FDR. RECOMMEND REPLACE DS**
80-	**C-05**	**80-E-14**	**BIOGAS COMPRESSOR 3**	**80MCC8004**			**X**		**60**				**CONT**		**X**			**INSTALL NEW STARTER (IN MCC8001 SECTION 8), FDR. RECOMMEND REPLACE DS**
80-	**P-81**	**TBD**	**DIGESTER 4 MIXING PUMP 1**	**80MCC8004A**			**X**		**40**		**40**		**CONT**		**X**			**INSTALL NEW MCC, DS, CONDUIT FDR, SEE NOTE 3**
80-	**P-82**	**TBD**	**DIGESTER 4 MIXING PUMP 2**	**80MCC8004B**			**X**		**40**		**40**		**CONT**		**X**			**INSTALL NEW MCC, DS, CONDUIT FDR, SEE NOTE 3**
80-	**P-83**	**TBD**	**DIGESTER 4 MIXING PUMP 3**	**80MCC8004A**			**X**		**40**		**40**		**CONT**		**X**			**INSTALL NEW MCC, DS, CONDUIT FDR, SEE NOTE 3**
80-	**P-84**	**TBD**	**DIGESTER 4 AXIAL MIX PUMP 1**	**80MCC8004A**			**X**		**40**		**40**		**CONT**		**X**			**INSTALL NEW MCC, DS, CONDUIT FDR, SEE NOTE 3**
80-	**P-85**	**TBD**	**DIGESTER 4 AXIAL MIX PUMP 2**	**80MCC8004B**			**X**		**40**		**40**		**CONT**		**X**			**INSTALL NEW MCC, DS, CONDUIT FDR, SEE NOTE 3**
80-	**P-86**	**TBD**	**DIGESTER 4 AXIAL MIX PUMP 3**	**80MCC8004A**			**X**		**40**		**40**		**CONT**		**X**			**INSTALL NEW MCC, DS, CONDUIT FDR, SEE NOTE 3**
80-	**P-87**	**TBD**	**DIGESTER 4 RECIRC PUMP 1**	**80MCC8004A**			**X**		**20**		**20**		**CONT**		**X**			**INSTALL NEW MCC, DS, CONDUIT FDR, SEE NOTE 3**
80-	**P-88**	**TBD**	**DIGESTER 4 RECIRC PUMP 2**	**80MCC8004B**			**X**		**20**		**20**		**CONT**		**X**			**INSTALL NEW MCC, DS, CONDUIT FDR, SEE NOTE 3**
80-	F-01	N/A	BIOGAS FLARE 1	TBD		X			5		*2.5*		*50%*		*X*			
80-	F-02	N/A	BIOGAS FLARE 2	TBD		X			5		*2.5*		*50%*		*X*			
80-	**F-03**	**N/A**	**BIOGAS FLARE 3**	**TBD**			**X**		**7.5**		**3.75**		**50%**		**X**			**INSTALL NEW CB, CONDUIT, FDR**
80-	**F-03**	**N/A**	**BIOGAS FLARE 4**				**X**		**7.5**		**3.75**		**50%**		**X**			**INSTALL NEW CB, CONDUIT, FDR**
80-		**N/A**	**MISCELLANEOUS ADDITIONAL DIGESTER LOADS**	**TBD**			**X**		**100**		**50**							**INSTALL NEW MCC, DS, CONDUIT FDR, SEE NOTE 3**
N/A		**N/A**	**FOG LOADS**				**X**		**120**		**100**		**CONT**					**INSTALL NEW MCC, DS, CONDUIT FDR, SEE NOTE 3**
	NOTES																	
	1	EX. HP'S TAKEN FROM SINGLE LINE - NOT FIELD VERIFIED																
	2	HP'S FOR A VFD-DRIVEN MOTOR ARE LISTED WITH THE EQUIPMENT																
	3	INSTALL NEW MCCs 80MCC8007 AND 80MCC8008 FED FROM 80USS TO ACCOMMODATE THE NEW LOADS. FIELD-VERIFY SPACE FOR NEW EQUIPMENT.																

APPENDIX D - TABLE 4: SLUDGE DEWATERING SYSTEM

MBC CAPACITY ASSESSMENT - PROJECTED LOAD MODIFICATIONS

REVISION		1															
DRIVEN EQUIPMENT							NOTES	480 V LOAD - AC MOTORS						MOTOR CONTROL			
TAG		DWG	DRIVEN EQUIPMENT NAME	EQUIPMENT STATUS				CONNECTED		MAX RUNNING		DUTY CYCLE		SPEED			ELECTRICAL WORK REQUIRED
NUMBER(S)		NUMBER		EXISTING MCC NAME	EXISTING TO DEMO	PROPOSED LOAD		HP	KW/ KVA	HP	KW/ KVA	CONT	INT/ VAR	CONSTANT SPEED	VARIABLE VFD	BYPASS CONTACTOR	
76-	P-51	76-E-15	DEWATERING CENTRIFUGE SLUDGE FEED PUMP 1	76MCC76C01	X			-25				CONT			X	NO	
76-	P-52	76-E-16	DEWATERING CENTRIFUGE SLUDGE FEED PUMP 2	76MCC76C02	X			-25				CONT			X	NO	
76-	P-53	76-E-15	DEWATERING CENTRIFUGE SLUDGE FEED PUMP 3	76MCC76C01	X			-25				CONT			X	NO	
76-	P-54	76-E-16	DEWATERING CENTRIFUGE SLUDGE FEED PUMP 4	76MCC76C02	X			-25				CONT			X	NO	
76-	P-55	76-E-13	DEWATERING CENTRIFUGE SLUDGE FEED PUMP 5	76MCC76B01	X			-25				CONT			X	NO	
76-	P-56	76-E-14	DEWATERING CENTRIFUGE SLUDGE FEED PUMP 6	76MCC76B02	X			-25				CONT			X	NO	
76-	P-57	76-E-13	DEWATERING CENTRIFUGE SLUDGE FEED PUMP 7	76MCC76B01	X			-25				CONT			X	NO	
76-	P-58	76-E-14	DEWATERING CENTRIFUGE SLUDGE FEED PUMP 8	76MCC76B02	X			-25				CONT			X	NO	
76-	VFD-51	76-E-15	DEWATERING CENTRIFUGE SLUDGE FEED PUMP 1 VFD	76MCC76C01	X												DEMO EXIST CB, ISO XFR, VFD, DS, FDR
76-	VFD-52	76-E-16	DEWATERING CENTRIFUGE SLUDGE FEED PUMP 2 VFD	76MCC76C02	X												DEMO EXIST CB, ISO XFR, VFD, DS, FDR
76-	VFD-53	76-E-15	DEWATERING CENTRIFUGE SLUDGE FEED PUMP 3 VFD	76MCC76C01	X												DEMO EXIST CB, ISO XFR, VFD, DS, FDR
76-	VFD-54	76-E-16	DEWATERING CENTRIFUGE SLUDGE FEED PUMP 4 VFD	76MCC76C02	X												DEMO EXIST CB, ISO XFR, VFD, DS, FDR
76-	VFD-55	76-E-13	DEWATERING CENTRIFUGE SLUDGE FEED PUMP 5 VFD	76MCC76B01	X												DEMO EXIST CB, ISO XFR, VFD, DS, FDR
76-	VFD-56	76-E-14	DEWATERING CENTRIFUGE SLUDGE FEED PUMP 6 VFD	76MCC76B02	X												DEMO EXIST CB, ISO XFR, VFD, DS, FDR
76-	VFD-57	76-E-13	DEWATERING CENTRIFUGE SLUDGE FEED PUMP 7 VFD	76MCC76B01	X												DEMO EXIST CB, ISO XFR, VFD, DS, FDR
76-	VFD-58	76-E-14	DEWATERING CENTRIFUGE SLUDGE FEED PUMP 8 VFD	76MCC76B02	X												DEMO EXIST CB, ISO XFR, VFD, DS, FDR
76-	**P-51A**	76-E-15	**DEWATERING CENTRIFUGE SLUDGE FEED PUMP 1A**	76MCC76C01		**X**		**50**				**CONT**			**X**	**NO**	
76-	**P-52A**	76-E-16	**DEWATERING CENTRIFUGE SLUDGE FEED PUMP 2A**	76MCC76C02		**X**		**50**				**CONT**			**X**	**NO**	
76-	**P-53A**	76-E-15	**DEWATERING CENTRIFUGE SLUDGE FEED PUMP 3A**	76MCC76C01		**X**		**50**				**CONT**			**X**	**NO**	
76-	**P-54A**	76-E-16	**DEWATERING CENTRIFUGE SLUDGE FEED PUMP 4A**	76MCC76C02		**X**		**50**				**CONT**			**X**	**NO**	
76-	**P-55A**	76-E-13	**DEWATERING CENTRIFUGE SLUDGE FEED PUMP 5A**	76MCC76B01		**X**		**50**				**CONT**			**X**	**NO**	
76-	**P-56A**	76-E-14	**DEWATERING CENTRIFUGE SLUDGE FEED PUMP 6A**	76MCC76B02		**X**		**50**				**CONT**			**X**	**NO**	
76-	**P-57A**	76-E-13	**DEWATERING CENTRIFUGE SLUDGE FEED PUMP 7A**	76MCC76B01		**X**		**50**				**CONT**			**X**	**NO**	
76-	**P-58A**	76-E-14	**DEWATERING CENTRIFUGE SLUDGE FEED PUMP 8A**	76MCC76B02		**X**		**50**				**CONT**			**X**	**NO**	
76-	**VFD-51A**	**76-E-15**	**DEWATERING CENTRIFUGE SLUDGE FEED PUMP 1A VFD**	**76MCC76C01**		**X**											**INSTALL NEW CB, ISO XFR, VFD, DS, FDR**
76-	**VFD-52A**	**76-E-16**	**DEWATERING CENTRIFUGE SLUDGE FEED PUMP 2A VFD**	**76MCC76C02**		**X**											**INSTALL NEW CB, ISO XFR, VFD, DS, FDR**
76-	**VFD-53A**	**76-E-15**	**DEWATERING CENTRIFUGE SLUDGE FEED PUMP 3A VFD**	**76MCC76C01**		**X**											**INSTALL NEW CB, ISO XFR, VFD, DS, FDR**
76-	**VFD-54A**	**76-E-16**	**DEWATERING CENTRIFUGE SLUDGE FEED PUMP 4A VFD**	**76MCC76C02**		**X**											**INSTALL NEW CB, ISO XFR, VFD, DS, FDR**
76-	**VFD-55A**	**76-E-13**	**DEWATERING CENTRIFUGE SLUDGE FEED PUMP 5A VFD**	**76MCC76B01**		**X**											**INSTALL NEW CB, ISO XFR, VFD, DS, FDR**
76-	**P-56A**	**76-E-14**	**DEWATERING CENTRIFUGE SLUDGE FEED PUMP 6A VFD**	**76MCC76B02**		**X**											**INSTALL NEW CB, ISO XFR, VFD, DS, FDR**
76-	**P-57A**	**76-E-13**	**DEWATERING CENTRIFUGE SLUDGE FEED PUMP 7A VFD**	**76MCC76B01**		**X**											**INSTALL NEW CB, ISO XFR, VFD, DS, FDR**
76-	**P-58A**	**76-E-14**	**DEWATERING CENTRIFUGE SLUDGE FEED PUMP 8A VFD**	**76MCC76B02**		**X**											**INSTALL NEW CB, ISO XFR, VFD, DS, FDR**
76-	P-61	76-E-15	DEWATERING CENTRIFUGE POLYMER FEED PUMP 1	76MCC76C01	X			-5				CONT			X	NO	
76-	P-62	76-E-16	DEWATERING CENTRIFUGE POLYMER FEED PUMP 2	76MCC76C02	X			-5				CONT			X	NO	
76-	P-63	76-E-15	DEWATERING CENTRIFUGE POLYMER FEED PUMP 3	76MCC76C01	X			-5				CONT			X	NO	
76-	P-64	76-E-16	DEWATERING CENTRIFUGE POLYMER FEED PUMP 4	76MCC76C02	X			-5				CONT			X	NO	
76-	P-65	76-E-13	DEWATERING CENTRIFUGE POLYMER FEED PUMP 5	76MCC76B01	X			-5				CONT			X	NO	
76-	P-66	76-E-14	DEWATERING CENTRIFUGE POLYMER FEED PUMP 6	76MCC76B02	X			-5				CONT			X	NO	
76-	P-67	76-E-13	DEWATERING CENTRIFUGE POLYMER FEED PUMP 7	76MCC76B01	X			-5				CONT			X	NO	
76-	P-68	76-E-14	DEWATERING CENTRIFUGE POLYMER FEED PUMP 8	76MCC76B02	X			-5				CONT			X	NO	
76-	VFD-61	76-E-15	DEWATERING CENTRIFUGE POLYMER FEED PUMP 1 VFD	76MCC76C01	X												DEMO EXIST CB, REACTOR, VFD. RECOMMEND DEMO EXIST DS, FDR
76-	VFD-62	76-E-16	DEWATERING CENTRIFUGE POLYMER FEED PUMP 2 VFD	76MCC76C02	X												DEMO EXIST CB, REACTOR, VFD. RECOMMEND DEMO EXIST DS, FDR
76-	VFD-63	76-E-15	DEWATERING CENTRIFUGE POLYMER FEED PUMP 3 VFD	76MCC76C01	X												DEMO EXIST CB, REACTOR, VFD. RECOMMEND DEMO EXIST DS, FDR
76-	VFD-64	76-E-16	DEWATERING CENTRIFUGE POLYMER FEED PUMP 4 VFD	76MCC76C02	X												DEMO EXIST CB, REACTOR, VFD. RECOMMEND DEMO EXIST DS, FDR
76-	VFD-65	76-E-13	DEWATERING CENTRIFUGE POLYMER FEED PUMP 5 VFD	76MCC76B01	X												DEMO EXIST CB, REACTOR, VFD. RECOMMEND DEMO EXIST DS, FDR
76-	VFD-66	76-E-14	DEWATERING CENTRIFUGE POLYMER FEED PUMP 6 VFD	76MCC76B02	X												DEMO EXIST CB, REACTOR, VFD. RECOMMEND DEMO EXIST DS, FDR
76-	VFD-67	76-E-13	DEWATERING CENTRIFUGE POLYMER FEED PUMP 7 VFD	76MCC76B01	X												DEMO EXIST CB, REACTOR, VFD. RECOMMEND DEMO EXIST DS, FDR
76-	VFD-68	76-E-14	DEWATERING CENTRIFUGE POLYMER FEED PUMP 8 VFD	76MCC76B02	X												DEMO EXIST CB, REACTOR, VFD. RECOMMEND DEMO EXIST DS, FDR
76-	**P-61A**	**76-E-15**	**DEWATERING CENTRIFUGE POLYMER FEED PUMP 1A**	**76MCC76C01**		**X**		**10**				**CONT**			**X**	**NO**	
76-	**P-62A**	**76-E-16**	**DEWATERING CENTRIFUGE POLYMER FEED PUMP 2A**	**76MCC76C02**		**X**		**10**				**CONT**			**X**	**NO**	
76-	**P-63A**	**76-E-15**	**DEWATERING CENTRIFUGE POLYMER FEED PUMP 3A**	**76MCC76C01**		**X**		**10**				**CONT**			**X**	**NO**	
76-	**P-64A**	**76-E-16**	**DEWATERING CENTRIFUGE POLYMER FEED PUMP 4A**	**76MCC76C02**		**X**		**10**				**CONT**			**X**	**NO**	
76-	**P-65A**	**76-E-13**	**DEWATERING CENTRIFUGE POLYMER FEED PUMP 5A**	**76MCC76B01**		**X**		**10**				**CONT**			**X**	**NO**	
76-	**P-66A**	**76-E-14**	**DEWATERING CENTRIFUGE POLYMER FEED PUMP 6A**	**76MCC76B02**		**X**		**10**				**CONT**			**X**	**NO**	
76-	**P-67A**	**76-E-13**	**DEWATERING CENTRIFUGE POLYMER FEED PUMP 7A**	**76MCC76B01**		**X**		**10**				**CONT**			**X**	**NO**	
76-	**P-68A**	**76-E-14**	**DEWATERING CENTRIFUGE POLYMER FEED PUMP 8A**	**76MCC76B02**		**X**		**10**				**CONT**			**X**	**NO**	
76-	**VFD-61A**	**76-E-15**	**DEWATERING CENTRIFUGE POLYMER FEED PUMP 1A VFD**	**76MCC76C01**		**X**											**INSTALL NEW CB, REACTOR, VFD. RECOMMEND INSTALL NEW DS, FDR**
76-	**VFD-62A**	**76-E-16**	**DEWATERING CENTRIFUGE POLYMER FEED PUMP 2A VFD**	**76MCC76C02**		**X**											**INSTALL NEW CB, REACTOR, VFD. RECOMMEND INSTALL NEW DS, FDR**
76-	**VFD-63A**	**76-E-15**	**DEWATERING CENTRIFUGE POLYMER FEED PUMP 3A VFD**	**76MCC76C01**		**X**											**INSTALL NEW CB, REACTOR, VFD. RECOMMEND INSTALL NEW DS, FDR**
76-	**VFD-64A**	**76-E-16**	**DEWATERING CENTRIFUGE POLYMER FEED PUMP 4A VFD**	**76MCC76C02**		**X**											**INSTALL NEW CB, REACTOR, VFD. RECOMMEND INSTALL NEW DS, FDR**
76-	**VFD-65A**	**76-E-13**	**DEWATERING CENTRIFUGE POLYMER FEED PUMP 5A VFD**	**76MCC76B01**		**X**											**INSTALL NEW CB, REACTOR, VFD. RECOMMEND INSTALL NEW DS, FDR**
76-	**VFD-66A**	**76-E-14**	**DEWATERING CENTRIFUGE POLYMER FEED PUMP 6A VFD**	**76MCC76B02**		**X**											**INSTALL NEW CB, REACTOR, VFD. RECOMMEND INSTALL NEW DS, FDR**
76-	**VFD-67A**	**76-E-13**	**DEWATERING CENTRIFUGE POLYMER FEED PUMP 7A VFD**	**76MCC76B01**		**X**											**INSTALL NEW CB, REACTOR, VFD. RECOMMEND INSTALL NEW DS, FDR**
76-	**VFD-68A**	**76-E-14**	**DEWATERING CENTRIFUGE POLYMER FEED PUMP 8A VFD**	**76MCC76B02**		**X**											**INSTALL NEW CB, REACTOR, VFD. RECOMMEND INSTALL NEW DS, FDR**

APPENDIX D - TABLE 4: SLUDGE DEWATERING SYSTEM

MBC CAPACITY ASSESSMENT - PROJECTED LOAD MODIFICATIONS

REVISION			**1**														
DRIVEN EQUIPMENT								NOTES	480 V LOAD - AC MOTORS						MOTOR CONTROL			
TAG		DWG	DRIVEN EQUIPMENT NAME	EQUIPMENT STATUS				CONNECTED		MAX RUNNING		DUTY CYCLE		SPEED			ELECTRICAL WORK REQUIRED
NUMBER(S)		NUMBER		EXISTING MCC NAME	EXISTING TO DEMO	**PROPOSED LOAD**		HP	KW/ KVA	HP	KW/ KVA	CONT	INT/ VAR	CONSTANT SPEED	VARIABLE VFD	BYPASS CONTACTOR	
76-	DC-1	SI-E-29	DEWATERING CENTRIFUGE 1 MAIN DRIVE		X		NOTE 4	-300				CONT			X	NO	DEMO EXIST REACTOR, VFD
			DC1 BACKDRIVE		X		NOTE 4	-100				CONT			X	NO	DEMO EXIST REACTOR, VFD
76-	DC-8	SI-E-28	DEWATERING CENTRIFUGE 8 MAIN DRIVE		X		NOTE 4	-100				CONT			X	NO	DEMO EXIST REACTOR, VFD
			DC8 BACKDRIVE		X		NOTE 4	-100				CONT			X	NO	DEMO EXIST REACTOR, VFD
76-	**DC-1A**	SI-E-29	**DEWATERING CENTRIFUGE 1A MAIN DRIVE**			**X**	**NOTE 5**	**200**				**CONT**			**X**	**NO**	**INSTALL NEW CENTRIFUGE DRIVE (NOTE 7)**
			TC1A BACKDRIVE			**X**	**NOTE 5**	**50**				**CONT**			**X**	**NO**	**INSTALL NEW CENTRIFUGE DRIVE (NOTE 7)**
76-	**TC-8A**	**SI-E-28**	**DEWATERING CENTRIFUGE 2A**			**X**	**NOTE 5**	**200**				**CONT**			**X**	**NO**	**INSTALL NEW CENTRIFUGE DRIVE (NOTE 7)**
			TC2A BACKDRIVE			**X**	**NOTE 5**	**50**				**CONT**			**X**	**NO**	**INSTALL NEW CENTRIFUGE DRIVE (NOTE 7)**

NOTES

1. EX. HP'S TAKEN FROM SINGLE LINE - NOT FIELD VERIFIED
2. HP'S FOR A VFD-DRIVEN MOTOR ARE LISTED WITH THE EQUIPMENT
3. SPACE AVAIALABLE IN ORIGINAL MCC FOR UNIT NO. 6
4. 300 HP MAIN DRIVE AND 60 HP BACKDRIVE FIELD VERIFIED
5. BASED ON ALDEC G3-165 DATA SHEET PROVIDED BY COOMBS HOPKINS
6. ORIGINAL PUMPS HAVE ALREADY BEEN REPLACED ONCE. ORIGINAL 10 HP'S ARE NOW 20 HP'S
7. FIELD-VERIFY SPACE FOR NEW EQUIPMENT.

APPENDIX D - TABLE 5: CENTRATE PUMP STATION

MBC CAPACITY ASSESSMENT - PROJECTED LOAD MODIFICATIONS

REVISION **1**

DRIVEN EQUIPMENT								NOTES	480 V LOAD - AC MOTORS						MOTOR CONTROL			
TAG		DWG	DRIVEN EQUIPMENT NAME	EQUIPMENT STATUS					CONNECTED		MAX RUNNING		DUTY CYCLE		SPEED			ELECTRICAL WORK REQUIRED
NUMBER(S)		NUMBER		EXISTING MCC NAME	EXISTING TO DEMO	EXISTING TO REMAIN	**PROPOSED LOAD**		HP	KW/ KVA	HP	KW/ KVA	CONT	INT/ VAR	CONSTANT SPEED	VARIABLE VFD	BYPASS CONTACTOR	
94-	P-01	SI-E-37	CENTRATE PUMP 1	94USS	X				-100				CONT			X		
94-	P-02	SI-E-38	CENTRATE PUMP 2	94USS	X				-100				CONT			X		
94-	P-03	SI-E-37	CENTRATE PUMP 3	94USS	X				-100				CONT			X		
94-	P-01	SI-E-37	CENTRATE PUMP 1 (LEAD)	**94USS**			**X**		150				CONT			X		**INSTALL NEW CB, ISO XFR, VFD, DS, FDR (NOTE 3)**
94-	P-02	SI-E-38	CENTRATE PUMP 2 (LAG 1)	**94USS**			**X**		150				CONT			X		**INSTALL NEW CB, ISO XFR, VFD, DS, FDR (NOTE 3)**
94-	P-03	SI-E-37	CENTRATE PUMP 3 (LAG 2)	**94USS**			**X**		150				CONT			X		**INSTALL NEW CB, ISO XFR, VFD, DS, FDR (NOTE 3)**
94-	**P-04**	**SI-E-38**	**CENTRATE PUMP 4 (FUTURE, STANDBY)**	**94USS**			**X**		**150**				**CONT**			**X**		**INSTALL NEW CB, ISO XFR, VFD, DS, CONDUIT, FDR (NOTE 3)**

NOTES
1 EX. HP'S TAKEN FROM SINGLE LINE - NOT FIELD VERIFIED
2 HP'S FOR A VFD-DRIVEN MOTOR ARE LISTED WITH THE EQUIPMENT
3 94USS 2000 KVA XFR'S ARE REQUIRED TO UTILIZE THEIR FA RATING OR BE REPLACED WITH 2500 KVA UNITS AS AN OPTION. FIELD-VERIFY SPACE FOR NEW EQUIPMENT.

Appendix E: Basis of Estimate Memorandum and Estimate Summary

Memorandum

Date: April 26, 2016

To: Anil Pai, San Diego

From: Don Snowden, West Monroe

Internal ESG Review By: Don Gordon, San Diego

Project No.: 148827-300

Subject: PureWater NCWRP Impact on MBC

Conceptual Design Completion

Basis of Estimate of Probable Construction Cost

The Basis of Estimate Report and supporting estimate reports for the subject project are attached. Please call me if you have questions or need additional information.

DRS

Enclosures (3):

1. Basis of Estimate Report
2. Summary Estimate

Basis of Estimate Report

PureWater NCWRP Impact on MBC

Introduction

Brown and Caldwell (BC) is pleased to present this opinion of probable construction cost (estimate) prepared for the impact of NCWRP expansion on MBC in San Diego, CA.

Summary

This Basis of Estimate contains the following information:

- Scope of work
- Background of this estimate
- Class of estimate
- Estimating methodology
- Direct cost development
- Indirect cost development
- Bidding assumptions
- Estimating assumptions
- Estimating exclusions
- Allowances for known but undefined work
- Contractor and other estimate markups

Scope of Work

Work consists of modifications to the MBC as follows:

1. Grit Removal –
    a. (3) Raw Solids Pumps.
    b. (2) Teacups and Grit Snails.
    c. (1) Classifier and screw conveyor.
    d. (1) ½ sized dumpster.
    e. Existing Building and Expansion Modifications.
2. Thickening Centrifuges
    a. Replacement of (6) centrifuges with associated centrifuge feed pumps and chemical feed pumps.
    b. Replacement of 1,520 linear feet of small diameter sludge pipelines, along with associated bypass pipeline during replacement.
    c. Moving to and from temporary onsite storage, along with cost for temporary onsite storage.
3. (2) two phased Digester Options
    a. There are (2) alternatives; one with FOG, and one without FOG.

   b. There are (2) phases in each alternative. All Phases consists mainly of piping improvements, except on. Phase 2 with FOG adds a 105 ft diameter x 48 ft tall prestressed digester, along with gallery expansion.

4. Dewatering Centrifuges
   a. Replacement of (2) centrifuges with (8) centrifuge feed pumps and chemical feed pumps.
   b. Moving to and from temporary onsite storage, along with cost for temporary onsite storage.
5. Centrate System Improvements consisting of replacing (4) centrate pumps.
6. Various Improvement to Waste Heat Utilization
   a. Conversion of (2) existing boilers to dual fuel capability.
   b. Installation of waste heat recovery equipment for (2) existing MCAS Miramar engines, and re-configuration of existing CHW system into HRS/HRR systems feeding existing MBC HW Loop.
   c. Installation of 400 linear feet of HWS and HWR to FOG.
   d. Relocating the 10-inch HRR tie point to the 16-HRR to prevent short circuiting. Additional temperature sensors are also provided.

Background of this Estimate of Probable Construction Cost

The attached estimate of probable construction cost is based on documents dated April 4, 2016, received by the ESG. These documents are described as ten percent complete based on the current project progression, additional or updated scope and/or quantities, and ongoing discussions with the project team. Further information can be found in the detailed estimate reports.

AACEI Estimate Classification

In accordance with the Association for the Advancement of Cost Engineering International (AACE) criteria, this is a Class 5 estimate. A Class 5 estimate is defined as a Conceptual Level or Project Viability Estimate. Typically, engineering is from 0 to 10 percent complete. Class 5 estimates are used to prepare planning level cost scopes or evaluation of alternative schemes, long range capital outlay planning and can also form the base work for the Class 4 Planning Level or Design Technical Feasibility Estimate.

Expected accuracy for Class 5 estimates typically ranges from -50 to +100 percent, depending on the technological complexity of the project, appropriate reference information and the inclusion of an appropriate contingency determination. In unusual circumstances, ranges could exceed those shown.

Estimating Methodology

This estimate was prepared using quantity take-offs, vendor quotes and equipment pricing furnished either by the project team or by the estimator. The estimate includes direct labor costs and anticipated productivity adjustments to labor, and equipment. Where possible, estimates for work anticipated to be performed by specialty subcontractors have been identified.

Construction labor crew and equipment hours were calculated from production rates contained in documents and electronic databases published by R.S. Means, Mechanical Contractors Association (MCA), National Electrical Contractors Association (NECA), and Rental Rate Blue Book for Construction Equipment (Blue Book).

This estimate was prepared using BC's estimating system, which consists of a Windows-based commercial estimating software engine using BC's material and labor database, historical project data, the latest vendor and material cost information, and other costs specific to the project locale.

Direct Cost Development

Costs associated with the General Provisions and the Special Provisions of the construction documents, which are collectively referred to as Contractor General Conditions (CGC), were based on the estimator's interpretation of the contract documents. The estimates for CGCs are divided into two groups: a time-related group (e.g., field personnel), and non-time-related group (e.g., bonds and insurance). Labor burdens such as health and welfare, vacation, union benefits, payroll taxes, and workers compensation insurance are included in the labor rates. No trade discounts were considered.

Indirect Cost Development

A percentage allowance for contractor's home office expense has been included in the overall rate markups. The rate is standard for this type of heavy construction and is based on typical percentages outlined in Means Heavy Construction Cost Data.

The contractor's cost for builder's risk, general liability and vehicle insurance has been included in this estimate. Based on historical data, this is typically two to four percent of the overall construction contract amount. These indirect costs have been included in this estimate as a percentage of the gross cost, and are added after the net markups have been applied to the appropriate items.

Bidding Assumptions

The following bidding assumptions were considered in the development of this estimate.

1. Bidders must hold a valid, current Contractor's credentials, applicable to the type of project.
2. Bidders will develop estimates with a competitive approach to material pricing and labor productivity, and will not include allowances for changes, extra work, unforeseen conditions or any other unplanned costs.
3. Estimated costs are based on a minimum of four bidders. Actual bid prices may increase for fewer bidders or decrease for a greater number of bidders.
4. Bidders will account for General Provisions and Special Provisions of the contract documents and will perform all work except that which will be performed by traditional specialty subcontractors as identified here:
   - Electrical and Instrumentation
   - HVAC systems
   - Painting and Coatings
   - Prestressed Tank
   - Pile Driving

Estimating Assumptions

As the design progresses through different completion stages, it is customary for the estimator to make assumptions to account for details that may not be evident from the documents. The following assumptions were used in the development of this estimate.

1. Contractor performs the work during normal daylight hours, nominally 7 a.m. to 5 p.m., Monday through Friday, in an 8-hour shift. No allowance has been made for additional shift work or weekend work.
2. Contractor has complete access for lay-down areas and mobile equipment.
3. Equipment rental rates are based on verifiable pricing from the local project area rental yards, Blue Book rates and/or rates contained in the estimating database.
4. Contractor markup is based on conventionally accepted values that have been adjusted for project-area economic factors.
5. Major equipment costs are based on both vendor supplied price quotes obtained by the project design team and/or estimators, and on historical pricing of like equipment.
6. Process equipment vendor training using vendors' standard Operations and Maintenance (O&M) material, is included in the purchase price of major equipment items where so stated in that quotation.
7. Bulk material quantities are based on manual quantity take-offs.
8. There is sufficient electrical power with the existing plant load centers to feed the specified equipment. Neither new power supply, nor transformers by the electric utility are anticipated.
9. Pavement demolition and replacement is based on a 5 inch asphalt course, and a 12-inch crushed stone base course.
10. All replacement equipment received new equipment pads.
11. The temporary storage cost is based upon 20,000 cubic feet required, using ¾ of capacity of (10) 40 ft shipping containers stored onsite.

Estimating Exclusions

The following estimating exclusions were assumed in the development of this estimate.

1. Hazardous materials remediation and/or disposal.
2. O&M costs for the project with the exception of the vendor supplied O&M manuals.
3. Utility agency costs for incoming power modifications.
4. Permits beyond those normally needed for the type of project and project conditions.
5. No Piling is included in this estimate.

Allowances for Known but Undefined Work

Allowances were made in the development of this estimate for equipment header piping.

Contractor and Other Estimate Markups

Contractor markup is based on conventionally accepted values which have been adjusted for project-area economic factors. Estimate markups are shown in Table 1.

Table 2. Estimate Markups

Item	Rate (%)
Net Cost Markups	
Labor (employer payroll burden)	12
Materials and process equipment	10
Equipment (construction-related)	8
Subcontractor	5
Sales Tax (State and local for materials, process equipment and construction equipment rentals, etc.)	8
Material Shipping and Handling	2
Gross Cost Markups	
Contractors General Conditions	10
Start-up, Training and O&M	2
Undesigned/Undeveloped Detail Construction Contingency	40
Builders Risk, Liability and Auto Insurance	2
Performance and Payment Bonds	1.5
Escalation to Midpoint of Construction	Client Applied

Labor Markup

The labor rates used in the estimate were derived chiefly from the latest published State Prevailing Wage Rates. These include base rate paid to the laborer plus fringes. A labor burden factor is applied to these such that the final rates include all employer paid taxes. These taxes are FICA (which covers social security plus Medicare), Workers Comp (which varies based on state, employer experience and history) and unemployment insurance. The result is fully loaded labor rates. In addition to the fully loaded labor rate, an overhead and profit markup is applied at the back end of the estimate. This covers payroll and accounting, estimator's wages, home office rent, advertising and owner profit.

Materials and Process Equipment Markup

This markup consists of the additional cost to the contractor beyond the raw dollar amount for material and process equipment. This includes shop drawing preparation, submittal and/or re-submittal cost, purchasing and scheduling materials and equipment, accounting charges including invoicing and payment, inspection of received goods, receiving, storage, overhead and profit.

Equipment (Construction) Markup

This markup consists of the costs associated with operating the construction equipment used in the project. Most GCs will rent rather than own the equipment and then charge each project for its equipment cost. The equipment rental cost does not include fuel, delivery and pick-up charges, additional insurance requirements on rental equipment, accounting costs related to home office receiving invoices and payment. However, the crew rates used in the estimate do account for the equipment rental cost. Occasionally, larger contractors will have some or all of the equipment needed for the job, but in order to recoup their initial purchasing cost they will charge the project an internal rate for equipment use which is similar to the rental cost of equipment. The GC will apply an overhead and profit percentage to each individual piece of equipment whether rented or owned.

Subcontractor Markup

This markup consists of the GC's costs for subcontractors who perform work on the site. This includes costs associated with shop drawings, review of subcontractor's submittals, scheduling of subcontractor work, inspections, processing of payment requests, home office accounting, and overhead and profit on subcontracts.

Sales Tax (Materials, Process Equipment and Construction Equipment)

This is the tax that the contractor must pay according to state and local tax laws. The percentage is applied to both the material and equipment the GC purchases as well as the cost for rental equipment. The percentage is based on the local rates in place at the time the estimate was prepared.

Contractor Startup, Training, and O&M Manuals

This cost markup is often confused with either vendor startup or owner startup. It is the cost the GC incurs on the project beyond the vendor startup and owner startup costs. The GC generally will have project personnel assigned to facilitate the installation, testing, startup and O&M Manual preparation for equipment that is put into operation by either the vendor or owner. These project personnel often include an electrician, pipe fitter or millwright, and/or I&E technician. These personnel are not included in the basic crew makeup to install the equipment but are there to assist and trouble shoot the startup and proper running of the equipment. The GC also incurs a cost for startup for such things as consumables (oil, fuel, filters, etc.), startup drawings and schedules, startup meetings and coordination with the plant personnel in other areas of the plant operation.

Builders Risk, Liability, and Vehicle Insurance

This percentage comprises all three items. There are many factors which make up this percentage, including the contractor's track record for claims in each of the categories. Another factor affecting insurance rates has been a dramatic price increase across the country over the past several years due to domestic and foreign influences. Consequently, in the construction industry we have observed a range of 0.5 to 1 percent for Builders Risk Insurance, 1 to 1.25 percent for General Liability Insurance, and 0.85 to 1 percent for Vehicle Insurance. Many factors affect each area of insurance, including project complexity and contractor's requirements and history. Instead of using numbers from a select few contractors, we believe it is more prudent to use a combined 2 percent to better reflect the general costs across the country. Consequently, the actual cost could be higher or lower based on the bidder, region, insurance climate, and on the contractor's insurability at the time the project is bid.

Material Shipping and Handling

This can range from 2 to 6 percent, and is based on the type of project, material makeup of the project, and the region and location of the project. Material shipping and handling covers delivery costs from vendors, unloading costs (and in some instances loading and shipment back to vendors for rebuilt equipment), site paper work, and inspection of materials prior to unloading at the project site. BC typically adjusts this percentage by the amount of materials and whether vendors have included shipping costs in the quotes that were used to prepare the estimate. This cost also includes the GC's cost to obtain local supplies; e.g., oil, gaskets and bolts that may be missing from the equipment or materials shipped.

Escalation to Midpoint of Construction for All Project Cost

In addition to contingency, it is customary for projects that will be built over several years to include an escalation to midpoint of anticipated construction to account for the future escalation of labor, material and equipment costs beyond values at the time the estimate is prepared. For this conceptual level of estimating, the PureWater program wished to omit escalation from the base estimate, and apply as appropriate in the future.

Undesigned/Undeveloped Detail Construction Contingency

The contingency factor covers unforeseen conditions, area economic factors, and general project complexity. This contingency is used to account for those factors that cannot be addressed in each of the labor and/or material installation costs. Based on industry standards, completeness of the project documents, project complexity, the current design stage and area factors, construction contingency can range from 10 to 50 percent. Contingency is applied at the estimators discretion based on the amount of Undesigned/undeveloped detail for the particular project

Performance and Payment Bonds

Based on historical and industry data, this can range from 0.75 to 3 percent of the project total. There are several contributing factors including such items as size of the project, regional costs, and contractor's historical record on similar projects, complexity and current bonding limits. BC uses 1.5 percent for bonds, which we have determined to be reasonable for most heavy construction projects.

Project Number:	148827-300
Estimate Issue Number:	1
Estimate Issue Date:	6/6/2016
Estimator:	Snowden

San Diego PureWater Program
T.O. 18 - Impact NCWRP to MBC
CLASS V ESTIMATE

BC Project Manager	Anil Pai
BC Office	San Diego
QA/QC Reviewer	Don Gordon
QA/QC Review Date	6/6/2016

Notes

PROCESS LOCATION/AREA INDEX

Base Estimate
- 05. Grit Removal
- 10. Thickening Centrifuges
- 15a Digestion w/FOG; PHASE 1
- 15b Digestion w/FOG; PHASE 2
- 15c Digestion w/o FOG; PHASE 1
- 15d Digestion w/o FOG; PHASE 2
- 20. Dewatering Centrifuges
- 25. Centrate System
- 50. Waste Heat Utilization

Other Improvements for MBC Digesters
- 100. Demolition
- 110. Recirculatin Pumps
- 120. Centrifugal Mixing Pumps
- 130. Vane Axial Mixing Pumps
- 140. HEX

Bid Item Summary

6/7/2016 9:24 AM

Project Number: 148827-300
Estimate Issue Number: 1
Estimate Issue Date: 6/6/2016
Estimator: Snowden

T.O. 18 - Impact NCWRP to MBC

TOTALS	Area	Bid Item:	Assembly	Description	Total Gross Amount
01					
	01			Base Estimate	
		05.		Grit Removal	
			02220	Div 2- Demolition	520,557
			03333	Div 3- Small Eq Pad (4x4x1)	4,583
			26001	Electrical and Instrumentaiton (FACTORED)	666,461
			46999	Div 46-WW Equipment	2,615,482
				05. Grit Removal	3,807,081
		10.		Thickening Centrifuges	
			02220	Div 2- Demolition	129,194
			02999	Div 1-Offsite Storage	32,622
			02999	Div 2-Demolition	23,034
			03333	Div 3- Small Eq Pad (4x4x1) Centrifuge Feed Pump	13,748
			03333	Div 3- Centrifuge Pedestals (10x4x2)	137,344
			03333	Div 3- Small Eq Pad (4x4x2) Polymer Pumps	27,496
			03333	Div 3- Small Eq Pad (4x4x1) Digester Feed Pump	9,165
			05127	Div 5- Structrural Steel Beams	29,549
			26001	Div 26-Electrical and Instrumentaiton (FACTORED)	1,896,127
			40120	Div40-Piping	122,665
			40120	Div 40-Piping, 10-inch	227,504
			40120	Div 40-Piping, 6-inch	104,564
			40120	Div 40 Piping, 8-inch	287,711
			40530	Div 1-Pipeline Bypass (No Add'l Pumping Cost)	33,956
			46999	Div 46-WW Equipment	18,191,649
				10. Thickening Centrifuges	21,266,328
		15a		Digestion w/FOG; PHASE 1	
			32999	Asphalt Demo & Replacement (8-inch Biogas to Cogen)	4,788

Note that subtotals include a 40% contingency. The contingency was separated before reporting construction cost values in Table 5.1-1 and 5.1-2.

TOTALS	Area	Bid Item:	Assembly	Description	Total Gross Amount
			32999	Asphalt Demo & Replacement (16-inch Biogas to Cogen)	99,581
			32999	Asphalt Demo & Replacement (16-inch Biogas to Cogen)	10,710
			33500	UG Pipeline - 8 inch Biogas to Cogen	42,892
			33500	UG Pipeline - 16 inch Biogas to Cogen	423,310
			33500	UG Pipeline - 16 inch Biogas to Flares	139,363
			46999	Digester Equip & Piping	1,856,268
			46999	Misc. Wastewater Work	3,284,133
				15a Digestion w/FOG; PHASE 1	5,861,045
		15b		Digestion w/FOG; PHASE 2	
			01600	Hoisting & Craneage Requirements by Installing Vendor	85,544
			03999	Gallery Extension-Structural	1,802,611
			13999	Post-Tensioned Digester Tanks	6,424,379
			26999	Electrical & Instrumentation Subcontracts	854,194
			31240	Dewatering Systems	234,495
			31999	Excavating & Backfill (tank)	492,263
			31999	Sheeting (tank)	786,580
			31999	Excavating & Backfill (Gallery Extension)	399,445
			32999	Asphalt Demo & Replacement (8-inch Biogas to Cogen)	4,788
			32999	Asphalt Demo & Replacement (16-inch Biogas to Cogen)	99,581
			32999	Asphalt Demo & Replacement (18-inch Biogas to Cogen)	11,149
			33500	UG Pipeline - 8 inch Biogas to Cogen	43,000
			33500	UG Pipeline - 16 inch Biogas to Cogen	516,255
			33500	UG Pipeline - 18 inch Biogas to Flares	159,555
			46999	Digester Equip & Piping	3,467,206
			46999	Digester Tank Anciliary Items	799,962
			46999	Misc. Wastewater Work	3,284,133
				15b Digestion w/FOG; PHASE 2	19,465,140
		15c		Digestion w/o FOG; PHASE 1	

TOTALS	Area	Bid Item:	Assembly	Description	Total Gross Amount
			32999	Asphalt Demo & Replacement (8-inch Biogas to Cogen)	4,788
			32999	Asphalt Demo & Replacement (12-inch Biogas to Cogen)	91,556
			32999	Asphalt Demo & Replacement (12-inch Biogas to Cogen)	9,845
			33500	UG Pipeline - 8 inch Biogas to Cogen	41,742
			33500	UG Pipeline - 12 inch Biogas to Cogen	356,948
			33500	UG Pipeline - 12 inch Biogas to Flares	88,511
			46999	Digester Equip & Piping	226,597
			46999	Digester Equip & Piping	810,230
				15c Digestion w/o FOG; PHASE 1	1,630,218
		15d		Digestion w/o FOG; PHASE 2	
			32999	Asphalt Demo & Replacement (8-inch Biogas to Cogen)	4,788
			32999	Asphalt Demo & Replacement (12-inch Biogas to Cogen)	100,890
			32999	Asphalt Demo & Replacement (14-inch Biogas to Cogen)	10,283
			33500	UG Pipeline - 8 inch Biogas to Cogen	41,742
			33500	UG Pipeline - 12 inch Biogas to Cogen	356,948
			33500	UG Pipeline - 14 inch Biogas to Flares	109,770
			46999	Digester Equip & Piping	811,126
				15d Digestion w/o FOG; PHASE 2	1,435,547
		20.		Dewatering Centrifuges	
			02220	Div 2- Demolition	55,536
			02999	Div 1-Offsite Storage	32,622
			03333	Div 3- Small Eq Pad (4x4x1) Centrifuge Feed Pump	17,398
			03333	Div 3- Centrifuge Pedestals (10x4x2)	78,284
			03333	Div 3- Small Eq Pad (4x4x2) Polymer Pumps	9,165
			26001	Div 26-Electrical and Instrumentaiton (FACTORED)	1,013,771
			40120	Div40-Piping	122,665
			40530	Div 1-Pipeline Bypass (No Add'l Pumping Cost)	33,956

TOTALS	Area	Bid Item:	Assembly	Description	Total Gross Amount
			46999	Div 46-WW Equipment	3,305,347
				20. Dewatering Centrifuges	4,668,744
	25.			Centrate System	
			02220	Div 2- Demolition	2,164
			03333	Div 3- Small Eq Pad (4x4x1)	6,292
			26001	Div 26-Electrical and Instrumentaiton (FACTORED)	262,830
			40120	Div40-Piping	26,285
			46999	Div 46-WW Equipment	1,039,513
				25. Centrate System	1,337,083
	50.			Waste Heat Utilization	
			40140	Boiler-Dual Fuel Conversion	323,735
			40140	Boiler-Dual Fuel Conversion	510,058
			40170	HWS to FOG Receiving Sta	102,003
			40170	HW Loop Interconnection Enhancement @ MBC Cogen	45,175
				50. Waste Heat Utilization	980,971
				01 Base Estimate	60,452,158
	02			Other Improvements for MBC Digesters	
		100		Demolition	
			46999	Misc. Wastewater Work	103,777
				100 Demolition	103,777
		110		Recirculation Pumps	
			46999	Misc. Wastewater Work	255,984
				110 Recirculation Pumps	255,984
		120		Centrifugal Mixing Pumps	

TOTALS	Area	Bid Item:	Assembly	Description	Total Gross Amount
			46999	Misc. Wastewater Work	698,138
				120 Centrifugal Mixing Pumps	698,138
		130		Vane Axial Mixing Pumps	
			46999	Misc. Wastewater Work	1,291,555
				130 Vane Axial Mixing Pumps	1,291,555
		140		HEX	
			46999	Misc. Wastewater Work	737,941
				140 HEX	737,941
				02 Other Improvements for MBC Digesters	3,087,395
				01	63,539,553

Brown AND Caldwell

Bid Item Summary

6/6/2016 1:02 PM

Project Number:	148827-300
Estimate Issue Number:	1
Estimate Issue Date:	6/6/2016
Estimator:	Snowden

T.O. 18 - Impact NCWRP to MBC

TOTALS	Area	Bid Item:	Description	Total Gross Amount
01				
	01		Base Estimate	
		05.	Grit Removal	3,807,081
		10.	Thickening Centrifuges	21,266,328
		15a	Digestion w/FOG; PHASE 1	5,861,045
		15b	Digestion w/FOG; PHASE 2	19,465,140
		15c	Digestion w/o FOG; PHASE 1	1,630,218
		15d	Digestion w/o FOG; PHASE 2	1,435,547
		20.	Dewatering Centrifuges	4,668,744
		25.	Centrate System	1,337,083
		50.	Waste Heat Utilization	980,971
			01 Base Estimate	60,452,158
	02		Other Improvements for MBC Digesters	
		100	Demolition	103,777
		110	Recirculation Pumps	255,984
		120	Centrifugal Mixing Pumps	698,138
		130	Vane Axial Mixing Pumps	1,291,555
		140	HEX	737,941
			02 Other Improvements for MBC Digesters	3,087,395
			01	63,539,553

Grand total does not represent project total because it adds together Phase I and Phase II improvements and w/FOG and w/o FOG improvements even though they are separate alternatives and scenarios (software automatically calculates final total).

Estimate Detail Report

6/6/2016 1:00 PM

Project Number:	148827-300
Estimate Issue Number:	1
Estimate Issue Date:	6/6/2016
Estimator:	Snowden

T.O. 18 - Impact NCWRP to MBC

Estimate Totals

Description	Rate	Amount	Totals
Labor		3,722,170	
Material		18,201,615	
Subcontract		6,572,239	
Equipment		924,126	
Other		5,338,522	
		34,758,672	34,758,672
Labor Mark-up	12.000 %	446,660	
Material Mark-up	10.000 %	1,820,162	
Subcontractor Mark-up	5.000 %	328,612	
Construction Equipment Mark-up	8.000 %	73,930	
Other - Process Equip Mark-up	8.000 %	427,082	
		3,096,446	37,855,118
Material Shipping & Handling	2.000 %	364,032	
Material Sales Tax	8.000 %	1,224,812	
Other - Process Eqp Sales Tax	8.000 %	32,470	
Net Markups		1,621,314	39,476,432
E&I Cost (Out)	(100.000) %	(2,791,596)	
		(2,791,596)	36,684,836
Contractor General Conditions	10.000 %	3,668,484	
E&I General Conditions	10.000 %	279,160	
GC Electrical Mark-Up	5.500 %	153,538	
E&I Cost (IN)	100.000 %	2,791,596	
		6,892,778	43,577,614
Start-Up, Training, O&M	1.250 %	260,303	
		260,303	43,837,917
Undesign/Undevelop Contingency	40.000 %	17,535,167	
		17,535,167	61,373,084
Bldg Risk, Liability Auto Ins	2.000 %	1,227,462	
		1,227,462	62,600,546
Contractor Bonds & Insurance	1.500 %	939,008	
		939,008	63,539,554
Escalation to Midpoint (ALL)			
Gross Markups			63,539,554
Total			**63,539,554**

Grand total does not represent project total because it adds together Phase I and Phase II improvements and w/FOG and w/o FOG improvements even though they are separate alternatives and scenarios (software automatically calculates final total).

Appendix F: Workshop Presentations and Summary

Task No.018
Technical Memorandum

Evaluate Impacts of NCWRP Expansion on Metropolitan Biosolids Center

Project Workshop – May 18, 2016

Pure Water San Diego

MWH BUILDING A BETTER WORLD

Brown AND Caldwell

BLP Engineers, Inc.
Environmental Engineers, Scientists, and Planners

WORKSHOP AGENDA

- Introduction and Workshop Agenda
- Projected Biosolids Flows and Loads
- Projected Impacts on Selected Unit Processes:
  - Grit Removal System
  - Raw Solids Thickening
  - Anaerobic Digestion
  - Digested Biosolids Dewatering
  - Centrate System
  - Odor Control System
  - Chemical Storage and Handling System
  - Utilities Extension Needs
  - Siting Impacts
  - Waste Heat Utilization
- Opinions of Probable Costs
- Construction Schedule
- Raw Solids and Centrate Considerations and Impacts
- Discussion of City's Review Comments
- Next Steps
- Thank you! Questions?

PROJECTED BIOSOLIDS FLOW & LOADS

- Excel spreadsheet based flow and loads model
- Models developed to reflect various scenarios
  - Base Case with no FOG addition
  - Two additional cases with FOG addition and Lystek
  - Each of the above three had two scenarios
    - Average volatile solids destruction in digesters
    - Reduced volatile solids destruction in digesters
- All models assumed no Central Area Plant
- Modeled average daily and peak-day flows

PROJECTED FLOWS & LOADS FROM NCWRP

ITEM Phase I Condition Phase II Condition	Min NPR (Avg Day)	Base NPR (Avg Day)	Max NPR (Avg Day)	Min NPR (Peak Day)	Base NPR (Peak Day)	Max NPR (Peak Day)
Flow, MGD Phase I	1.88	2.45	2.90	2.87	3.75	4.43
Flow, MGD Phase II	3.29	3.87	4.28	5.04	5.92	6.55
Total Solids, lb/d Phase I	78,331	102,236	124,597	125,330	163,577	199,355
Total Solids, lb/d Phase II	137,352	161,288	183,930	219,763	258,061	294,288
Volatile Solids, lb/d – Phase I	59,607	77,800	94,819	95,372	124,481	151,710
Volatile Solids, lb/d – Phase II	104,520	122,737	139,969	167,232	196,379	223,950

GRIT REMOVAL SYSTEM

ITEM	PHASE I		PHASE II	
	NCWRP EXPANSION	OTHER IMPROVEMENTS	NCWRP EXPANSION	OTHER IMPROVEMENTS
Install Raw Solids Feed Pumps	All 3 Raw Solids Feed Pumps		Covered at Phase I	
Expand Area 76 Grit Building	Expand Building		Covered at Phase I	
Install Grit Cyclone Separators (Teacups)	Install One New Teacup		Install One Additional Teacup	
Install Grit Clarifiers, Augers (Snails) and Screw Conveyors	Install One New Clarifier, Snail, And Screw Conveyor		Covered at Phase I	

RAW SOLIDS THICKENING SYSTEM

ITEM	PHASE I		PHASE II	
	NCWRP EXPANSION	OTHER IMPROVEMENTS	NCWRP EXPANSION	OTHER IMPROVEMENTS
Raw Sludge Centrifuge Feed Pumps		Replace 3 existing Sludge Feed Pumps with larger pumps		Replace 5 Sludge Feed Pumps with larger pumps, Install 6th pump
Thickening Centrifuges		Replace 3 existing centrifuges with larger centrifuges		Replace 5 existing centrifuges with larger centrifuges, Install 6th centrifuge
Polymer Feed Pumps		Replace 3 existing Polymer Feed Pumps with larger pumps		Replace 5 Polymer Feed Pumps with larger pumps, Install 6th pump
Thickened Sludge (Digester Feed) Pumps		Replace 3 existing Digester Feed Pumps with 4 larger pumps. Install new 8 inch forcemain		Replace 3 existing Digester Feed Pumps with 4 larger pumps, Install new 8 inch forcemain

ANAEROBIC DIGESTERS - BASE CASE

ITEM	PHASE I (W/O FOG)		PHASE II (W/O FOG)	
	NCWRP EXPANSION	OTHER IMPROVEMENTS	NCWRP EXPANSION	OTHER IMPROVEMENTS
Upgrade Axial Mixing Pumps	Refurbish Axial Mixing Pumps and Valves		Covered at Phase I	
Upgrade Biogas Conveyance System	Enlarge Biogas Laterals and Equipment		Phase I Upgrades Plus Enlarge Gas Compressors, Gas Header to Cogeneration	
Install Additional Biogas Flare			Install One New Flare and Enlarge Gas Header to Flares	
Implement Digester Management Safeguards			Implement Digester Management Safeguards	

ANAEROBIC DIGESTERS – FOG & LISTEK

ITEM	PHASE I (W/ FOG & LISTEK)		PHASE II (W/ FOG & LISTEK)	
	NCWRP EXPANSION	OTHER IMPROVEMENTS	NCWRP EXPANSION	OTHER IMPROVEMENTS
Construct 4th Digester			Construct 4th Digester all Appurtenant Pumps, Piping, HEX, and Extension of Gallery	
Upgrade Axial Mixing Pumps and Digester Feed Lines	Refurbish Axial Mixing Pumps and Valves, and Enlarge Digester Feed Lines		Complete at Phase I	
Upgrade Biogas Conveyance System	Enlarge Biogas Laterals and Equipment, Enlarge Biogas Compressors		Phase I Upgrades Plus Enlarge Gas Header to Cogeneration	
Install Additional Biogas Flares	Install One New Flare and Enlarge Gas Header to Flares		Phase I Upgrades Plus Additional Flare and Enlarge Gas Header to Flares	
Implement Digester Management Safeguards			Implement Digester Management Safeguards	

DIGESTED SLUDGE DEWATERING SYSTEM

ITEM	PHASE I		PHASE II	
	NCWRP EXPANSION	**OTHER IMPROVEMENTS**	**NCWRP EXPANSION**	**OTHER IMPROVEMENTS**
Digested Sludge Centrifuge Feed Pumps		Replace existing 8 Sludge Feed Pumps with larger pumps		Replace existing 8 Sludge Feed Pumps with larger pumps
Thickening Centrifuges		Replace DC-1 and DC-8 with larger centrifuges		Replace DC-1 and DC-8 with larger centrifuges
Polymer Feed Pumps		Replace existing 8 Polymer Feed Pumps with larger pumps		Replace existing 8 Polymer Feed Pumps with larger pumps

CENTRATE SYSTEM

ITEM	PHASE I		PHASE II	
	NCWRP EXPANSION	OTHER IMPROVEMENTS	NCWRP EXPANSION	OTHER IMPROVEMENTS
Restore Force Main to Design Conditions		Yes		Covered at Phase I
Replace Existing Centrate Pumps		No Changes		Replace Three Pumps
Install Fourth Centrate Pump		No Changes		Install New Pump

ODOR CONTROL SYSTEM

- Existing odor control system adequate for future
- Increase in foul air from expanded Grit Building would only contribute to minor increase
- Slight reduction expected in treatment efficiency of chemical scrubbers
- Carbon absorbers have adequate capacity to handle slightly increased loading

CHEMICAL HANDLING SYSTEMS

ITEM	PHASE I		PHASE II	
	NCWRP EXPANSION	OTHER IMPROVEMENTS	NCWRP EXPANSION	OTHER IMPROVEMENTS
Ferrous Chloride Feed Pumps – Base Case	Provide 4th off-the-shelf spare pump		Provide 4th off-the-shelf spare pump	
Ferrous Chloride Feed Pumps – with FOG		Furnish and Install 4th Feed Pump with Piping and Appurtenances to 4th Digester		Furnish and Install 4th Feed Pump with Piping and Appurtenances to 4th Digester
Ferrous Chloride Feed Pumps – with FOG and Lystek		Furnish and Install 4th Feed Pump with Piping and Appurtenances to 4th Digester		Furnish and Install 4th Feed Pump with Piping and Appurtenances to 4th Digester
Dilute Polymer Storage and Transfer	No Action	No Action	No Action	No Action

UTILITIES EXTENSION NEEDS

ITEM	PHASE I		PHASE II	
	NCWRP EXPANSION	OTHER IMPROVEMENTS	NCWRP EXPANSION	OTHER IMPROVEMENTS
Utilities Extension Needs – Base Case	Digester MCC Expansion		• Digester MCC Expansion • Utility Piping- Biogas Main to Cogen	
Utilities Extension Needs – with FOG		Digester MCC Expansion		• New MCC for Digester 4 Plus • Digester MCC Expansion • Utility Piping Extensions to Digester 4 and FOG • Biogas Main to Cogen
Utilities Extension Needs – with FOG and Lystek		Digester MCC Expansion		• New MCC for Digester 4 Plus Digester MCC Expansion • Utility piping extensions to Digester 4 and FOG (Lystek not considered) • Biogas Main to Cogen

SITING IMPACTS

ITEM	PHASE I		PHASE II	
	NCWRP EXPANSION	OTHER IMPROVEMENTS	NCWRP EXPANSION	OTHER IMPROVEMENTS
Siting Impacts – Base Case	No significant permanent impacts		No significant permanent impacts	
Siting Impacts – with FOG		FOG location N. of Maintenance Yard		FOG location N. of Maintenance Yard
Siting Impacts – with FOG and Lystek		• FOG location N. of Maintenance Yard • Lystek Siting to be determined in future		• FOG location N. of Maintenance Yard • Lystek siting to be determined in future

WASTE HEAT UTILIZATION

ITEM	PHASE I		PHASE II	
	NCWRP EXPANSION (W/ FOG)	OTHER IMPROVEMENTS	NCWRP EXPANSION (W/ FOG)	OTHER IMPROVEMENTS
Modify Hot Water Supply/ Return Piping/Controls		Modify HWS/HWR Connection to Cogeneration Waste Heat Piping and Controls		Covered at Phase I
Extend Hot Water Supply/ Return Piping to Digester 4			Extend HWS/HWR Piping in the Gallery (FOG & Lystek cases only)	
Extend Hot Water Supply/ Return Piping to FOG Receiving Station	Extend HWS/HWR Piping to the FOG Receiving Station (FOG & Lystek cases only)		Covered at Phase I (FOG and Lystek cases only)	
Harvest Additional Waste Heat for External Heating Demands				Harvest Additional Waste Heat from Cogeneration Engines 5 and 6; Convert Existing Boilers to Biogas; Utilize Waste Heat from New Cogeneration System
Evaluate Potential Waste Heat Utilization Options				Evaluate Thermophilic Digestion, Pasteurization, Direct Heat Drying, Thermal Oxidation, Heat Augmentation for Greenhouse Drying

OPINION OF PROBABLE COSTS, PHASE I

Construction Cost	NCWRP Expansion	FOG Addition	Other
Grit Removal	$0	$0	$0
Thickening Centrifuges	$9,119,000	$0	$0
Digester System	$1,165,000	$4,189,000	$0
Dewatering Centrifuges	$0	$0	$0
Centrate System	$0	$0	$0
Odor Control	$0	$0	$0
Chemical Storage	$0	$0	$0
Evaluation of Utilities	$0	$0	$0
Additional Facilities Siting	$0	$0	$0
Waste Heat Utilization	$0	$73,000	$628,000
Subtotal Construction Cost	$10,284,000	$4,262,000	$628,000
Contingency (40%)	$4,113,600	$1,704,800	$251,200
Subtotal Delivery Costs	$3,787,000	$1,571,000	$230,000
Subtotal Other Costs	$302,000	$125,000	$18,000
Grand Total Without Fog Addition Other Upgrades Included	$18,486,600	$0	$1,127,200
Grand Total With Fog Addition And Other Upgrades Included	$14,896,000	$7,662,800	$1,127,200

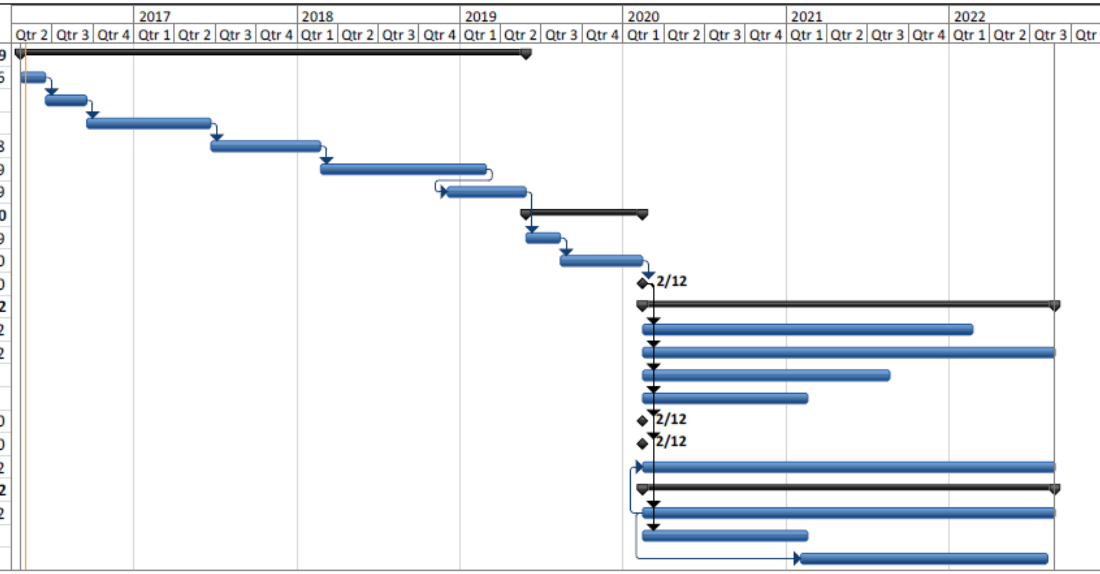
OPINION OF PROBABLE COSTS, PHASE II

Construction Cost	NCWRP Expansion	FOG Addition	Other
Grit Removal	$2,721,000	$0	$0
Thickening Centrifuges	$15,199,000	$0	$0
Digester System	$1,026,000	$14,764,000	$0
Dewatering Centrifuges	$0	$0	$3,337,000
Centrate System	$956,000	$0	$0
Odor Control	$0	$0	$0
Chemical Storage	$0	$0	$0
Evaluation of Utilities	$0	$0	$0
Additional Facilities Siting	$0	$0	$0
Waste Heat Utilization	$0	$73,000	$628,000
Subtotal Construction Cost	$19,902,000	$14,837,000	$3,965,000
Contingency (40%)	$7,960,800	$5,934,800	$1,586,000
Subtotal Delivery Costs	$7,327,000	$5,463,000	$1,461,000
Subtotal Other Costs	$585,000	$436,000	$117,000
Grand Total Without Fog Addition Other Upgrades Included	$35,774,800	$0	$7,128,000
Grand Total With Fog Addition And Other Upgrades Included	$32,184,000	$26,670,800	$7,129,200

CONSTRUCTION SCHEDULE

TO 18 - MBC IMPACTS FROM NCWRP EXPANSION
FIGURE 6.1-1

ID	Task Mode	Task Name	Duration	Start	Finish
1		**Design**	**808 days**	**Thu 4/21/16**	**Mon 5/27/19**
2		Complete PDR(Study)	40 days	Thu 4/21/16	Wed 6/15/16
3		Procure 10% Designer	66 days	Thu 6/16/16	Thu 9/15/16
4		10% Design Development	198 days	Fri 9/16/16	Tue 6/20/17
5		Procure Final Designer	176 days	Wed 6/21/17	Wed 2/21/18
6		Final Design Development	265 days	Thu 2/22/18	Wed 2/27/19
7		Permitting	126 days	Mon 12/3/18	Mon 5/27/19
8		**Construction Bid and Award**	**187 days**	**Tue 5/28/19**	**Wed 2/12/20**
9		Advertise and Bid	55 days	Tue 5/28/19	Mon 8/12/19
10		Award Construction Contract	132 days	Tue 8/13/19	Wed 2/12/20
11		Contractor NTP	0 days	Wed 2/12/20	Wed 2/12/20
12		**Procure/Construct/Commissioning**	**660 days**	**Wed 2/12/20**	**Wed 8/24/22**
13		Grit Removal	528 days	Thu 2/13/20	Mon 2/21/22
14		Thickening Centrifuges	660 days	Thu 2/13/20	Wed 8/24/22
15		Digester Improvements without FOG	396 days	Thu 2/13/20	Thu 8/19/21
16		Centrate System	264 days	Thu 2/13/20	Tue 2/16/21
17		Odor Control (No Improvements)	0 days	Wed 2/12/20	Wed 2/12/20
18		Chemical Systems (No Improvements)	0 days	Wed 2/12/20	Wed 2/12/20
19		Extension of Utilities	660 days	Thu 2/13/20	Wed 8/24/22
20		**FOG Related & Other Improvements**	**660 days**	**Thu 2/13/20**	**Wed 8/24/22**
21		Digester Improvements with FOG	660 days	Thu 2/13/20	Wed 8/24/22
22		Dewatering Centrifuges	264 days	Thu 2/13/20	Tue 2/16/21
23		Waste Heat Utilization	396 days	Mon 2/1/21	Mon 8/8/22



RAW SOLIDS AND CENTRATE CONVEYANCE –CONSIDERATIONS & IMPACTS

- DIGESTER MANAGEMENT SAFEGUARDS
- SOLIDS TRANSMISSION MAINS

DISCUSSION OF CITY REVIEW COMMENTS

NEXT STEPS

- WORKSHOP MINUTES: May 25, 2016
- ADDRESSING CITY'S COMMENTS: June 2, 2016
- FINAL EDITING/PRODUCTION: June 9, 2016
- FINAL TM: June 10, 2016

THANK YOU! QUESTIONS?

WORKSHOP SUMMARY

Subject: Draft Technical Memorandum Workshop for Evaluation of Impacts of NCWRP Expansion on MBC

Date: Wednesday, May 18, 2016

Time: 1:30 pm to 4:30 pm

Participants: Amer Barhoumi(PUD), Monika Smoczynski(PUD), Dwight Correia(PUD), Neil Tran(PUD), Raymond Ngo(PUD), Christine Waters(MWH), Victor Occiano(BC), Boris Pastushenko(BLP), Tim Cooper(BLP), Anil Pai(BC)

Location: MOC 2, Conference Room 2E

1. Following introduction by Monika, the following handouts were distributed to participants:

- Agenda
- Power Point Presentation Slide printouts
- Site Plan(11x17)
- Schedule(11x17)
- General Recommendations(Excerpt from TM, Section2.2)
- High and Low Flow Biosolids Wasting Scenarios
- PUD Review Comments.

2. Boris, Anil and Tim conducted Power Point presentation outlining the following:

- Projected Flows and Loads

- Projected Impacts on Selected Unit Processes:

  -- Grit Removal System
  -- Raw Solids Thickening
  -- Anaerobic Digestion
  -- Digested Biosolids Dewatering
  -- Centrate System
  -- Odor Control System
  -- Chemical Storage and Handling System
  -- Utilities Extension Needs
  -- Siting Impacts
  -- Waste Heat Utilization

- Opinion of Probable Costs

- Construction Schedule
- Raw Solids and Centrate Conveyance Considerations and Impacts
- High and Low Biosolids Wasting Scenarios from NCWRP and their impacts on equipment sizing and costs.

3. Boris, Tim and Anil have presented PUD's Review Comments and an Action Plan on how to address them. All attendees were engaged in extensive and collaborative discussion of PUD Comments Nos. 2,3, 6, 19, 21, 23, 24, 29, 30, 32, 33, 35, 38, 40, 43, 49, 50, 52-54, 59 and GC Comments Nos. 1-9. The remainder of the comments were agreed to and will be addressed in the Final TM. Project team will provide formal responses to the review comments to reflect specific details discussed at the meeting, and will incorporate the review comments in the Final TM.

Comments from Dwight Correia will be received at a later date, but it has been indicated that the comments discussed at the workshop cover, pretty much the extent of his comments.

4. The following principal decisions have been made and/or directions received by the project team:

- Provide formal responses to PUD review comments as an appendix to the TM.
- Modify Site Plan exhibit (Figure 2.1-1) to show fenceline and site boundary per EIR. Grit Building extension to be shown in this figure as well. Clean up MBC site boundary callouts and leader lines as applicable. Also consider removing section numbers to allow figure to stand alone. Indicate using color which items are PW related and which are FOG or "Other" improvements.
- Modify Project Schedule to incorporate accelerated consultant procurement, permitting and pre-purchase of the centrifuges to arrive on end of 2021 project completion, and include scheduling assumptions needed for expediting the work.
- Define specifically what is related to NCWRP Expansion (Pure Water Program), FOG, and Other Recommended Improvements (oriented on improvements to MBC's reliability and efficiency).
- Define specifically whether some of the items require design efforts or just simple equipment replacement without designing changes to the MBC (if any).
- Delete language referring to 2:1 peaking factors and clarify that short term operational conditions require MBC to run at double its maximum design output.
- Revise "14" PLWTP sludge forcemain to read "12"/14"" PLWTP forcemain
- Consider revisions to install all required teacups in a single phase.
- Comment on suction manifold deletion for thickened sludge pumps.
- MBC digesters will not be used in future for wet weather storage or for NCAWPF off-spec water diversion considering digester capacity limitations at the MBC.
- Indicate that valves for digesters 1 and 2 have already been replaced and that valves for digester 3 are on site and ready for replacement.
- Indicate that the dewatering transfer pumps were replaced with chopper pumps by the plant staff, and that connection of the 4th digester to the suction of the dewatering transfer pumps will be a challenging project.
- Infrequent diversion of biosolids to PLWTP from NCWRP is a safeguard built into the MBC's flow management philosophy that will be maintained by PUD and utilized in case one digester is taken out of service at maximum loading conditions. Future MBC pre-design and final design consultants will be required to evaluate the NCWRP biosolids diversion infrastructure, PLWTP solids reserve capacity and ability to sustain additional soluble BOD loads, and means and methods of conveyance biosolids from

MBC to PLWTP without shorting flows to MPS. One way to do this is to use diversion structures in the Rose Canyon system.

- Follow current project phasing structure (Phase I/Phase II) but remove indication on what timing/duration and/or spread of activities is going to be with understanding that eventually it could be more phases of the project.
- Assess at least strategically what impacts of Padre Dam Municipal Water District program of flows and solids could be and provide an indication of potential increase/decrease of solids/loadings. Rough modeling might be required. Model a 15 mgd (assume product water) scalping plant returning solids to sewer – eventually arrive at Morena Blvd PS.
- Include potential replacement of existing digester recirculation, mixing, axial mixing pumps for all digesters, and heat exchangers for Digesters 1 and 2, as other recommended improvements and include in the cost estimate. Indicate that axial pump replacement (non-propeller pumps) and recirculation and mix pump replacement (chopper pumps) will take place as part of ongoing equipment replacement by maintenance at the end of its useful life and that outside engineering services will not be needed.
- Assessment of the blended sludge and centrate pipelines between NCWRP and MBC, conveyance of digested sludge from PLWTP, and PLWTP and NCWRP solids diversion and retention capacities is not a part of the scope of this project.
- Projected NCWRP impacts on MBC presented in the TM are based on high NCWRP biosolids flow wasting scenario that represents a conservative approach with biosolids flows up to 6.55 mgd at 0.5% TS. The low biosolids flow wasting scenario resulting in capping NCWRP biosolids flow at 3.9 mgd (0.85-1 % TS) due to the blended sludge pipeline restrictions, as proposed under 10% EDR for NCWRP expansion may represent certain costs savings that will not developed to the same level of analysis as the more conservative, high biosolids wasting scenario. The associated cost savings for the low flow biosolids wasting scenario will be presented as a high level, order of magnitude assessment of potential savings as a separate section in the TM.
- Food waste and green waste co-digestion evaluation is not included in the scope of this project.
- Evaluations presented in the subject TM are limited to principal items of equipment and do not include the support or auxiliary facilities , Raw Solids Receiving Tanks, Cake Conveyance, Storage and Loading.
- Agreed as part of the discussion that additional biogas holding tank will not be required.

5. Next Steps:

- Workshop Summary: May 25, 2016
- Addressing City's Comments: June 2, 2016
- Final Editing/Production: June 9, 2016
- Final TM: June 10, 2016.

Appendix G: Comment Log

Pure Water Program **Date:** 5/25/2016

Description: Draft Technical Memorandum-Impacts of NCWRP Expansion on MBC

TM distributed to: Wastewater Treatment & Disposal, Engineering & Program Management, and Pure Water

NO	REFERENCE	CITY COMMENT	REVIEWER	ACTION	RESPONSES TO CITY COMMENTS
1	General	The TM should include a discussion on other future projects at MBC including alternatives to Lystek (other technologies to create class A fertilizer) and the cogeneration expansion.	K. Balo	Noted. No action.	Included in other Documents(refer to TM Ref 19). Will be analyzed soon under upcoming update by BC.
2	General	Would any of the outlined improvements be in conflict with future improvements and expansions of MBC including cogeneration?	K. Balo	Noted. No action	No conflicts known with future improvements. Potential future biosolids drying, thermopohilic digestion, or cogeneration projects should analyze potential for conflicts.
3	General	Following a determination on what improvements are necessary to support the NCWRP Expansion, environmental staff at the City need a list and description. This scope will need to be included in the overall North City Project EIR/EIS. Details will be needed to perform an environmental analysis of the additional project components at MBC. A PDSS is requested for this project.	K. Balo	Noted. No action.	Will be done under 10% design effort. Proper scoping and funding should be allocated.
4	General	Heat exchangers for digester #1 and #2 are in need of replacement	Richard Pitchford	Noted. Will be included in other recommended improvements.	
5	General	In the report, "Program" is referenced. Is this referring to the Pure Water Program? If so, please clarify in table of abbreviations or within report.	Raymond Ngo	Noted. “Program” will be replaced with “Pure Water”	“Pure Water” is listed in the abbreviations as the “Pure Water San Diego Program”
6	Page 10	How will TM-4 findings change if assumptions are low? Exclusion of Morena and CEPT are significant.	Jesse Pagliaro	Noted. No action.	TM-4 is not being updated at this time. If the assumed removal efficiencies with CEPT are low, the

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NO	REFERENCE	CITY COMMENT	REVIEWER	ACTION	RESPONSES TO CITY COMMENTS
					only mechanism for addressing this question in this TM is the safety factor in the sizing of the unit process equipment. The projected loadings using average removals with CEPT should be assessed as part of the 10% pre-design effort.
7	Page 10, Section 2.1.1.3, 5th row	Change to: large units because (a) this approach avoids increasing the size of the building and other supporting systems; and (b) newer centrifuges are significantly more energy efficient than their existing counterparts.	Raymond Ngo	Revised as noted.	
8	Page 13, Section 2.1.1.4	<u>2rd paragraph</u> 2nd Row: Insert space between PLWTP and but 3rd Row: Change emission rate to MER for consistency. <u>3rd paragraph</u> 2nd row: add period between condition and it. <u>4th paragraph</u> 1st row: change required to requires. 3rd row: change to "existing biogas with 3 new blowers; (3) increase the size of the biogas feed line from the blowers to the cogeneration facility; and (4) install an additional biogas flare."	Raymond Ngo	Noted. Will be reflected, as pointed.	
9	Page 11: Figure 2.1-1	Are all of the proposed/recommended improvements located within the footprint of the facility? The MBC Site facility boundary is very	K. Balo	Noted. Will be reflected, as pointed.	

Pure Water Program **Date:** 5/25/2016

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NO	REFERENCE	CITY COMMENT	REVIEWER	ACTION	RESPONSES TO CITY COMMENTS
		hard to see on the figure and blends in with topo lines.			
10	Page 13	Any number of issues can influence plant performance. Consideration of PLWTP as receiver of additional waste streams may pose issues due to vulnerabilities associated with highly solubilized BOD.	Jesse Pagliaro	Noted. No action.	This will need to be further evaluated by pre-design and design consultants.
11	Page 13, 1st sentence	Change condition to conditions.	Raymond Ngo	Noted. Will be corrected.	
12	Page 13, Section 2.1.1.4	<u>2rd paragraph</u> 2nd Row: Insert space between PLWTP and but 3rd Row: Change emission rate to MER for consistency. <u>3rd paragraph</u> 2nd row: add period between condition and it. <u>4th paragraph</u> 1st row: change required to requires. 3rd row: change to "existing biogas with 3 new blowers; (3) increase the size of the biogas feed line from the blowers to the cogeneration facility; and (4) install an additional biogas flare."	Raymond Ngo	Noted. Will be corrected.	
13	Page 14	2nd Row: The last sentence was cut off.	Raymond Ngo	Noted. Will be corrected.	
14	Page 14, 2.1.1.6	2nd paragraph, 2nd row: change to "available and the other three"	Raymond Ngo	Noted. Will be corrected.	
15	Page 15	2nd row: change 2.1.1.12 to 2.1.1.11	Raymond Ngo	Noted. Will be corrected.	

Pure Water Program **Date:** 5/25/2016

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NO	REFERENCE	CITY COMMENT	REVIEWER	ACTION	RESPONSES TO CITY COMMENTS
16	Page 15-19	Update all tables to ensure that all X's are lined up with the respective bullet points and that each bullet point has its corresponding X.	Raymond Ngo	Noted. Will be corrected.	
17	Page 17	Recommend consideration of other waste streams (food waste, etc.).	Jesse Pagliaro	Noted. No action.	Other waste streams utilization will be evaluated under a separate project. See assumptions and clarifications.
18	Page 17	5th row: change to "a design consultant."	Raymond Ngo	Noted. Will be corrected.	
19	Page 20	Bypass to PLWTP is potentially problematic; recommend consideration of 4th digester at MBC	Jesse Pagliaro	Noted. 4th digester is recommended for Phase II conditions with FOG.	Infrequent diversion of biosolids to PLWTP from NCWRP is a safeguard built in the MBC's flow management philosophy that will be maintained by PUD and utilized in case one digester us taken out of service at maximum loading conditions. Future MBC pre-design and final design consultants will be required to evaluate the NCWRP biosolids diversion infrastructure, PLWTP solids reserve capacity and ability to sustain additional soluble BOD loads, and means and methods of conveyance biosolids from MBC to PLWTP without shorting flows to MPS.
20	Page 20	for 2nd bullet point, change "must address should include" to either "must address" or "should		Noted. Will be corrected.	Could not locate "f" on Page 20. Removed the "of" from the 5th line

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NO	REFERENCE	CITY COMMENT	REVIEWER	ACTION	RESPONSES TO CITY COMMENTS
		include" 3rd paragraph 5th row: remove the "f"			of the second bullet item.
21	Page 21	Bypass to PLWTP needs to be further evaluated; assumptions that include potential for discharge of solubilized material need to be considered.	Jesse Pagliaro	Noted.	Refer to Response to Comment No.19
22	Page 21	1st row: remove colon and add the following ", which results in the following:"		Noted. Will be corrected.	1st row to be revised per Dwight's comments. 6th row revised as noted
23	Page 22: 20 inch centrate line restoration	The TM concludes that restoration of the 20 inch centrate line would be required. Is any additional information available on how this may be done and what the scope of the work may include?	K. Balo	Noted. No action.	Analysis of the centrate pipeline and potential methods of restoration is done under a separate project.
24	Page 25: padre dam reclamation	The report mentions that Padre dam may increase water reclamation. Padre Dam's current plan (available on their webpage) indicates as expanded reclamation facility would not operate in scalping mode and would reduce the solids/waste stream currently discharged into the metro system. They would handle their own biosolids. How does the planning study address Padre Dam's project or would their project have any measurable effect on biosolids processing at MBC?	K. Balo	Noted. Will be strategically analyzed.	Project team will provide an order of magnitude assessment of impacts of PDMWD program of flows and solids, and provide an indication of potential increase/decrease of solids/loadings.
25	Page 3	Paragraph 1: There is a significant effort to offload organics (food waste, etc.) from landfill (AB1826); may be advisable to evaluate potential impacts of other waste streams.	Jesse Pagliaro	Noted. No action.	Food waste and green waste co-digestion evaluation is not included in the scope of this project. See Section 7.10 – See Assumptions and Clarifications.

Pure Water Program **Date:** 5/25/2016

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NO	REFERENCE	CITY COMMENT	REVIEWER	ACTION	RESPONSES TO CITY COMMENTS
26	Page 35	First paragraph under 4.1.1.1.1 states pumps capable of being operated at two speeds. These pumps are on VFD.	Richard Pitchford	Noted. Will be corrected.	
27	Page 35	Second paragraph under 4.1.1.1.1 Should be receiving tank not gank	Richard Pitchford	Noted. Will be corrected.	
28	Page 36	Second paragraph under 4.1.1.2 states two units out of service for maintenance. Unit #3 needs to be completely refurbished	Richard Pitchford	Noted. Will be corrected.	
29	Page 38	Are there any other options then teacups	Richard Pitchford	Noted. No action.	Only teacups were evaluated per City direction. Other systems deemed cost-prohibitive.
30	Page 4	Need to evaluate discharge to PLWTP; consider 4th digester for all potential additional waste streams	Jesse Pagliaro	Noted. No Action.	Refer to Response to Comment No.19.
31	Page 42	Second paragraph 4 sentence starts off "the lag" should be the lead	Richard Pitchford	Noted. Will be corrected.	
32	Page 42	Whole 5 paragraph needs to be redone. Why does this talk about dewatering when it should be thickening and the whole assumption is wrong as written.	Richard Pitchford	Paragraph deleted. See Section 7.	There is no current operating experience with running multiple thickening centrifuges at MBC. The City only runs one. But there is operating experience with multiple dewatering centrifuges. Hence the reference to dewatering centrifuges. The team is extrapolating from the one system how the City might run multiple units of the other system. This paragraph has been deleted and expanded upon in Section 7 – Assumptions and Clarifications.

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NO	REFERENCE	CITY COMMENT	REVIEWER	ACTION	RESPONSES TO CITY COMMENTS
33	Page 43	Recommend evaluation of completely offloading discharge to PLWTP; evaluation of discharge of all waste streams from NCWRP and AWPF to MBC	Jesse Pagliaro	Noted. No Action.	Refer to Response to Comment No.19.
34	Page 43	Second paragraph should say “day tank” not mix tank	Richard Pitchford	Noted. Will be corrected.	
35	Page 51	4.3.1.1.1 States normal operating level of 45 ft. This is not what appears on DCS, does this include the cone? Needs to be clarified as most people looking at this would assume we operate at 35 ft	Richard Pitchford	Noted. Will be clarified in the text.	Current operating level is 45’ above top of cone. Level reading although shows 35’ because the level sensor is installed 10’ above top of cone.
36	Page 53	4.3.1.2 New isolation valve have been installed on Digester #1 and #2. Valve are on site for #3 awaiting digester cleaning to install.	Richard Pitchford	Noted. Will be clarified in the text.	
37	Page 56	If 4th digester is built, scenario cited in last paragraph is no longer an issue.	Jesse Pagliaro	Noted. Will be clarified in the text.	
38	Page 64	Was PLWTP Staff involved in assessment? Re last paragraph.	Jesse Pagliaro	Noted. No action.	Refer to Response to Comment No.19.
39	Page 67	Concur with additional digester.	Jesse Pagliaro	Noted. No action.	
40	Page 72	Add chopper pumps at time of upgrade – Phase I	Jesse Pagliaro	Noted. Will be included in other recommended improvements.	
41	Page 73	Change 4th paragraph to feet instead of elevation. 9 to 11	Richard Pitchford	Revised as noted.	One of the common problems in working with depth readings is that the EOI (Elevation Of Instrument) is not documented in the As-Built Drawings. There is no way for the

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NO	REFERENCE	CITY COMMENT	REVIEWER	ACTION	RESPONSES TO CITY COMMENTS
					Team to correlate the depth reading seen at the HMI to an elevation on the Contract Drawings. The EOI has been noted in this case so that the reader can relate the levels displayed at the HMI to the elevations on the drawings.
42	Page 76	Concur with recommendation in 4.4.2.2	Jesse Pagliaro	Noted. No action.	
43	Page 78	What is the status of the evaluation of onsite centrate treatment?	Jesse Pagliaro	Noted. No action.	Evaluation of on-site treatment options was done under a separate project. It is our understanding that it has been decided by the City to proceed with centrate disposal versus on-site treatment with potential discharge of the centrate through the brine line.
44	Page 82	Improvements outlined in 4.5.2.2 should occur.	Jesse Pagliaro	Noted. No action.	
45	Page 88	4.7.1 third paragraph 4th line should be “day tank” not mix tank also 4.7.1.1 first line should be “day tank” not mix tank	Richard Pitchford	Noted. Will be corrected.	
46	Page 105	Concur with recommendations outlined in 4.10.3.2	Jesse Pagliaro	Noted. No action.	
47	Page 107	Pursue recommendations outlined in Strategy 3	Jesse Pagliaro	Noted. No action.	
48	Page 110	May need to consider other waste flows that will be generated as a result of AB1826 implementation	Jesse Pagliaro	Noted. No action.	Refer to Response to Comment No.25

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NO	REFERENCE	CITY COMMENT	REVIEWER	ACTION	RESPONSES TO CITY COMMENTS
49	Pg 9, Section 2.1.1	Suggest deleting sentence referring to 4-year separation between Phase I and II.	Christine Waters	Noted. Will be corrected per discussion at the project workshop.	
50	Page 3, 2nd paragraph	Does existing 16" blended sludge line from NCWRP to MBC have capacity for the increased flows? If not, should WRP Upgrades scope be changed to require RAS surface wasting and not allow option of mixed liquor wasting?	Christine Waters	Noted.	As agreed, projected NCWRP impacts on MBC presented in the TM are based on high NCWRP biosolids wasting scenario that represents a conservative approach with biosolids flows up to 6.55 mgd at 0.5% TS. The low biosolids flow wasting scenario resulting in capping NCWRP biosolids flow at 3.9 mgd(0.85-1 % TS) due to the blended sludge pipeline restrictions, as proposed under 10% EDR for NCWRP expansion may represent

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NO	REFERENCE	CITY COMMENT	REVIEWER	ACTION	RESPONSES TO CITY COMMENTS
					certain costs savings that will not be developed to the same level of analysis as the more conservative, high biosolids wasting scenario. The associated cost savings for the low flow biosolids wasting scenario will be presented as a high level, order of magnitude assessment of potential savings as a separate section in the TM.
51	Page 11 Figure 2.1-1	Please show MBC site boundary.	Christine Waters	Noted. Will be provided.	
52	Page 17 Section 2.1.1.13	Are there options to complete MBC Improvements before end of 2021 for startup of NC Pure Water facilities?	Christine Waters	Noted. Corrections will be made.	As agreed at the project workshop, the Project Schedule will be modified to incorporate accelerated consultant procurement, permitting and sole-source procurement and pre-purchase of the centrifuges to arrive on end of 2021 project completion.
53	Page 22 1st paragraph	Does the jumper/crossover piping identified in footnote 3 allow centrate be pumped back to NCWRP (and overflow diversion to PLWTP) via the raw sludge pipeline to avoid shutdown of MBC if the centrate pipeline is out of service (avoiding the last two bulleted items listed)?	Christine Waters	Noted. No action.	The subject arrangement is for a temporary operation that would not be possible to maintain when Pure water Program will go on-line.
54	Page 98 Section 4.10.1.1.2	Will proposed upgrades increase the power demand at MBC above the 6.4 MW existing from Fortistar?	Christine Waters	Noted. No action.	Existing demand is 2-2.5 MW of the existing 6.4 MW FortiStar generating capacity and the remainder is supplied to SDG&E. Potential increase in

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					electrical demands associated with proposed improvements will not exceed the current generating capacity.
55	Section 5 Pg 112	$7.011,000 Subtotal for Delivery Costs for Other Projects appears to by a typo. Should Subtotal Delivery Costs be $1,461,000? ($7.128M Total appears correct)	Christine Waters	Noted. Will be corrected.	
56	Pg. 42, second paragraph, first sentence	Under the current operational strategy, three existing progressing cavity pumps are able to take suction from the thickened solids wetwell and pump thickened raw sludge directly to the anaerobic digesters. Are the existing biosolids screens and the blending tanks being bypassed? Is it worth noting that the operational strategy of the biosolids screens and the blending tanks has been revised?	Monika Smoczynski	Noted. Will be referenced in the text.	
57	Pg. 59	Does the common overflow pipeline from the three digesters to the digested biosolids storage tanks have sufficient capacity?	Monika Smoczynski	Will be noted in the text.	
58	Pg. 59	Will the additional gas flare tie into the emergency power supply?	Monika Smoczynski	Will be noted in the text.	
59	Section 5-Schedule	The schedule which has presented for the improvements at MBC must be revised to align with the completion of the NCWRP Expansion project in 2021. Are there any opportunities to accelerate the schedule to complete the necessary improvements at MBC by 2021?	Monika Smoczynski	Noted. Will be revised.	Refer to response to Comment No.52.
60	GC-1	The report talks about Phase I and Phase II projects that split the 30 mgd Pure Water flow at North City	GC	Noted. No action.	As discussed at the project workshop, current project phasing structure(Phase

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		into Phase I of 15 mgd and Phase 2 of the other 15 mgd. This is confusing because the Pure Water Program goals are Phase I at 30 mgd (by 2021) and Phase II and additional 53 mgd for a combined 83 mgd (by 2035).			I/Phase II) will be maintained by PUD with understanding that eventually it could be more phases of the project.
61	GC-2	There should be discussion about increase sludge production from the central area facility when brought on line in 2035 (additional 53 MGD) and just say not addressed here.	GC	Noted. No action.	The central area sludge generation is outside of the scope of this project.
62	GC-3	There is discussion about co digestion with FOG, but nothing about co-digestion with Food Waste. Food Waste should be mentioned as potential feed stock in the future.	GC	Noted. No action.	Refer to response to Comment No. 25
63	GC-4	Are the peak loadings and flows that occur one every five years, are these due to digester cleaning at Point Loma? If so, can this be explicitly stated?	GC	Noted. Will clarify in the text.	The peak loading referenced are related to construction and maintenance activities.
64	GC-5	I understand that one out of the three digesters is dedicated to wet-weather storage. This fact should be stated or discussed. The digester capacity could be freed up if the wet weather discharge project were allowed to move forward. There is discussion that wet weather storage discharge will not be needed once Pure Water goes online, however, it is nice to build flexibility into the system. We never know when a plant or process will go down or if off-spec water will need to be discharged.	GC	Noted. No action.	As directed by the City, MBC digesters will not be used in future for wet weather storage or for NCAWPF off-spec water diversion considering digester capacity limitations at the MBC.
65	GC-6 Section 2.1.1.4	First paragraph states that if one digester is out of service, a portion of the solids generated at NCWRP can be bypassed to PLWTP. How will this be accomplished, via the brine line that	GC	Will be noted in the text in general	Infrequent diversion of biosolids to PLWTP from NCWRP is a safeguard built in the MBC's flow management philosophy that will be maintained by

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NO	REFERENCE	CITY COMMENT	REVIEWER	ACTION	RESPONSES TO CITY COMMENTS
		discharge downstream of the proposed Morena Blvd. Sewer Pump Station?		terms.	PUD and utilized in case one digester us taken out of service at maximum loading conditions. Future MBC pre-design and final design consultants will be required to evaluate the NCWRP biosolids diversion infrastructure, PLWTP solids reserve capacity and ability to sustain additional soluble BOD loads, and means and methods of conveyance biosolids from MBC to PLWTP without shorting flows to MPS. Potentially this could be accomplished either via existing 54" Rose Canyon sewer, JB 1, 42" sewer down to 45" interceptor with diversion to 60" sewer leading to a 60" interceptor straight to North Metro Interceptor bypassing the MBS, or via pumping flow through the brine line.
66	GC-7 Sxn 2.1.1.13	A start-up date of November 2022 is given. This is after the Pure Water Program target date of 2021.	GC	Noted. Will be revised.	Refer to Response to Comment No. 52
67	GC-8	The 20-in centrate line has been identified as the weak link in the system. A recent condition assessment has demonstrated this line needs cleaning. If this line were to go down, the whole system would be brought down. Should a second centrate line be installed for redundancy?	GC	Noted. No action.	Analysis of the centrate pipeline and potential methods of restoration is done under a separate project.
68	GC-9	An impact that was not fully discussed is the impact of the centrate. Currently the centrate is	GC	Noted. No action.	Refer to Response to Comments No.43 and No.67

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NO	REFERENCE	CITY COMMENT	REVIEWER	ACTION	RESPONSES TO CITY COMMENTS
		discharged and goes to Point Loma. If centrate is discharged in the sanitary sewer, it will end up at Morena Boulevard and be pumped back to North City. There was some discussion about discharging the centrate to the brine line that discharges downstream of the proposed MBPS or constructing a centrate treatment process. This report is about impacts of NC on MBC, but the concepts need to be coordinated and integrated as they tend to impact one another.			
69	Page 38 Section 4.1.2.2	Replacement of the 3 raw solids feed pumps should include VFD's and should not be two speed like the existing pumps. This would allow for better control of the teacup and TC feed loop.	Dwight Correia	Per Comment 26, pumps are already on VFDs	Text in Section 4.1.2.2 has been corrected.
70	Table 4.1-3 and 4.1-4	New grit separators have a different capacity compared to the existing units. Is this intentional?	Dwight Correia	Will be corrected.	Incorrect capacity was entered. Will correct to 1042 gpm.
71	Page 42 5th paragraph	I agree with Richard Pitchford's comment that this whole paragraph is incorrect	Dwight Correia	See Response to Comment 32.	
72	Page 50 Section 4.2.3.2	1. Consider including a discussion on the need for mixing in the wetwell 2. Will the digester feed pump suction header need to be upgraded in size or will the operating level in the wetwell need to be raised? If the operating level is raised, will there be sufficient operating volume in the wetwell? 3rd paragraph states that 3 of the 4 digester feed pumps will deliver 650 gpm. Past experience	Dwight Correia	1. Noted. See revised paragraph 2. Noted. See revised Paragraph 3. Noted	1&2. Items 1 and 2 to be evaluated in detail by the pre-design consultant for the 10% design. 3. Capacity of the overflow pipes should be analyzed in detail by pre-design consultant. It seems that with the modification to the emergency overflow weir made by the plant staff,

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		indicates that the 650 gpm may be in excess of the capacity of the digester overflow pipes to the biosolids storage tanks when the levels in the biosolids storage tanks are high. Please confirm the capacity in the digester overflow pipes to the biosolids storage tanks.			two 6-inch lines(normal overflow and emergency overflow) are available now for conveyance of overflow from each digester via two 10-inch lines.
73	Page 52 Footnote #15 Second sentence	Problems with plugging heat exchangers was only one of many problems that prompted bypassing the screens and the blending tanks. FYI, other problems included: • Unreliable operations of the screens due to the non-continuous flow from the thickened solids wetwell • Unbalanced mixing flows in the blending tanks that resulted in all of the sludge being transferred to one blending tank only • Undersized original digester feed pumps that tripped offline frequently (pumps were sized for static head only; no pipeline head loses were included in hydraulic calculations) • No check valve or reliable motorized valve to prevent high backflows from the digesters when the pumps tripped offline. High backflows to the low elevation blending tanks overwhelmed the small blending tanks overflow pipes causing spills from the blending tanks which are located at the low point of the plant and adjacent to storm drain inlets	Dwight Correia	Noted. Will be referenced in the text.	

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74	Page 52 Footnote #16 Second sentence	1. 1st line, the statement "…could be transferred between the digesters…" should read "…could be transferred to the digesters…" 2. 3rd line, 3rd sentence describes the original dewatering transfer pumps which were replaced 10 years ago with higher capacity, constant speed, chopper pumps	Dwight Correia	1.Noted. Will be corrected. 2. Noted. Will be referenced.	
75	Page 56 and several other locations	Typical comment. All of the valves on Digesters 1 & 2 have already been replaced so that their axial mix pumps can be isolated and repaired when necessary. When digester #3 is taken out of service all of its valves will be replaced so that in the future the axial mix pumps can be isolated and repaired when needed.	Dwight Correia	Noted. Will be referenced in the text.	
76	Table 4.3-2	Statement is made regarding stress testing a digester. How is this accomplished? Where will the solids come from?	Dwight Correia	Noted. Will be explained, in principle.	The pre-design consultant should be required to develop a stress test protocol and conduct a test that should include holding a portion of biosolids load within the NCWRP and in the Raw Solids Tanks to develop an inventory necessary for the stress test. Pre-design consultant, should be required to evaluate whether digester stress test is possible to accomplish until multiple digesters are in service.
77	Table 4.3-2, Biogas production parameter and other following	Typical comment. The comment states that the "system is adequate for Phase I and Phase II loads. Digester biogas laterals need to be upsized." When do the laterals need to be upsized? The buried header may be adequate but the <u>system</u> is	Dwight Correia	Noted. Will be further elaborated in the text.	The laterals will need to be upsized at Phase I loads.

Description: Draft Technical Memorandum-Impacts of NCWRP Expansion on MBC

TM distributed to: Wastewater Treatment & Disposal, Engineering & Program Management, and Pure Water

NO	REFERENCE	CITY COMMENT	REVIEWER	ACTION	RESPONSES TO CITY COMMENTS
	parameters	not adequate if the laterals need to be upgraded. Please re-word to clarify intent.			
78	Table 4.3-2 Detention time parameter	Test does not fit in the Comments box. Please increase row height.	Dwight Correia	Noted. Will be corrected.	
79	Page 58, 4th paragraph, 6th line	The sentence that starts "However, the energy used will be….." makes no sense. Please re-word to clarify intent.	Dwight Correia	Noted. Will be reworded.	
80	Page 59, Top paragraph	The statement that MBC could receive peak flows and loadings that are twice those under average conditions is incorrect. It may be more correct to state that MBC occasionally has the need to process stored flows at twice the average design flows. Consider changing the wording.	Dwight Correia	Noted. Will be reworded.	
81	Table 4.3-6	Typical. 1. The comments column needs to be reformatted so that it is readable and understandable. 2. Comments box sizes need to be increased 3. Statements in the comments box need to be separated so that it is obvious to what sub-parameter they pertain. 4. In several locations the statement ".. slightly exceeds borderline" is made. What does this mean? First comment for the "Biogas Production" parameter states "SYSTEM IS INADEQUATE FOR PHASE I LOADS AND BORDERLINE FOR PHASE II LOADS" Should the work "inadequate" be changed to "adequate"?	Dwight Correia	1-3. Noted. Will be corrected. 4. Noted. Will be clarified. 5. Noted. Will be assessed and corrected.	In general, "slightly exceeds borderline" means that if a parameter or criterion reaches or slightly(within 1-5%) exceeds target firm capacity or recognized criterion, it is understood as reaching or exceeding a limit(or borderline) of the capacity at which it is still seems to be functional but with an apparent risk of not meeting the capacity or criterion.

Pure Water Program **Date:** 5/25/2016

Description: Draft Technical Memorandum-Impacts of NCWRP Expansion on MBC

TM distributed to: Wastewater Treatment & Disposal, Engineering & Program Management, and Pure Water

NO	REFERENCE	CITY COMMENT	REVIEWER	ACTION	RESPONSES TO CITY COMMENTS
82	Page 67 Section 4.3.3.2	For the new digester, please include digester transfer equipment or a connection to the existing digester transfer pumps.	Dwight Correia	Noted. Will be referenced.	
83	Page 72 2nd bullet	Future cogeneration will be by a 2nd cogenerator. The will require a new parallel header with new dedicated compressors. Please delete the option of increasing the size of the biogas line.	Dwight Correia	Noted. This will be reworded and clarified.	In fact, the cost take offs included construction of a new header to the cogeneration facility. It is understood that if a new cogeneration facility is constructed, this header will need to be constructed to bring gas to the new facility/not old cogeneration facility.
84	Page 74 Footnote #24	Where did this information come from? I am not familiar with the information.	Dwight Correia	A reference will be added to the text.	The information comes from an examination of Seepex pump curves. For a given unit and horsepower, the set of curves shows the influence of pressure on flow at a given speed. Whether the change in pressure is inlet or discharge pressure, the correlation remains the same. It is easier to visualize flow versus pressure compared to speed versus pressure at a given flow.
85	Page 79 Section 4.5.1.1.3	• The pressure sustaining station has been physically bypassed. • The air release valves located at the pipeline high point have been upgraded. The pressure monitoring station is no longer used or maintained.	Dwight Correia	Noted, text will be updated.	
86	Page 79 Section 4.5.1.2	Please include statements that the pipeline condition is being assessed under the condition assessment program which has conducted hydraulic	Dwight Correia	Noted, will update text.	

Description: Draft Technical Memorandum-Impacts of NCWRP Expansion on MBC

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NO	REFERENCE	CITY COMMENT	REVIEWER	ACTION	RESPONSES TO CITY COMMENTS
		testing already.			
87	Section 3 All versions of Figure 3.1	The blending tanks cannot be used as they have been physically bypassed. They should be deleted from the process flow diagram.	Dwight Correia	Noted. Will be deleted.	
88	Page 31	1. The last 2 sentences on this page do not make sense to me. Please clarify the intended meaning. 1st paragraph, 4th line. Delete sentence that begins with "Struvite is much more…" It is a repeat of the information in the prior sentences.	Dwight Correia	Noted, will update.	1. Intent was to indicate that flow from PLWTP was not a large impact to dewatering processes. Agreed. Sentence will be deleted.

Attachment 9

JPA Mid Year Budget

Metro Wastewater Joint Powers Authority
Treasurer's Report
Six months ending December 31, 2016

Metro Wastewater JPA
Treasurer's Report

Six months ending December 31, 2016
Unaudited

Beginning Cash Balance at July 1, 2016	$	231,585
Operating Results		
Membership Dues & Interest Income		56,855
Expenses		(69,518)
Change in Net Position		(12,663)
Net change in Receivables & Payables		81,452
Cash used in Operations		68,789
Ending Cash Balance at December 31, 2016	$	300,374

Submitted by:

Karen Jassoy, Treasurer, 3/9/17

Metro Wastewater JPA
Statement of Net Position

As of Dec 31, 2016 and Jun 30, 2016

Unaudited

	Dec 31, 2016	Jun 30, 2016	$ Change
ASSETS			
Checking/Savings	$ 300,374	$ 231,585	$ 68,789
Accounts Receivable	-	35,278	(35,278)
Total Assets	**$ 300,374**	**$ 266,863**	**$ 33,511**
LIABILITIES			
Accounts Payable	$ 6,170	$ 16,821	$ (10,651)
Unearned Membership Billings	56,825	-	56,825
Total Liabilities	**$ 62,995**	**$ 16,821**	**$ 46,174**
NET POSITION			
Total Net Position at Beginning of Period	$ 250,042	$ 126,475	$ 123,567
Change in Net Position	(12,663)	123,567	(136,231)
Total Net Position at End of Period	**$ 237,379**	**$ 250,042**	**$ (12,663)**

Net Position at 12/31/16	*$ 237,379*
FY '17 JPA Required Operating Reserve	
(based on 4 months of Operating Expenses)	*75,783*
Over required reserve	*$ 161,596*

Metro Wastewater JPA
Statement of Operations
Budget vs. Actual

Six months ending December 31, 2016
Unaudited

	Actual	Budget	Over (Under) Budget
Income			
Membership Dues	$ 56,825	$ 56,838	$ (13)
Interest Income	30	25	5
Total Income	$ 56,855	$ 56,863	$ (8)
Expenses			
Administrative Assistant	$ -	$ 4,000	$ (4,000)
Admin & Treasury Services-Padre	8,214	9,500	(1,286)
Bank Charges		100	
Dues & Subscriptions	-	300	(300)
JPA/TAC meeting expenses	2,732	2,500	232
Miscellaneous		125	(125)
Professional Services			
Engineering - Atkins	6,000	25,000	(19,000)
Audit - White Nelson Diehl Evans	-	6,000	(6,000)
Financial - Kese Group	24,560	32,500	(7,940)
Legal - BB&K	19,610	22,500	(2,890)
Per Diem - Agency	7,050	9,000	(1,950)
Postage	54	-	54
Printing	3	250	(247)
Telephone	-	700	(700)
Website Maintenance & Hosting	1,295	1,200	95
Total Expenses	$ 69,518	$ 113,675	$ (44,057)
Change in Net Position	$ (12,663)	$ (56,812)	$ 44,149

Metro Wastewater JPA
Statement of Cash Flows

Six months ending December 31, 2016
Unaudited

OPERATING ACTIVITIES		
Change in Net Position	$	(12,663)
Adjustments to reconcile Change in Net Position to net cash provided by operations:		
Accounts Receivable		35,278
Accounts Payable		(10,651)
Deferred Revenue		56,825
Net cash provided by Operations		68,789
Net cash increase for period		68,789
Cash at beginning of period		231,585
Cash at end of period	**$**	**300,374**

Metro Wastewater JPA
Vendor Accrual Summary
As of December 31, 2016

Atkins North America	$	375	*
Best, Best and Krieger		1,055	*
Jerrold Jones		300	*
Keze Group		240	*
Padre Dam		4,000	*
Vision Interrnet Providers		200	
Total	**$**	**6,170**	

***Accruals; bills received and paid after 12/31/16**

Attachment 10

Position on Pt. Loma NPDES Modified Permit

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION
2375 Northside Drive, Suite 100, San Diego, CA 92108
619-516-1990 Fax 619-516-1994
http://www.waterboards.ca.gov/sandiego/

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105
https://www.epa.gov/aboutepa/epa-region-9-pacific-southwest

TENTATIVE ORDER NO. R9-2017-0007
NPDES NO. CA0107409

WASTE DISCHARGE REQUIREMENTS AND NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM PERMIT FOR THE CITY OF SAN DIEGO E.W. BLOM POINT LOMA WASTEWATER TREATMENT PLANT DISCHARGE TO THE PACIFIC OCEAN THROUGH THE POINT LOMA OCEAN OUTFALL

The following Discharger is subject to waste discharge requirements (WDRs) set forth in this Order/Permit:

Table 1. Discharger Information

Discharger	City of San Diego
Name of Facility	E.W. Blom Point Loma Wastewater Treatment Plant
Facility Address	1902 Gatchell Road
	San Diego, CA 92106
	San Diego County
The California Regional Water Quality Control Board, San Diego Region (San Diego Water Board) and the U.S. Environmental Protection Agency (USEPA), Region IX and the have classified this discharge as a major discharge.	

Table 2. Discharge Location

Discharge Point	Effluent Description	Discharge Point Latitude (North)	Discharge Point Longitude (West)	Receiving Water
001	**Advanced primary treated wastewater**	**32º 39’ 55” N**	**117º 19’ 25” W**	Pacific Ocean

Table 3. Administrative Information for State Order

This Order was adopted by the San Diego Water Board on:	**To Be Determined**
This Order shall become effective on:	**To Be Determined**
This Order shall expire on:	**To Be Determined**
The Discharger shall file a Report of Waste Discharge as an application for reissuance of WDRs in accordance with title 23, California Code of Regulations (CCR), no later than:	**180 days prior to the Order expiration date**

I, David W. Gibson, Executive Officer, do hereby certify that this Order with all attachments is a full, true, and correct copy of the Order adopted by the California Regional Water Quality Control Board, San Diego Region, on **To Be Determined**~~August 10, 2016~~.

Tentative

David W. Gibson, Executive Officer

Table 4. Administrative Information for Federal Permit

This Permit was issued by the USEPA, Region IX on:	**To Be Determined**
This Permit shall become effective on:	**To Be Determined**
This Permit shall expire on:	**To Be Determined**
The Discharger shall file a new application for reissuance of a NPDES permit in accordance with title 40 of the Code of Federal Regulations (40 CFR) section 122.21(d), no later than:	**180 days prior to the Permit expiration date**

I, Tomás Torres, Water Division Director, do hereby certify that this Permit with all attachments is a full, true, and correct copy of the NPDES Permit issued by the U.S. Environmental Protection Agency, Region IX, on **To Be Determined**~~August 10, 2016~~.

Tentative

Tomás Torres, Water Division Director

CONTENTS

TABLES

ATTACHMENTS

I. FACILITY INFORMATION

General information about the E.W. Blom Point Loma Wastewater Treatment Plant (Facility) is summarized in Table 1. More detailed information describing the Facility, Pump Station No. 2, Metro Biosolids Center (MBC), the Point Loma Ocean Outfall (PLOO), and other associated infrastructure (collectively referred to as Facilities) is contained in sections I and II of the Fact Sheet (Attachment F). Section I of the Fact Sheet also includes information regarding the City of San Diego's (Discharger's) Order/Permit application.

II. FINDINGS

The San Diego Water Board and the USEPA, Region IX, finds:

A. **Legal Authorities.** This Order/Permit is issued pursuant to federal Clean Water Act (CWA) section 402 and implementing regulations adopted by the USEPA and chapter 5.5, division 7 of the California Water Code (Water Code) (commencing with section 13370). This Order/Permit shall serve as a jointly-issued State and federal National Pollutant Discharge Elimination System (NPDES) permit authorizing the Discharger to discharge into waters of the U.S. at the discharge location described in Table 2 subject to the WDRs in this Order/Permit. This Order/Permit also serves as WDRs pursuant to article 4, chapter 4, division 7 of the Water Code (commencing with section 13260). Although Discharge Point No. 001 is beyond the limit of State-regulated ocean waters, effluent plume migration into State waters warrants joint regulation of the discharge by the San Diego Water Board and USEPA, Region IX.

B. **Background and Rationale for Requirements.** The San Diego Water Board and USEPA, Region IX developed the requirements in this Order/Permit based on information submitted as part of the application, through monitoring and reporting programs, and other available information. The Fact Sheet (Attachment F), which contains background information and rationale for the requirements in this Order/Permit, is hereby incorporated into and constitutes Findings for this Order/Permit. Attachments A through E, G, and H are also incorporated into this Order/Permit.

C. **Provisions and Requirements Implementing State Law.** The provisions/requirements in subsections VI.A.2.a-d, VI.C.1.b, and VI.C.1.c are included to implement State law only. These provisions/requirements are not required or authorized under the federal CWA; consequently, violations of these provisions/requirements are not subject to the enforcement remedies that are available for NPDES violations.

D. **CWA Section 301(h) Tentative Decision.** USEPA, Region IX has drafted a CWA section 301(h) Tentative Decision Document (TDD) evaluating the Discharger's proposed improved discharge and effluent limitations for total suspended solids (TSS) and biochemical oxygen demand (5-day @ 20 degrees Celsius (°C)) (BOD_5), the 301(h)-variance-based effluent flow rate of 205 million gallons per day (MGD) (average annual daily flow), and effluent concentrations between the years 2009 and 2014 for TSS and BOD_5, as provided in the updated January 2015 301(h) application and supplemental information provided in June 2016. The 2016 TDD concludes that the Discharger's 301(h) application satisfies CWA sections 301(h) and 301(j)(5). Based on this information, it is the USEPA, Region IX Regional Administrator's tentative decision to grant the Discharger's variance request for TSS and BOD_5, in accordance with this tentative decision and the 1984 301(h) Memorandum of Understanding between the State of California and USEPA; the San Diego Water Board and USEPA, Region IX have jointly proposed issuance of a draft 301(h)-modified permit incorporating both federal NPDES requirements and State WDRs. The final permit will be issued without prejudice to the rights of any party to address the legal issue of the applicability of CWA section 1311(j)(5) to the Discharger's future NPDES permits for its discharges from the Facility.

E. **Permit Renewal Contingency.** The Discharger's Order/Permit renewal of the variance from federal secondary treatment standards, pursuant to CWA sections 301(h) and (j)(5), is contingent upon:

1. Determination by the California Coastal Commission that the proposed discharge is consistent with the Coastal Zone Management Act of 1972, as amended (16 U.S. Code (U.S.C.) section 1451 et seq.);
2. Determination by the U.S. Fish and Wildlife Service and the National Oceanic and Atmospheric Administration's (NOAA's) National Marine Fisheries Service that the proposed discharge is consistent with the federal Endangered Species Act of 1973, as amended (16 U.S.C. section 1531 et seq.);
3. Determination by the NOAA National Marine Fisheries Service that the proposed discharge is consistent with the Magnuson-Stevens Fishery Conservation and Management Act, as amended (16 U.S.C. section 1801 et seq.);
4. Determination by the San Diego Water Board that the discharge will not result in additional treatment pollution control, or other requirement, on any other point or nonpoint sources (40 CFR section 125.64);
5. Certification and concurrence by the San Diego Water Board that the discharge will comply with water quality standards for the pollutants for which the 301(h) variance is requested (40 CFR section 125.61) (i.e., TSS and BOD_5). The joint issuance of a NPDES permit, which incorporates both the 301(h) variance and State WDRs, will serve as the San Diego Water Board's concurrence; and
6. Final decision by the USEPA, Region IX Regional Administrator regarding the Discharger's CWA section 301(h) variance request.

F. **Executive Officer Delegation of Authority.** The San Diego Water Board by prior resolution has delegated all matters that may legally be delegated to its Executive Officer to act on its behalf pursuant to Water Code section 13223. Therefore, the Executive Officer is authorized to act on the San Diego Water Board's behalf on any matter within this Order/Permit unless such delegation is unlawful under Water Code section 13223 or this Order/Permit explicitly states otherwise.

G. **Notification of Interested Parties.** The San Diego Water Board and USEPA, Region IX have notified the Discharger and interested agencies and persons of their intent to jointly issue a federal NPDES permit that incorporates State WDRs for the discharge and have provided them with an opportunity to submit written comments and recommendations. The San Diego Water Board and USEPA, Region IX have also provided an opportunity for the Discharger and interested agencies and persons to submit oral comments and recommendations at a joint public hearing. Details of the notification are provided in the Fact Sheet (Attachment F).

H. **Consideration of Public Comment.** The San Diego Water Board and USEPA, Region IX, at a joint public hearing, heard and considered all comments pertaining to the discharge. Details of the public hearing conducted by the San Diego Water Board and USEPA, Region IX are provided in the Fact Sheet (Attachment F).

THEREFORE, IT IS HEREBY ORDERED, that this Order/Permit supersedes Order No. R9-2009-0001 except for enforcement purposes, and, in order to meet the provisions contained in division 7 of the Water Code (commencing with section 13000) and regulations adopted thereunder, and the provisions of the CWA and regulations and guidelines adopted thereunder, the Discharger shall comply with the requirements in this Order/Permit. The Discharger is hereby authorized to discharge subject to WDRs in this Order/Permit at the discharge location described in Table 2 to the Pacific Ocean off the coast of San Diego. If any part of this Order/Permit is subject to a temporary stay of enforcement, unless otherwise specified in the order granting stay, the Discharger shall comply with the analogous portions of Order No. R9-2009-0001. This action in no way prevents the San Diego Water Board and/or USEPA, Region IX from taking enforcement action for past violations of Order No. R9-2009-0001.

Any discharges not expressly authorized in this Order/Permit cannot become authorized or shielded from liability under CWA section 402(k) by disclosure to USEPA, State, or local authorities after issuance of this Order/Permit via any means, including during an inspection.

III. DISCHARGE PROHIBITIONS

A. The discharge of waste from the Facilities to a location other than Discharge Point No. 001, unless specifically regulated by this Order/Permit or separate WDRs, is prohibited.

B. The Discharger must comply with Discharge Prohibitions contained in the *Water Quality Control Plan, Ocean Waters of California, California Ocean Plan* (Ocean Plan). All such prohibitions are incorporated into this Order/Permit as if fully set forth herein and summarized in Attachment G, as a condition of this Order/Permit.

C. The Discharger must comply with Discharge Prohibitions contained in chapter 4 of the *Water Quality Control Plan for the San Diego Basin* (Basin Plan). All such prohibitions are incorporated into this Order/Permit as if fully set forth herein and summarized in Attachment G, as a condition of this Order/Permit.

IV. EFFLUENT LIMITATIONS AND DISCHARGE SPECIFICATIONS

A. Effluent Limitations and Performance Goals – Discharge Point No. 001

1. Effluent Limitations – Discharge Point No. 001

The Discharger shall maintain compliance with the following effluent limitations at Discharge Point No. 001, with compliance measured at Monitoring Location EFF-001 as described in the Monitoring and Reporting Program (MRP, Attachment E):

Table 5. Effluent Limitations, Discharge Point No. 001[1]

Parameter	Units	Effluent Limitations[2,3]						
		Average Annual	Average Monthly	Average Weekly	Maximum Daily	Instantaneous		Six-month Median
						Minimum	Maximum	
Flow	MGD	--	240	--	--	--	--	--
TSS	milligram per liter (mg/L)	--	60[4]	--	--	--	--	--
	Facility percent removal	--	75[4]	--	--	--	--	--
	System-wide percent removal	--	≥80[5]	--	--	--	--	--
	metric ton per year (mt/yr)	12,000[6]	--	--	--	--	--	--
		11,999[7]	--	--	--	--	--	--
BOD_5	System-wide percent removal	≥58[5]	--	--	--	--	--	--
Oil and Grease	mg/L	--	25	40	--	--	75	--
	pounds per day (lbs/day)	--	42,743	68,388	--	--	128,228	--
Settleable Solids	milliliter per liter (ml/L)	--	1.0	1.5	--	--	3.0	--
Turbidity	nephelometric turbidity unit (NTU)	--	75	100	--	--	225	--
pH	standard units	--	--	--	--	6.0	9.0	--
BASED ON OCEAN PLAN OBJECTIVES FOR PROTECTION OF MARINE AQUATIC LIFE								
Total Residual Chlorine	microgram per liter (µg/L)	--	--	--	1.6E+03	--	1.2E+04	4.1E+02
	lbs/day	--	--	--	2.7E+03	--	2.1E+04	7.0E+02
Chronic Toxicity (Test of Significant Toxicity)[8,9]	"Pass" / "Fail"	--	--	--	"Pass"	--	--	--
BASED ON OCEAN PLAN OBJECTIVES FOR PROTECTION OF HUMAN HEALTH – CARCINOGENS								
Aldrin	µg/L	--	4.5E-03	--	--	--	--	--
	lbs/day	--	7.7E-03	--	--	--	--	--
~~Tetrachloro-dibenzo-dioxin (TCDD) Equivalents~~	~~µg/L~~	~~--~~	~~8.0E-07~~	~~--~~	~~--~~	~~--~~	~~--~~	~~--~~
	~~lbs/day~~	~~--~~	~~1.4E-06~~	~~--~~	~~--~~	~~--~~	~~--~~	~~--~~

1. See Attachment A for definitions of abbreviations and a glossary of common terms used in this Order/Permit.
2. The mass emission rate (MER) limitation, in lbs/day, was calculated based on the following equation: MER (lbs/day) = 8.34 x Q x C, where Q is the 301(h)-variance-based flow of 205 MGD and C is the concentration (in mg/L). The 301(h)-variance-based flow rate of 205 MGD was taken from the 1995 301(h) application and carried over from Orders Nos. 95-106, R9-2002-0025, and R9-2009-0001 (see section II.C of the Fact Sheet (Attachment F) for more info).
3. Scientific "E" notation is used to express certain values. In scientific "E" notation, the number following the "E" indicates the position of the decimal point in the value. Negative numbers after the "E" indicate that the value is less than 1, and positive numbers after the "E" indicate that the value is greater than 1. In this notation a value of 6.1E-02 represents 6.1×10^{-2} or 0.061, 6.1E+02 represents 6.1×10^{2} or 610, and 6.1E+00 represents 6.1×10^{0} or 6.1.

4. The Dischargers shall, as an average monthly, remove 75% of suspended solids from the influent stream before discharging wastewaters to the ocean, except that the effluent limitation to be met shall not be lower than 60 mg/l. This effluent limitation was derived from the Ocean Plan, Table 2.
5. The average monthly system-wide percent removal was derived from CWA sections 301(h) and (j)(5). Percent removal shall be calculated on a system-wide basis, as provided in section VII.G of this Order/Permit. Section VII.G of this Order/Permit is carried over from Orders Nos. R9-2002-0025 and R9-2009-0001.
6. To be achieved on the effective date of this Order/Permit through the end of the fourth year of this Order/Permit. Mass emission limits for TSS apply only to discharges from publicly-owned treatment works (POTWs) owned and operated by the Discharger and the Discharger's wastewater generated in the San Diego Metropolitan Sewerage System (Metro System) service area, excluding TSS contributions from Metro System flows treated in the City of Escondido and South Bay WRP flows discharged to the South Bay Ocean Outfall. If the Discharger is requested to accept wastewater originating in Tijuana, Mexico, treated or untreated, such acceptance would be contingent upon an agreement acceptable to the USEPA, Region IX, San Diego Water Board and Discharger. The TSS contribution from that flow would not be counted toward Discharger’s mass emission limit(s).
7. To be achieved by the beginning of the fifth year of this Order/Permit. Mass emission limits for TSS apply only to discharges from POTWs owned and operated by the Discharger and the Discharger's wastewater generated in the Metro System service area, excluding TSS contributions from Metro System flows treated in the City of Escondido and South Bay WRP flows discharged to the South Bay Ocean Outfall. If the Discharger is requested to accept wastewater originating in Tijuana, Mexico, treated or untreated, such acceptance would be contingent upon an agreement acceptable to the USEPA, Region IX, San Diego Water Board and Discharger. The TSS contribution from that flow would not be counted toward Discharger’s mass emission limit(s).
8. As specified in section VII.M of this Order/Permit and section III.C of the MRP (Attachment E).
9. The Chronic Toxicity final effluent limitation is protective of both the numeric acute and chronic toxicity 2015 Ocean Plan water quality objectives. The final effluent limitation will be implemented using *Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to West Coast Marine and Estuarine Organisms* (EPA/600/R-95/136, 1995), current USEPA guidance in the *National Pollutant Discharge Elimination System Test of Significant Toxicity implementation Document* (EPA 833-R-10-003, June 2010) (https://www3.epa.gov/npdes/pubs/wet_final_tst_implementation2010.pdf) and EPA Regions 8, 9, and 10, Toxicity Training Tool (January 2010).

2. Performance Goals – Discharge Point No. 001

Parameters that do not have reasonable potential to cause or contribute to an exceedance of water quality objectives, or for which reasonable potential to cause or contribute to an exceedance of water quality objectives cannot be determined, are referred to as performance goal parameters and are assigned the performance goals listed in Table 6 below. Performance goal parameters shall be monitored at Monitoring Location EFF-001 as described in the MRP (Attachment E). The San Diego Water Board and USEPA, Region IX will use the results for informational purposes only, not compliance determinations. The performance goals in Table 6 below are not water quality-based effluent limitations (WQBELs) and are not enforceable, as such.

Table 6. Performance Goals, Discharge Point No. 001[1]

Parameter	Units	Performance Goals[2,3]			
		Six-month Median	Maximum Daily	Instantaneous Maximum	Average Monthly
BASED ON OCEAN PLAN OBJECTIVES FOR PROTECTION OF MARINE AQUATIC LIFE					
Arsenic, Total Recoverable	µg/L	1.0E+03	5.9E+03	1.6E+04	--
	lbs/day	1.8E+03	1.0E+04	2.7E+04	--
Cadmium, Total Recoverable	µg/L	2.1E+02	8.2E+02	2.1E+03	--
	lbs/day	3.5E+02	1.4E+03	3.5E+03	--
Chromium (VI), Total Recoverable[4]	µg/L	4.1E+02	1.6E+03	4.1E+03	--
	lbs/day	7.0E+02	2.8E+03	7.0E+03	--
Copper, Total Recoverable	µg/L	2.1E+02	2.1E+03	5.7E+03	--
	lbs/day	3.5E+02	3.5E+03	9.8E+03	--
Lead, Total Recoverable	µg/L	4.1E+02	1.6E+03	4.1E+03	--
	lbs/day	7.0E+02	2.8E+03	7.0E+03	--
Mercury, Total Recoverable[5]	µg/L	8.1E+00	3.3E+01	8.2E+01	--
	lbs/day	1.4E+01	5.6E+01	1.4E+02	--
Nickel, Total Recoverable	µg/L	1.0E+03	4.1E+03	1.0E+04	--
	lbs/day	1.8E+03	7.0E+03	1.8E+04	--
Selenium, Total Recoverable	µg/L	3.1E+03	1.2E+04	3.1E+04	--
	lbs/day	5.3E+03	2.1E+04	5.3E+04	--
Silver, Total Recoverable	µg/L	1.1E+02	5.4E+02	1.4E+03	--
	lbs/day	1.9E+02	9.3E+02	2.4E+03	--
Zinc, Total Recoverable	µg/L	2.5E+03	1.5E+04	3.9E+04	--
	lbs/day	4.2E+03	2.5E+04	6.7E+04	--
Cyanide, Total[6]	µg/L	2.1E+02	8.2E+02	2.1E+03	--
	lbs/day	3.5E+02	1.4E+03	3.5E+03	--
Ammonia (as N)	µg/L	1.2E+05	4.9E+05	1.2E+06	--
	lbs/day	2.1E+05	8.4E+05	2.1E+06	--
Phenolic Compounds (Non-Chlorinated)	µg/L	6.2E+03	2.5E+04	6.2E+04	--
	lbs/day	1.1E+04	4.2E+04	1.1E+05	--
Chlorinated Phenolics	µg/L	2.1E+02	8.2E+02	2.1E+03	--
	lbs/day	3.5E+02	1.4E+03	3.5E+03	--
Endosulfan	µg/L	1.8E+00	3.7E+00	5.5E+00	--
	lbs/day	3.2E+00	6.3E+00	9.5E+00	--
Endrin	µg/L	4.1E-01	8.2E-01	1.2E+00	--
	lbs/day	7.0E-01	1.4E+00	2.1E+00	--
Hexachlorocyclohexane (HCH)	µg/L	8.2E-01	1.6E+00	2.5E+00	--
	lbs/day	1.4E+00	2.8E+00	4.2E+00	--
Radioactivity	pico-curies per liter (pCi/L)	Not to exceed limits specified in title 17, division 1, chapter 5, subchapter 4, group 3, article 3, section 30253 of the CCRs, Reference to section 30253 is prospective, including future changes to any incorporated provisions of federal law, as the changes take effect.			

Parameter	Units	Performance Goals[2,3]			
		Six-month Median	Maximum Daily	Instantaneous Maximum	Average Monthly
BASED ON OCEAN PLAN OBJECTIVES FOR PROTECTION OF HUMAN HEALTH – NONCARCINOGENS					
Acrolein	µg/L	--	--	--	4.5E+04
	lbs/day	--	--	--	7.7E+04
Antimony, Total Recoverable	µg/L	--	--	--	2.5E+05
	lbs/day	--	--	--	4.2E+05
Bis(2-chloroethoxy) Methane	µg/L	--	--	--	9.0E+02
	lbs/day	--	--	--	1.5E+03
Bis(2-chloroisopropyl) Ether	µg/L	--	--	--	2.5E+05
	lbs/day	--	--	--	4.2E+05
Chlorobenzene	µg/L	--	--	--	1.2E+05
	lbs/day	--	--	--	2.0E+05
Chromium (III), Total ~~Recoverable~~[4]Recoverable[7]	µg/L	--	--	--	3.9E+07
	lbs/day	--	--	--	6.7E+07
Di-n-butyl Phthalate	µg/L	--	--	--	7.2E+05
	lbs/day	--	--	--	1.2E+06
Dichlorobenzenes	µg/L	--	--	--	1.0E+06
	lbs/day	--	--	--	1.8E+06
Diethyl Phthalate	µg/L	--	--	--	6.8E+06
	lbs/day	--	--	--	1.2E+07
Dimethyl Phthalate	µg/L	--	--	--	1.7E+08
	lbs/day	--	--	--	2.9E+08
4,6-dinitro-2-methylphenol	µg/L	--	--	--	4.5E+04
	lbs/day	--	--	--	7.7E+04
2,4-dinitrophenol	µg/L	--	--	--	8.2E+02
	lbs/day	--	--	--	1.4E+03
Ethylbenzene	µg/L	--	--	--	8.4E+05
	lbs/day	--	--	--	1.4E+06
Fluoranthene	µg/L	--	--	--	3.1E+03
	lbs/day	--	--	--	5.3E+03
Hexachlorocyclopentadiene	µg/L	--	--	--	1.2E+04
	lbs/day	--	--	--	2.0E+04
Nitrobenzene	µg/L	--	--	--	1.0E+03
	lbs/day	--	--	--	1.7E+03
Thallium, Total Recoverable	µg/L	--	--	--	4.1E+02
	lbs/day	--	--	--	7.0E+02
Toluene	µg/L	--	--	--	1.7E+07
	lbs/day	--	--	--	3.0E+07
Tributyltin	µg/L	--	--	--	2.9E-01
	lbs/day	--	--	--	4.9E-01
1,1,1-trichloroethane	µg/L	--	--	--	1.1E+08
	lbs/day	--	--	--	1.9E+08

Parameter	Units	Performance Goals[2,3]			
		Six-month Median	Maximum Daily	Instantaneous Maximum	Average Monthly
BASED ON OCEAN PLAN OBJECTIVES FOR PROTECTION OF HUMAN HEALTH – CARCINOGENS					
Acrylonitrile	µg/L	--	--	--	2.1E+01
	lbs/day	--	--	--	3.5E+01
Benzene	µg/L	--	--	--	1.2E+03
	lbs/day	--	--	--	2.1E+03
Benzidine	µg/L	--	--	--	1.4E-02
	lbs/day	--	--	--	2.4E-02
Beryllium, Total Recoverable	µg/L	--	--	--	6.8E+00
	lbs/day	--	--	--	1.2E+01
Bis(2-chloroethyl) Ether	µg/L	--	--	--	9.2E+00
	lbs/day	--	--	--	1.6E+01
Bis(2-ethlyhexyl) Phthalate	µg/L	--	--	--	7.2E+02
	lbs/day	--	--	--	1.2E+03
Carbon Tetrachloride	µg/L	--	--	--	1.8E+02
	lbs/day	--	--	--	3.2E+02
Chlordane	µg/L	--	--	--	4.7E-03
	lbs/day	--	--	--	8.1E-03
Chlorodibromomethane	µg/L	--	--	--	1.8E+03
	lbs/day	--	--	--	3.0E+03
Chloroform	µg/L	--	--	--	2.7E+04
	lbs/day	--	--	--	4.6E+04
Dichlorodiphenyltrichloro-ethane (DDT)	µg/L	--	--	--	3.5E-02
	lbs/day	--	--	--	6.0E-02
1,4-dichlorobenzene	µg/L	--	--	--	3.7E+03
	lbs/day	--	--	--	6.3E+03
3,3'-dichlorobenzidine	µg/L	--	--	--	1.7E+00
	lbs/day	--	--	--	2.8E+00
1,2-dichloroethane	µg/L	--	--	--	5.7E+03
	lbs/day	--	--	--	9.8E+03
1,1-dichloroethylene	µg/L	--	--	--	1.8E+02
	lbs/day	--	--	--	3.2E+02
Dichlorobromomethane	µg/L	--	--	--	1.3E+03
	lbs/day	--	--	--	2.2E+03
Dichloromethane	µg/L	--	--	--	9.2E+04
	lbs/day	--	--	--	1.6E+05
1,3-dichloropropene	µg/L	--	--	--	1.8E+03
	lbs/day	--	--	--	3.1E+03
Dieldrin	µg/L	--	--	--	8.2E-03
	lbs/day	--	--	--	1.4E-02
2,4-dinitrotoluene	µg/L	--	--	--	5.3E+02
	lbs/day	--	--	--	9.1E+02

Parameter	Units	Performance Goals[2,3]			
		Six-month Median	Maximum Daily	Instantaneous Maximum	Average Monthly
1,2-diphenylhydrazine	µg/L	--	--	--	3.3E+01
	lbs/day	--	--	--	5.6E+01
Halomethanes	µg/L	--	--	--	2.7E+04
	lbs/day	--	--	--	4.6E+04
Heptachlor	µg/L	--	--	--	1.0E-02
	lbs/day	--	--	--	1.8E-02
Heptachlor Epoxide	µg/L	--	--	--	4.1E-03
	lbs/day	--	--	--	7.0E-03
Hexachlorobenzene	µg/L	--	--	--	4.3E-02
	lbs/day	--	--	--	7.4E-02
Hexachlorobutadiene	µg/L	--	--	--	2.9E+03
	lbs/day	--	--	--	4.9E+03
Hexachloroethane	µg/L	--	--	--	5.1E+02
	lbs/day	--	--	--	8.8E+02
Isophorone	µg/L	--	--	--	1.5E+05
	lbs/day	--	--	--	2.6E+05
N-nitrosodimethylamine	µg/L	--	--	--	1.5E+03
	lbs/day	--	--	--	2.6E+03
N-nitrosodi-N-propylamine	µg/L	--	--	--	7.8E+01
	lbs/day	--	--	--	1.3E+02
N-nitrosodiphenylamine	µg/L	--	--	--	5.1E+02
	lbs/day	--	--	--	8.8E+02
Polynuclear Aromatic Hydrocarbons (PAHs)	µg/L	--	--	--	1.8E+00
	lbs/day	--	--	--	3.1E+00
Polychlorinated Biphenyls (PCBs)	µg/L	--	--	--	3.9E-03
	lbs/day	--	--	--	6.7E-03
Tetrachlorodibenzodioxin (TCDD) Equivalents	µg/L	--	--	--	8.0E-07
	lbs/day	--	--	--	1.4E-06
1,1,2,2-tetrachloroethane	µg/L	--	--	--	4.7E+02
	lbs/day	--	--	--	8.1E+02
Tetrachloroethylene	µg/L	--	--	--	4.1E+02
	lbs/day	--	--	--	7.0E+02
Toxaphene	µg/L	--	--	--	4.3E-02
	lbs/day	--	--	--	7.4E-02
Trichloroethylene	µg/L	--	--	--	5.5E+03
	lbs/day	--	--	--	9.5E+03
1,1,2-trichloroethane	µg/L	--	--	--	1.9E+03
	lbs/day	--	--	--	3.3E+03
2,4,6-trichlorophenol	µg/L	--	--	--	5.9E+01
	lbs/day	--	--	--	1.0E+02

Parameter	Units	Performance Goals[2,3]			
		Six-month Median	Maximum Daily	Instantaneous Maximum	Average Monthly
Vinyl Chloride	µg/L	--	--	--	7.4E+03
	lbs/day	--	--	--	1.3E+04

1. See Attachment A for definitions of abbreviations and a glossary of common terms used in this Order/Permit.
2. The MER limitation, in lbs/day, was calculated based on the following equation: MER (lbs/day) = 8.34 x Q x C, where Q is the 301(h)-variance-based flow of 205 MGD and C is the concentration (in mg/L). The 301(h)-variance-based flow rate of 205 MGD was taken from the 1995 301(h) application and carried over from Orders Nos. 95-106, R9-2002-0025, and R9-2009-0001 (see section II.C of the Fact Sheet (Attachment F) for more info).
3. Scientific "E" notation is used to express certain values. In scientific "E" notation, the number following the "E" indicates that position of the decimal point in the value. Negative numbers after the "E" indicate that the value is less than 1, and positive numbers after the "E" indicate that the value is greater than 1. In this notation a value of 6.1E-02 represents 6.1×10^{-2} or 0.061, 6.1E+02 represents 6.1×10^{2} or 610, and 6.1E+00 represents 6.1×10^{0} or 6.1.
4. Discharger may, at its option, meet this performance goal as a total chromium performance goal.
5. USEPA Method 1631E, with a quantitation level of 0.5 nanogram per liter (ng/L), shall be used to analyze total mercury.
6. If the Discharger can demonstrate to the satisfaction of the San Diego Water Board (subject to USEPA approval) that an analytical method is available to reliably distinguish between strongly and weakly complexed cyanide, effluent limitations for cyanide may be met by (or performance goals may be evaluated with) the combined measurement of free cyanide, simple alkali metals cyanides, and weakly complexed organometallic cyanide complexes. In order for the analytical method to be acceptable, the recovery of free cyanide from metal complexes must be comparable to that achieved by the approved method in 40 CFR part 136, as amended.

~~6.~~7. Discharger may meet the performance goal for total recoverable chromium (III) by calculating the difference between total recoverable chromium and total recoverable chromium (VI).

3. USEPA Toxics Mass Emission Performance Goals

The annual mass emission performance goals for toxic and carcinogenic parameters in Table 7 below apply to the undiluted effluent from the Facility discharged to the PLOO. The annual mass emission performance goals are not WQBELs and are not enforceable as such. The annual mass emission performance goals may be re-evaluated and modified during this Order/Permit term, or this Order/Permit may be modified to incorporate WQBELs for the parameters in Table 7, in accordance with the requirements set forth at 40 CFR sections 122.62 and 124.5. Performance goal parameters shall be monitored at Monitoring Location EFF-001 as described in the MRP (Attachment E). The San Diego Water Board and USEPA, Region IX will use the monitoring results for informational purposes only, not compliance determinations.

Table 7. Annual Mass Emissions Performance Goals[1]

Effluent Constituent	Units	Annual Mass Emission
Arsenic, Total Recoverable	mt/yr	0.88
Cadmium, Total Recoverable	mt/yr	1.4
Chromium (VI), Total Recoverable[2]	mt/yr	14.2
Copper, Total Recoverable	mt/yr	26
Lead, Total Recoverable	mt/yr	14.2
Mercury, Total Recoverable[3]	mt/yr	0.19
Nickel, Total Recoverable	mt/yr	11.3
Selenium, Total Recoverable	mt/yr	0.44
Silver, Total Recoverable	mt/yr	2.8

Effluent Constituent	Units	Annual Mass Emission
Zinc, Total Recoverable	mt/yr	18.3
Cyanide, Total[4]	mt/yr	1.57
Ammonia (as N)	mt/yr	8,018
Phenolic Compounds (Non-Chlorinated)	mt/yr	2.57
Chlorinated Phenolics	mt/yr	1.73
Endosulfan	mt/yr	0.006
Endrin	mt/yr	0.008
HCH	mt/yr	0.025
Acrolein	mt/yr	17.6
Antimony, Total Recoverable	mt/yr	56.6
Bis(2-chloroethoxy) Methane	mt/yr	1.5
Bis(2-chloroisopropyl) Ether	mt/yr	1.61
Chlorobenzene	mt/yr	1.7
Di-n-butyl Phthalate	mt/yr	1.33
Dichlorobenzenes	mt/yr	2.8
Diethyl Phthalate	mt/yr	6.23
4,6-dinitro-2-methylphenol	mt/yr	6.8
2,4-dinitrophenol	mt/yr	11.9
Ethylbenzene	mt/yr	2.04
Fluoranthene	mt/yr	0.62
Nitrobenzene	mt/yr	2.07
Thallium	mt/yr	36.8
Toluene	mt/yr	3.31
Tributyltin	mt/yr	0.001
1,1,1-trichloroethane	mt/yr	2.51
Acrylonitrile	mt/yr	5.95
Aldrin	mt/yr	0.006
Benzene	mt/yr	1.25
Benzidine	mt/yr	12.5
Beryllium, Total Recoverable	mt/yr	1.42
Bis(2-chloroethyl) Ether	mt/yr	1.61
Bis(2-ethylhexyl) Phthalate	mt/yr	2.89
Carbon Tetrachloride	mt/yr	0.79
Heptachlor Epoxide	mt/yr	0.024
Hexachlorobenzene	mt/yr	0.54
Hexachlorobutadiene	mt/yr	0.54
Hexachloroethane	mt/yr	1.13
Isophorone	mt/yr	0.71
N-nitrosodimethylamine	mt/yr	0.76
N-nitrosodiphenylamine	mt/yr	1.47
PAHs	mt/yr	15.45
PCBs	mt/yr	0.275
1,1,2,2-tetrachloroethane	mt/yr	1.95
Tetrachloroethylene (Tetrachloroethene)	mt/yr	4
Toxaphene	mt/yr	0.068

Effluent Constituent	Units	Annual Mass Emission
Trichloroethylene (Trichloroethene)	mt/yr	1.56
1,1,2-trichloroethane	mt/yr	1.42
2,4,6-trichlorophenol	mt/yr	0.960
Vinyl Chloride	mt/yr	0.40

1. See Attachment A for definitions of abbreviations and a glossary of common terms used in this Order/Permit.
2. Discharger may, at its option, meet this annual mass emission performance as a total chromium annual mass emission performance.
3. USEPA Method 1631E, with a quantitation level of 0.5 ng/L, shall be used to analyze total mercury.
4. If the Discharger can demonstrate to the satisfaction of the San Diego Water Board (subject to USEPA approval) that an analytical method is available to reliably distinguish between strongly and weakly complexed cyanide, effluent limitations for cyanide may be met by (or performance goals may be evaluated with) the combined measurement of free cyanide, simple alkali metals cyanides, and weakly complexed organometallic cyanide complexes. In order for the analytical method to be acceptable, the recovery of free cyanide from metal complexes must be comparable to that achieved by the approved method in 40 CFR part 136, as amended.

4. Interim Effluent Limitations – Not Applicable

B. Discharge Specifications

1. Waste discharged to the ocean must be essentially free of:
   a. Material that is floatable or will become floatable upon discharge;
   b. Settleable material or substances that may form sediments which will degrade benthic communities or other aquatic life;
   c. Substances which will accumulate to toxic levels in marine waters, sediments, or biota;
   d. Substances that significantly decrease the natural light to benthic communities and other marine life; and
   e. Materials that result in aesthetically undesirable discoloration of the ocean surface.
2. Waste effluents shall be discharged in a manner which provides sufficient initial dilution to minimize the concentrations of substances not removed in the treatment.
3. Location of waste discharges must be determined after a detailed assessment of the oceanographic characteristics and current patterns to assure that:
   a. Pathogenic organisms and viruses are not present in areas where shellfish are harvested for human consumption or in areas used for swimming or other body-contact sports;
   b. Natural water quality conditions are not altered in areas designated as being of special biological significance or areas that existing marine laboratories use as a source of seawater; and
   c. Maximum protection is provided to the marine environment.
4. Waste that contains pathogenic organisms or viruses should be discharged a sufficient distance from shellfishing and water-contact sports areas to maintain applicable bacterial standards without disinfection. Where conditions are such that an adequate distance cannot be attained, reliable disinfection in conjunction with a reasonable separation of the discharge point from the area of use must be provided. Disinfection procedures that

do not increase effluent toxicity and that constitute the least environmental and human hazard should be used.

C. Land Discharge Specifications – Not Applicable

D. Recycling Specifications – Not Applicable

V. RECEIVING WATER LIMITATIONS

A. Surface Water Limitation

The receiving water limitations set forth below for ocean waters are based on water quality objectives contained in the Basin Plan and Ocean Plan and are a required part of this Order/Permit. The discharge of waste shall not cause or contribute to violation of these limitations in the Pacific Ocean. Compliance with these limitations shall be determined from samples collected at stations representative of the area outside of the zone of initial dilution (ZID).

1. Bacterial Characteristics within State Waters

    a. Within a zone bounded by the shoreline and a distance of three nautical miles from the shoreline, including all kelp beds, the following bacterial objectives shall be maintained throughout the water column. The ZID for the ocean outfall is excluded.

        i. 30-day Geometric Mean – The following standards are based on the geometric mean of the five most recent samples from each site:

            (a) Total coliform density (colony forming units, CFU) shall not exceed 1,000 per 100 milliliter (ml);

            (b) Fecal coliform density (CFU) shall not exceed 200 per 100 ml; and

            (c) Enterococcus density (CFU) shall not exceed 35 per 100 ml.

        ii. Single Sample Maximum:

            (a) Total coliform density (CFU) shall not exceed 10,000 per 100 ml;

            (b) Fecal coliform density (CFU) shall not exceed 400 per 100 ml;

            (c) Enterococcus density (CFU) shall not exceed 104 per 100 ml; and

            (d) Total coliform density (CFU) shall not exceed 1,000 per 100 ml when the fecal coliform/total coliform ratio exceeds 0.1.

    b. The ZID of any wastewater outfall shall be excluded from designation as kelp beds for purposes of bacterial standards. Adventitious assemblages of kelp plants on waste discharge structures (e.g., outfall pipes and diffusers) do not constitute kelp beds for purposes of bacterial standards.

    c. At all areas where shellfish may be harvested for human consumption, as determined by the San Diego Water Board, the median total coliform density (CFU) shall not exceed 70 per 100 ml throughout the water column, and not more than 10 percent of the samples shall exceed 230 per 100 ml.

2. Bacterial Characteristics for waters beyond State Waters

    Ocean waters beyond the outer limit of the territorial sea shall not exceed the following CWA section 304(a)(1) criteria for enterococcus density (CFU) beyond the ZID in areas where primary contact recreation, as defined in USEPA guidance, occurs. USEPA describes the "primary contact recreation" use as protective when the potential for ingestion of, or immersion in, water is likely. Activities usually include swimming, water-skiing, skin-diving, surfing, and other activities likely to result in immersion. (Water Quality Standards Handbook, EPA- 823-B-94-005a, 1994, p. 2-2, available at https://www.epa.gov/wqs-tech/water-quality-standards-handbook)

a. 30-day Geometric Mean – The following standard is based on the geometric mean:

Enterococcus density (CFU) shall not exceed 35 per 100 ml.

The geometric mean values should be calculated based on a statistically sufficient number of samples (generally not less than five samples equally spaced over ~~a~~ any 30-day period). If any of the single sample limitations are exceeded, the San Diego Water Board and/or USEPA, Region IX may require repeat sampling on a daily basis until the sample falls below the ~~single sample limitation~~statistical threshold value in order to determine the persistence of the exceedance. When repeat sampling is required because of an exceedance of any one statistical threshold value~~single sample limitation~~, values from all samples collected during that 30-day period will be used to calculate the geometric mean.

b. Statistical Threshold Value (STV)~~Single Sample Maximum~~:

Enterococcus density (CFU) shall not exceed ~~104~~ 130 per 100 ml. ~~for designated bathing beach;~~ There should be no greater than ten percent excursion frequency of the STV magnitude in the same 30-day period.

~~i. Enterococcus density (CFU) shall not exceed 158 per 100 ml for moderate use;~~

~~i. Enterococcus density (CFU) shall not exceed 276 per 100 ml for light use; and~~

~~ii. Enterococcus density (CFU) shall not exceed 501 per 100 ml for infrequent use.~~

3. Physical Characteristics

a. Floating particulates and grease and oils shall not be visible.

b. The discharge of waste shall not cause aesthetically undesirable discoloration of the ocean surface.

c. Natural light shall not be significantly reduced at any point outside the ZID as a result of the discharge of waste.

d. The rate of deposition of inert solids and the characteristics of inert solids in the ocean sediments shall not be changed such that benthic communities are degraded.

4. Chemical Characteristics

a. The dissolved oxygen concentration shall not at any time be depressed more than 10 percent from that which occurs naturally, as the result of the discharge of oxygen demanding waste materials.

b. The pH shall not be changed at any time more than 0.2 standard units from that which occurs naturally.

c. The dissolved sulfide concentration of waters in and near sediments shall not be significantly increased above that present under natural conditions.

d. The concentration of substances set forth in Chapter II, Table 1 of the Ocean Plan, shall not be increased in marine sediments to levels that would degrade indigenous biota.

e. The concentration of organic materials in marine sediments shall not be increased to levels that would degrade marine life.

f. Nutrient materials shall not cause objectionable aquatic growths or degrade indigenous biota.

g. Numerical water quality objectives established in Chapter II, Table 1 of the Ocean Plan apply to all discharges within the jurisdiction of the Ocean Plan. Unless otherwise specified, all metal concentrations are expressed as total recoverable concentrations.

5. Biological Characteristics

a. Marine communities, including vertebrate, invertebrate, and plant species, shall not be degraded.

b. The natural taste, odor, color of fish, shellfish, or other marine resources used for human consumption shall not be altered.

c. The concentration of organic materials in fish, shellfish, or other marine resources used for human consumption shall not bioaccumulate to levels that are harmful to human health.

6. Radioactivity

Discharge of radioactive waste shall not degrade marine life.

B. Groundwater Limitations – Not Applicable

VI. PROVISIONS

A. Standard Provisions

1. The Discharger shall comply with all Standard Provisions included in Attachment D.

2. The Discharger shall comply with the following provisions. In the event that there is any conflict, duplication, or overlap between provisions specified by this Order/Permit, the more stringent provision shall apply.

a. The Facilities shall be supervised and operated by persons possessing certificates of appropriate grade pursuant to title 23, division 3, chapter 26 of the CCR. The Facilities shall be provided with a sufficient number of qualified personnel to operate the Facilities effectively so as to achieve the required level of treatment at all times.

b. All proposed new treatment facilities and expansions of existing treatment facilities shall be completely constructed and operable prior to initiation of the discharge from the new or expanded facilities. The Discharger shall submit a certification report for each new treatment facility, expansion of an existing treatment facility, and design capacity re-ratings, prepared by the design engineer. For design capacity re-ratings, the certification report shall be prepared by the engineer who evaluated the treatment facility design capacity. The signature and engineering license number of the engineer preparing the certification report shall be affixed to the report. If reasonable, the certification report shall be submitted prior to beginning construction of new treatment facilities or expansions of existing treatment facilities.

i. The certification report shall:

(a) Identify the design capacity of the treatment facility, including the daily and 30-day design capacity;

(b) Certify the adequacy of each component of the treatment facility; and

(c) Contain a requirement-by-requirement analysis, based on acceptable engineering practices, of the process and physical design of the facility to ensure compliance with this Order/Permit.

ii. The Discharger shall not initiate a discharge from an existing treatment facility at a daily flow rate in excess of its previously approved design capacity until:

(a) The certification report is received by the San Diego Water Board;

(b) The San Diego Water Board has received written notification of completion of construction (new treatment facilities and expansions only);

(c) An inspection of the facility has been made by the San Diego Water Board or its designated representatives (new treatment facilities and expansions only); and

(d) The San Diego Water Board, in consultation with USEPA, Region IX, has provided the Discharger with written authorization to discharge at a daily flow rate in excess of its previously approved design capacity.

c. The Facilities shall be protected against 100-year storm event as defined by the San Diego County Flood Control District (FCD).

d. The Facilities shall be protected against erosion, overland runoff, and other impacts resulting from a 100-year, 24-hour storm event as defined by the San Diego FCD.

e. The Facilities shall be protected against regional impacts due to climate change (e.g. sea level rise and floods).

f. The expiration date of this Order/Permit is contained in Tables 3 and 4 of this Order/Permit. After the expiration date, the terms and conditions of this Order/Permit are automatically continued pending issuance of a new permit, provided that all requirements of USEPA's NPDES regulations at 40 CFR section 122.6 and the State's regulations at title 23, division 3, chapter 9, article 3, section 2235.4 of the CCR regarding the continuation of expired permits and WDRs are met.

g. A copy of this Order/Permit shall be posted at a prominent location and shall be available to site personnel, San Diego Water Board, State Water Resources Control Board (State Water Board), and USEPA or their authorized representative at all times.

3. The Discharger shall comply with the following USEPA, Region IX standard conditions:

a. The following condition has been established to enforce applicable requirements of the Resource Conservation and Recovery Act (RCRA). POTWs may not receive hazardous waste by truck, rail, or dedicated pipe except as provided under 40 CFR part 270. Hazardous wastes are defined at 40 CFR part 261 and include any mixture containing any waste listed under 40 CFR sections 261.31 through 261.33. The Domestic Sewage Exclusion (40 CFR section 261.4) applies only to wastes mixed with domestic sewage in a sewer leading to a POTW and not to mixtures of hazardous wastes and sewage or septage delivered to the treatment plant by truck.

b. **Transfers by Modification:** Except as provided in 40 CFR section 122.61(b), this Order/Permit may be transferred by the Discharger to a new owner or operator only if this Order/Permit has been modified or revoked and reissued (under 40 CFR section 122.62(b)(2)), or a minor modification made (under 40 CFR section 122.63(d)), to identify the new permittee and incorporate such other requirements as may be necessary under the CWA. (40 CFR section 122.61(a).)

c. **Automatic Transfers:** As an alternative to transfers under 40 CFR section 122.61(b)(1), this Order/Permit may be automatically transferred to a new permittee if: the Discharger notifies the USEPA, Region IX Water Division Director and San Diego Water Board at least 30 days in advance of the proposed transfer date; the notice includes a written agreement between the Discharger and new permittee containing a specific date for transfer of permit responsibility, coverage, and liability between them; and the USEPA, Region IX Water Division Director and San Diego Water Board does not notify the Discharger and the proposed new permittee of their intent to modify or revoke and reissue this Order/Permit. A modification under this paragraph may also be a minor modification under 40 CFR section 122.63. If this notice is not received, the transfer is effective on the date specified in the written agreement between the Discharger and the new permittee. (40 CFR section 122.61(b).)

d. **Minor Modification of Permits:** Upon the consent of the Discharger, the USEPA, Region IX Water Division Director and San Diego Water Board may modify this Order/Permit to make the corrections or allowances for changes in the permitted activity listed under 40 CFR sections 122.63(a) through (g), without following the procedures of 40 CFR part 124. Any permit modification not processed as a minor modification under 40 CFR section 122.63 must be made for cause and with 40 CFR part 124 draft permit and public notice as required in 40 CFR section 122.62. (40 CFR section 122.63.)

e. **Termination of Permits:** The causes for terminating a permit during its term, or for denying a permit renewal application are found at 40 CFR sections 122.64(a)(1) through (4). (40 CFR section 122.64.)

f. **Availability of Reports:** Except for data determined to be confidential under 40 CFR part 2, all reports prepared in accordance with the terms of this Order/Permit shall be available for public inspection at the offices of the San Diego Water Board and USEPA, Region IX. As required by the CWA, permit applications, permits, and effluent data shall not be considered confidential. (Pursuant to CWA section 308.)

g. **Removed Substances:** Solids, sludges, filter backwash, or other pollutants removed in the course of treatment or control of wastewaters shall be disposed of in a manner such as to prevent any pollutant from such materials from entering navigable waters. (Pursuant to CWA section 301.)

h. **Severability:** The provisions of this Order/Permit are severable, and if any provision of this Order/Permit or the application of any provision of this Order/Permit to any circumstance is held invalid, the application of such provision to other circumstances and the remainder of this Order/Permit shall not be affected thereby. (Pursuant to CWA section 512.)

i. **Civil and Criminal Liability:** Except as provided in standard conditions on Bypass and Upset, nothing in this Order/Permit shall be construed to relieve the Discharger from civil or criminal penalties for noncompliance. (Pursuant to CWA section 309.)

j. **Oil and Hazardous Substances Liability:** Nothing in this Order/Permit shall be construed to preclude the institution of any legal action or relieve the Discharger from any responsibilities, liabilities, or penalties to which the Discharger is or may be subject under CWA section 311.

k. **State or Tribal Law:** Nothing in this Order/Permit shall be construed to preclude the institution of any legal action or relive the operator from any responsibilities, liabilities, or penalties established pursuant to any applicable State or Tribal law or regulation under authority preserved by CWA section 510.

l. **No Shield Clause:** Any discharges not expressly authorized in this Order/Permit cannot become authorized or shielded from liability under CWA section 402(k) by disclosure to USEPA, San Diego Water Board, State Water Board, or local authorities after issuance of this Order/Permit by any means, including during an inspection.

B. Monitoring and Reporting Program (MRP) Requirements

1. The Discharger shall comply with the MRP and future revisions thereto, in Attachment E.

2. Notifications required to be provided under this Order/Permit to the San Diego Water Board shall be made to:

   E-mail – SanDiego@waterboards.ca.gov

   Telephone – (619) 516-1990
   Facsimile – (619) 516-1994

C. Special Provisions

1. Reopener Provisions

a. This Order/Permit may be reopened for modification to include an effluent limitation if monitoring establishes that the discharge causes, has the reasonable potential to cause, or contributes to an excursion above a performance goal(s) set forth in section IV.A.2, Table 6, of this Order/Permit or as otherwise described in Table 1 of the Ocean Plan. (40 CFR section 122.44(d)(1))

b. This Order/Permit may be reopened for modification of the monitoring and reporting requirements and/or special studies requirements, at the discretion of the San Diego Water Board and USEPA, Region IX. Such modification(s) may include, but is (are) not limited to, revision(s) (i) to implement recommendations from Southern California Coastal Water Research Project (SCCWRP); (ii) to develop, refine, implement, and/or coordinate a regional monitoring program; (iii) to develop and implement improved monitoring and assessment programs in keeping with San Diego Water Board Resolution No. R9-2012-0069, *Resolution in Support of a Regional Monitoring Framework*; and/or (iv) to add provisions to require the Discharger to evaluate and provide information on cost and values of the MRP (Attachment E).

c. This Order/Permit may be modified, revoked and reissued, or terminated for cause in accordance with the provisions of 40 CFR parts 122, 124, and 125 at any time prior to its expiration under any of the following circumstances:

   i. Violation of any terms or conditions of this Order/Permit. (Water Code section 13381(a));

   ii. Obtaining this Order/Permit by misrepresentation or failure to disclose fully all relevant facts. (Water Code section 13381(b)); and

   iii. A change in any condition that requires either a temporary or permanent reduction or elimination of the permitted discharge. (Water Code section 13381(c)).

d. The filing of a request by the Discharger for modifications, revocation and reissuance, or termination of this Order/Permit does not stay any condition of this Order/Permit. Notification by the Discharger of planned operational or facility changes or anticipated noncompliance with this Order/Permit does not stay any condition of this Order/Permit. (40 CFR section 122.41(f))

e. If any applicable toxic effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is promulgated under CWA section 307(a) for a toxic pollutant and that standard or prohibition is more stringent than any limitation on the pollutant in this Order/Permit, the San Diego Water Board and USEPA, Region IX may institute proceedings under these regulations to modify or revoke and reissue this Order/Permit to conform to the toxic effluent standard or prohibition. (40 CFR section 122.4(b)(1))

f. This Order/Permit may be reopened and modified, in accordance with the provisions set forth in 40 CFR parts 122 and 124.

g. This Order/Permit may be reopened and modified to revise effluent limitations as a result of future Basin Plan Amendments, or the adoption of a total maximum daily load (TMDL) for the receiving water. (40 CFR section 122.62(a)(2))

h. This Order/Permit may be reopened upon submission by the Discharger of adequate information, as determined by the San Diego Water Board and USEPA, Region IX, to provide for dilution credits or a mixing zone, as may be appropriate. (40 CFR section 122.62(a)(2))

i. This Order/Permit may also be reopened and modified, revoked and reissued, or terminated in accordance with the provisions of 40 CFR sections 122.44, 122.62 to 122.64, and 125.62. Causes for taking such actions include, but are not limited to, failure to comply with any condition of this Order/Permit, and endangerment to human health or the environment resulting from the permitted activity.

j. The mass emission performance goals, contained in section IV.A.3 of this Order/Permit, may be re-evaluated and modified during this Order/Permit term, or this Order/Permit may be modified to incorporate WQBELs, in accordance with the requirements set forth at 40 CFR sections 122.62 and 124.5.

2. Special Studies, Technical Reports and Additional Monitoring Requirements

a. **Spill Prevention and Response Plans**

i. For purposes of section VI.C.2 of this Order/Permit, a spill is a discharge that occurs at or downstream of the Facility headworks, including MBC and PLOO, in violation of Discharge Prohibition III.A of this Order/Permit. A spill may include a discharge of treated or untreated wastewater, or material other than treated or untreated wastewater that cause, may cause, or are caused by significant operational failure, and/or endangers or may endanger human health or the environment. The term “spill” as used in section VI.C.2 of this Order/Permit does not include sanitary sewer overflows from the sewage collection system, including Pump Station No. 2, that are covered under separate WDRs (see section VI.C.5.e of this Order/Permit for more information).

ii. Within 120 days after the effective date of this Order/Permit, the Discharger shall develop and maintain a Spill Prevention Plan (SPP) and Spill Response Plan (SRP) for the Facility, MBC, and PLOO in an up-to-date condition and shall amend the SPP/SRP whenever there is a change (e.g., in the design, construction, operation, or maintenance of the Facility, MBC, and PLOO) which materially affects the potential for spills and the response required for each potential spill. The Discharger shall review and amend the SPP/SRP as appropriate after each spill from the Facility, MBC, and/or PLOO. The SPP/SRP and any amendments thereto shall be subject to the approval of the San Diego Water Board and USEPA, Region IX and shall be modified as directed by the San Diego Water Board and USEPA, Region IX. The Discharger shall submit the SPP/SRP and any amendments thereto to the San Diego Water Board and/or USEPA, Region IX upon request of the San Diego Water Board and/or USEPA, Region IX. The Discharger shall ensure that the up-to-date SPP/SRP is readily available to its personnel at all times and that its personnel are familiar with it.

b. **Spill Reporting Requirements**

The Discharger shall report spills, as defined in section VI.C.2.a.i above, in accordance with the following procedures.

i. If a spill results in a discharge of treated or untreated wastewater that is equal to or exceeds 1,000 gallons, and/or results in a discharge to a drainage channel and/or surface water; or results in a discharge to a storm drain that was not fully captured and returned to the Facility, the Discharger shall:

(a) Report the spill to the San Diego Water Board by email at SanDiego@waterboards.ca.gov within 24 hours from the time the Discharger becomes aware of the spill. If email communication is not possible, report the spill by telephone (619-516-1990) within 24 hours from the time the Discharger becomes aware of the spill. The report shall include a description of the spill and its cause; the spill material; the duration of the spill including exact dates and times; the estimated spill volume and its destination; if the spill has not been terminated, the anticipated time it is expected to continue; and steps taken or planned to reduce and or eliminate the spill.

(b) Submit a written report by email at SanDiego@waterboards.ca.gov, as well as any additional pertinent information, to the San Diego Water Board no later than five days from the time the Discharger becomes aware of the spill. The written report must be signed and certified as required by section V of the Standards Provisions (Attachment D).

The San Diego Water Board may waive the above-required written report under this provision on a case-by-case basis if the email or oral report has been received within 24 hours.

ii. If a spill results in a discharge of treated or untreated wastewater less than 1,000 gallons and the discharge does not reach a drainage channel or surface waters, or results in a discharge to a storm drain that was fully captured and returned to the Facility, the Discharger is not required to notify the San Diego Water Board within 24 hours, or provide a 5-day written report.

iii. For spills of material other than treated or untreated wastewater that cause, may cause, or are caused by significant operational failure, and/or endangers or may endanger human health or the environment, the Discharger shall notify the San Diego Water Board by email at SanDiego@waterboards.ca.gov within 24 hours from the time the Discharger becomes aware of the spill. If email communication is not possible, report the spill by telephone (619-516-1990) within 24 hours from the time the Discharger becomes aware of the spill. The report shall include a description of the spill and its cause; the spill material; the duration of the spill including exact dates and times; the estimated spill volume and its destination; if the spill has not been terminated, the anticipated time it is expected to continue; and steps taken or planned to reduce and or eliminate the spill.

Submit a written report by email at SanDiego@waterboards.ca.gov, as well as any additional pertinent information, to the San Diego Water Board no later than five days from the time the Discharger becomes aware of the spill. The written report must be signed and certified as required by section V of the Standards Provisions (Attachment D).

The San Diego Water Board may waive the above-required written report under this provision on a case-by-case basis if the email or oral report has been received within 24 hours.

iv. For all spills, the Discharger shall include a detailed summary of spills in the monthly Self-Monitoring Report (SMR) for the month in which the spill occurred. If no spills occurred during the calendar month, the Discharger shall report no spills in the monthly SMR for that calendar month.

v. The spill reporting requirements contained in this Order/Permit do not relieve the Discharger of responsibilities to report spills to other agencies, such as the California Office of Emergency Services and the County of San Diego Department of Environmental Health Services.

3. Best Management Practices and Pollution Prevention

Pollutant Minimization Program (PMP) - Reporting protocols in the MRP (Attachment E) describe sample results that are to be reported as Detected, But Not Quantified (DNQ) or Not Detected (ND). Definitions for a reported Minimum Level (ML) and Method Detection Limit (MDL) are provided in the Ocean Plan and in the Abbreviation and Definitions (Attachment A). These reporting protocols and definitions are used in determining the need to conduct a PMP, as follows:

a. The Discharger shall develop and conduct a PMP as further described below when there is evidence (e.g., sample results reported as DNQ when the effluent limitation is less than the MDL, sample results from analytical methods more sensitive than those methods required by this Order/Permit, presence of whole effluent toxicity, health advisories for fish consumption, results of benthic or aquatic organism tissue sampling) that a pollutant is present in the effluent above an effluent limitation and either:

i. The concentration of the pollutant is reported as DNQ and the effluent limitation is less than the reported ML; or

ii. The concentration of the pollutant is reported as ND and the effluent limitation is less than the MDL.

The goal of the PMP shall be to reduce all potential sources of a pollutant through pollutant minimization (control) strategies, including pollution prevention measures as appropriate, to maintain the effluent concentration at or below the effluent limitation. Pollution prevention measures may be particularly appropriate for persistent bioaccumulative priority pollutants where there is evidence that beneficial uses are being impacted. The San Diego Water Board and USEPA, Region IX may consider cost-effectiveness when establishing the requirements of a PMP. The completion and implementation of a Pollution Prevention Plan, if required pursuant to Water Code section 13263.3(d), shall be considered to fulfill the PMP requirements.

b. The PMP shall include, but not be limited to, the following actions and submittals acceptable to the San Diego Water Board and USEPA, Region IX:

   i. An annual review and semi-annual monitoring of potential sources of the reportable pollutant(s), which may include fish tissue monitoring and other bio-uptake sampling;

   ii. Quarterly monitoring for the reportable pollutant(s) in the influent to the wastewater treatment system;

   iii. Submittal of a control strategy designed to proceed toward the goal of maintaining concentrations of the reportable pollutant(s) in the effluent at or below the effluent limitation;

   iv. Implementation of appropriate cost-effective control measures for the reportable pollutant(s), consistent with the control strategy; and

   v. An annual status report that shall be sent to the San Diego Water Board and USEPA, Region IX including:

      (a) All PMP monitoring results for the previous year;

      (b) A list of potential sources of the reportable pollutant(s);

      (c) A summary of all actions undertaken pursuant to the control strategy; and

      (d) A description of actions to be taken in the following year.

4. Construction, Operation and Maintenance Specifications

a. The Discharger shall maintain in good working order a sufficient alternate power source for operating the Facilities. All equipment shall be located to minimize failure due to moisture, liquid spray, flooding, sea level rise, and other physical phenomena. The alternate power source shall be designed to permit inspection and maintenance and shall provide for periodic testing. If such alternate power source is not in existence, the Discharger shall halt, reduce, or otherwise control all discharges upon the reduction, loss, or failure of the primary source of power.

b. Emergency Power Facilities - The Discharger shall provide standby or emergency power facilities and/or storage capacity or other means so that in the event of plant upset or outage due to power failure or other cause, discharge of raw or inadequately treated sewage does not occur.

5. Special Provisions for Publicly-Owned Treatment Works (POTWs)

a. **Ensuring Adequate Capacity**

The Discharger shall submit a written report to the San Diego Water Board and USEPA, Region IX within 90 days after the monthly average influent flow rate equals or exceeds 75 percent of the design capacity of key Metro System facilities and operations that play a key role in Facility operations and Order/Permit compliance. Metro System facilities and operations include the advanced primary treatment Facility; the Point Loma Ocean Outfall; primary pump stations including, but not limited to, Pump Station No.1 and 2; sludge pipelines and biosolids handling facilities including MBC; and other key devices and systems used in the conveyance, storage, treatment of Metro System wastewater flows. The Discharger's senior administrative officer shall sign a letter in accordance with section V.B. of the Standard Provision (Attachment D) which transmits that report and certifies that the policy-making body is adequately informed of the influent flow rate relative to the design capacity of the Metro System facility or operation. The report shall include the following:

i. Average influent daily flow for the calendar month, the date on which the maximum daily flow occurred, and the rate of that maximum flow;

ii. The Discharger's best estimate of when the average daily influent flow for a calendar month will equal or exceed the design capacity of the Metro System facility or operation; and

iii. The Discharger's intended schedule for studies, design, and other steps showing how flow volumes will be prevented from exceeding existing design capacity or how design capacity will be increased.

b. **Sewage Sludge (Biosolids) Requirements**

i. General Requirements

(a) All biosolids generated by the Discharger during the treatment of wastewater shall be used or disposed of in compliance with applicable portions of: 40 CFR part 503-for biosolids that are land applied, placed on a surface disposal site (dedicated land disposal site, monofill, or sludge-only parcel at a municipal landfill), or incinerated; 40 CFR part 258-for biosolids disposed of in a municipal solid waste landfill (with other materials); and 40 CFR part 257-for all biosolids use and disposal practices not covered under 40 CFR parts 258 or 503.

Requirements for biosolids that are applied for the purpose of enhancing plant growth or for land reclamation are set forth in 40 CFR part 503, subpart B (land application). Requirements for biosolids that are placed on land for the purpose of disposal are set forth in 40 CFR part 503, subpart C (surface disposal).

The Discharger shall ensure that all biosolids produced at the Facilities are used or disposed of in accordance with these rules, whether the Discharger uses or disposes of the biosolids itself, or transfers their biosolids to another party for further treatment, use, or disposal. The Discharger is responsible for informing subsequent preparers, appliers, and disposers of requirements they must meet under these rules.

(b) The Discharger shall take all reasonable steps to prevent or minimize any biosolids use or disposal which has a likelihood of adversely affecting human health or the environment.

(c) No biosolids shall be allowed to enter wetlands or other waters of the U.S.

(d) Biosolids treatment, storage, use, or disposal shall not contaminate groundwater.

(e) Biosolids treatment, storage, use, or disposal shall not create a nuisance condition such as objectionable odors or flies.

(f) The Discharger shall assure that haulers transporting biosolids off-site for treatment, storage, use, or disposal take all necessary measures to keep the biosolids contained. Trucks hauling biosolids that are not classified Class A with respect to pathogens, as defined at 40 CFR section 503.32(a), shall be cleaned as necessary after loading and after unloading, so as to have no biosolids on the exterior of the truck, or wheels. Trucks hauling biosolids that are not Class A shall be tarped. All haulers must have and implement spill clean-up procedures. Trucks hauling biosolids that are not Class A shall not be used for hauling food or feed crops after unloading the biosolids unless the Discharger submits a hauling description, to be approved by USEPA, Region IX, describing how trucks will be thoroughly cleaned prior to adding food or feed.

(g) If biosolids are stored for over two years from the time they are generated, the Discharger must ensure compliance with all requirements for surface disposal under 40 CFR part 503, subpart C, or must submit a written notification to USEPA, Region IX, State Water Board, and San Diego Water Board with the information specified under 40 CFR section 503.20(b), demonstrating the need for longer temporary storage. During storage of any length for non-Class A biosolids, whether on the Facilities' site or off-site, adequate procedures must be taken to restrict access by the public and domestic animals.

(h) Any biosolids treatment, disposal, or storage site shall have facilities adequate to divert surface runoff from adjacent areas, to protect the site boundaries from erosion, and to prevent any conditions that would cause drainage from the materials to escape from the site. Adequate protection is defined as protection from at least a 100-year storm event and the highest tidal stage which may occur.

(i) There shall be adequate screening at the Facility headworks and/or at the biosolids treatment units to ensure that all pieces of metal, plastic, glass, and other inert objects with a diameter greater than 3/8 inches are removed.

ii. Inspection and Entry

The USEPA, San Diego Water Board, State Water Board, or an authorized representative thereof, upon the presentation of credentials, shall be allowed by the Discharger directly, or through contractual arrangements with their biosolids management contractors, to:

(a) Enter upon all premises where biosolids produced by the Discharger are treated, stored, used, or disposed of, by either the Discharger or another party to whom the Discharger transfers biosolids for further treatment, storage, use, or disposal;

(b) Have access to and copy any records that must be kept by either the Discharger or another party to whom the Discharger transfers biosolids for further treatment, storage, use, or disposal, under the conditions of this Order/Permit or 40 CFR part 503; and

(c) Inspect any facilities, equipment (including monitoring and control equipment), practices, or operations used in biosolids treatment, storage, use, or disposal by either the Discharger or another party to whom the Discharger transfers biosolids for further treatment, storage, use, or disposal.

iii. Monitoring

(a) Biosolids shall be monitored for the following constituents, at the frequency stipulated in Table 1 of 40 CFR section 503.16:

- arsenic,
- cadmium,
- chromium,
- copper,
- lead,
- mercury,
- molybdenum,
- nickel,
- selenium,
- zinc,
- organic nitrogen,
- ammonia nitrogen, and
- total solids.

If biosolids are removed for use or disposal on a routine basis, sampling should be scheduled at regular intervals throughout the year. If biosolids are stored for an extended period prior to use or disposal, sampling may occur at regular intervals, or samples of the accumulated stockpile may be collected prior to use or disposal, corresponding to the tons accumulated in the stockpile over that period.

Monitoring shall be conducted using the methods in *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods* (SW-846), or as otherwise required under 40 CFR section 503.8(b). All results must be reported on a 100% dry weight basis and records of all analyses must state on each page of the analytical results whether the reported results are expressed on an "as-is" or a "100% dry weight" basis.

(b) The Discharger shall sample biosolids twice per year for the pollutants listed under CWA section 307(a), using best practicable detection limits. As required under section VI.C.5.b.viii.(b), these results shall be included in the annual biosolids report.

iv. Pathogen and Vector Control

(a) Prior to land application, the permittee shall demonstrate that biosolids meet Class A or Class B pathogen reduction levels by one of the methods listed under 40 CFR section 503.32.

(b) Prior to disposal on a surface disposal site, the Discharger shall demonstrate that biosolids meet Class B pathogen reduction levels, or ensure that the site is covered at the end of each operating day. If pathogen reduction is demonstrated using a "Process to Further Reduce Pathogens" or one of the "Processes to Significantly Reduce Pathogens," the Discharger shall maintain daily records of the operating parameters used to achieve this reduction. If pathogen reduction is demonstrated by testing for fecal coliform and/or pathogens, samples must be collected at the frequency specified in Table 1 of 40 CFR section 503.16. If Class B is demonstrated using fecal coliform, at least seven grab samples must be collected during each monitoring period and a geometric mean calculated from these samples. The following holding times between sample collection and analysis shall not be exceeded: fecal coliform-24 hours when cooled to four °C; Salmonella spp. bacteria-24 hours when cooled to four °C; enteric viruses-two weeks when frozen; and helminth ova-one month when cooled to four °C.

(c) For biosolids that are land applied or placed on a surface disposal site, the Discharger shall track and keep records of the operational parameters used to achieve the Vector Attraction Reduction requirements under 40 CFR section 503.33(b).

v. Surface Disposal

If biosolids are placed on a surface disposal site (dedicated land disposal site or monofill), a qualified groundwater scientist shall develop a groundwater monitoring program for the site, or shall certify that the placement of biosolids on the site will not contaminate an aquifer.

vi. Landfill Disposal

Biosolids placed in a municipal landfill shall be tested by the Paint Filter Test (Method 9095) at the frequency specified in Table 1 of 40 CFR section 503.16, or more often if necessary to demonstrate that there are no free liquids.

vii. Notifications

The Discharger, either directly or through contractual arrangements with their biosolids management contractors, shall comply with the following notification requirements.

(a) Notification of Noncompliance

The Discharger shall notify USEPA, Region IX, State Water Board, and San Diego Water Board (for both Discharger and use or disposal site) of any noncompliance with the biosolids within 24 hours, if the noncompliance may endanger health or the environment. For other instances of noncompliance with the biosolids, the Discharger shall notify USEPA, Region IX and the State Water Board of the noncompliance in writing within five working days of becoming aware of the noncompliance. The Discharger shall require their biosolids management contractors to notify USEPA, Region IX and the State Water Board of any noncompliance within these same time-frames.

(b) Interstate Notification

If biosolids are shipped to another State or Tribal Land, the Discharger shall send 60 days prior notice of the shipment to the permitting authorities in the receiving State or Tribal Land, and the USEPA, Region IX.

(c) Land Application Notification

Prior to using any biosolids from the Facilities (other than composted biosolids) at a new or previously unreported site, the Discharger shall notify USEPA, Region IX, State Water Board, and San Diego Water Board. This notification shall include a description and topographic map of the proposed site(s), names and addresses of the applier and site owner, and a listing of any State or local permits which must be obtained. It shall also include a description of the crops or vegetation to be grown, proposed loading rates, and a determination of agronomic rates.

Within a given monitoring period, if any biosolids do not meet the applicable metals concentration limits specified under 40 CFR section 503.13, then the Discharger (or its contractor) must pre-notify USEPA, Region IX, State Water Board, and San Diego Water Board, and determine the cumulative metals loading at that site to date, as required by 40 CFR section 503.12.

The Discharger shall notify the applier of all subject requirements under 40 CFR part 503, including the requirement for the applier to certify that management practices, site restrictions, and applicable vector attraction reduction requirements have been met. The Discharger shall require the applier to certify at the end of 38 months, following application of Class B biosolids, that harvesting restrictions in effect for up to 38 months have been met.

(d) Surface Disposal Notification

Prior to disposal at a new or previously unreported site, the Discharger shall notify USEPA, Region IX, State Water Board, and San Diego Water Board. The notice shall include a description and topographic map of the proposed site, depth to groundwater, whether the site is lined or unlined, site operator and site owner, and any State or local permits. It shall also describe procedures for ensuring grazing and public access restrictions for three years following site closure. The notice shall include a groundwater monitoring plan or description of why groundwater monitoring is not required.

viii. Reporting

The Discharger shall submit an annual biosolids report to the State Water Board's California Integrated Water Quality System (CIWQS) program website (http://www.waterboards.ca.gov/water_issues/programs/ciwqs/), to the USEPA, Region IX Biosolids Coordinator, and to the Arizona Department of Environmental Quality Biosolids Program Coordinator by February 19 of each year for the period covering the previous calendar year. The report shall include:

(a) The amount of biosolids generated that year, in dry metric tons, and the amount accumulated from previous years.

(b) Results of all pollutant monitoring required under section VI.C.5.b.iii of this Order/Permit. Results must be reported on a 100% dry weight basis.

(c) Demonstrations of pathogen and vector attraction reduction methods, as required under 40 CFR sections 503.17 and 503.27, and certifications.

(d) Names, mailing addresses, and street addresses of persons who received biosolids for storage, further treatment, disposal in a municipal landfill, or other use or disposal method not covered above, and volumes delivered to each.

(e) The following information must be submitted by the Discharger, unless the Discharger requires its biosolids management contractors to report this information directly to the USEPA, Region IX Biosolids Coordinator:

(1) For land application sites:

- Locations of land application sites (with field names and numbers) used that calendar year, size of each field applied to, applier, and site owner;
- Volumes applied to each field (in wet tons and dry metric tons), nitrogen applied, and calculated plant available nitrogen;
- Crops planted, dates of planting and harvesting;
- For biosolids exceeding 40 CFR section 503.13 Table 3 metals concentrations, the locations of sites where the biosolids were applied and cumulative metals loading at the sites to date;
- Certifications of management practices at 40 CFR section 503.14; and
- Certifications of site restrictions at 40 CFR section 503.32(b)(5).

(2) For surface disposal sites:

- Locations of sites, site operator and site owner, size of parcel on which biosolids were disposed;
- Results of any required groundwater monitoring;
- Certifications of management practices at 40 CFR section 503.24; and
- For closed sites, the date of site closure and certifications of management practices for three years following site closure.

(f) All reports shall be submitted to:

State Water Board's CIWQS program website
(http://www.waterboards.ca.gov/water_issues/programs/ciwqs/)

Regional Biosolids Coordinator
U.S. Environmental Protection Agency
NPDES Permits Office (WTR 2-3)
75 Hawthorne Street
San Francisco, CA 94105-3901

Biosolids Program Coordinator
Arizona Department of Environmental Quality
Mail Code: ~~541585~~5415B-1
1110 West Washington Street
Phoenix, AZ 85007

c. **Requirements for Receipt of Anaerobically Digestible Material**

If the Discharger plans to receive hauled-in anaerobically digestible material for injection into an anaerobic digester, the Discharger shall notify the San Diego Water Board and USEPA, Region IX and develop and implement Standard Operating Procedures (SOPs) for this activity. The SOPs shall be developed prior to receiving hauled-in anaerobically digestible material. The SOPs shall address material handling, including unloading, screening, or other processing prior to anaerobic digestion; transportation; spill prevention; and spill response. In addition, the SOPs shall address avoidance of the introduction of materials that could cause interference, pass-through, or upset of the treatment processes; avoidance of prohibited material; vector control; odor control; operation and maintenance; and the disposition of any solid waste segregated from introduction to the digester. The Discharger shall train its staff on the SOPs and shall maintain records for a minimum of five years for each load received, describing the hauler, waste type, and quantity received. In addition, the Discharger shall maintain records for a minimum of five years for the disposition, location, and quantity of cumulative pre-digestion-segregated solid waste hauled off-site.

d. **Pretreatment Program**

i. The Discharger shall be responsible and liable for the performance of all Control Authority pretreatment requirements contained in 40 CFR part 403, including any subsequent revisions to that part. Where 40 CFR part 403 or subsequent revisions place mandatory actions upon the Discharger, as Control Authority, but do not specify a timetable for completion, the Discharger shall complete the mandatory actions within six months of the issuance date of this Order/Permit, or the effective date of the revisions to 40 CFR part 403, whichever is later. For violations of pretreatment requirements, the Discharger shall be subject to enforcement actions, penalties, fines, and other remedies imposed by the San Diego Water Board and/or USEPA, Region IX, as provided in the CWA and/or the Water Code.

ii. The Discharger shall comply with the urban area pretreatment program requirements under CWA section 301(h) and the implementation requirements at 40 CFR part 125. The Discharger's actions to comply shall include the following:

(a) During each calendar year, maintaining a rate of significant noncompliance (SNC), as defined at 40 CFR section 403.8(f)(2)(vii), for Significant Industrial Users (SIUs) of no more than 15 percent of the total number of SIUs. The 15 percent noncompliance criteria includes only SIUs that are in SNC and which have not received at least a second level formal enforcement action from the Discharger, in accordance with the Enforcement Response Plan[1]. The second level of enforcement is an Administrative Notice and Order.

(b) By July 1 of each year, the Discharger shall submit the annual analysis regarding local limits required under 40 CFR section 125.65(c)(1)(iii) to the State Water Board's CIWQS program website (http://www.waterboards.ca.gov/water_issues/programs/ciwqs/). As a consequence of any new local limits, some SIUs may need time to come into compliance with those limits. In any such cases, the Discharger shall issue a Compliance Findings of Violation and Order which is the first level of formal enforcement in its Enforcement Response Plan. The Order shall contain a schedule for achieving compliance with the new local limits. SIUs receiving such orders will not be included in the 15 percent noncompliance criteria.

iii. The Discharger shall implement and enforce its approved pretreatment program, and all subsequent revisions, which are hereby made enforceable conditions of this Order/Permit. The Discharger shall enforce the requirements promulgated pursuant to CWA sections 307(b), 307(c), 307(d), and 402(b) with timely, appropriate, and effective enforcement actions. The Discharger shall cause all nondomestic users subject to federal categorical standards to achieve compliance no later than the date specified in those requirements, or, in the case of a new nondomestic user, upon commencement of the discharge.

iv. The Discharger shall perform the pretreatment functions required by 40 CFR part 403, including, but not limited to:

(a) Implement the necessary legal authorities as required by 40 CFR section 403.8(f)(1);

(b) Enforce the pretreatment requirements under 40 CFR sections 403.5 and 403.6;

(c) Implement the programmatic functions as required by 40 CFR section 403.8(f)(2); and

(d) Provide the requisite funding and personnel to implement the pretreatment program, as required by 40 CFR section 403.8(f)(3).

[1] The Discharger's Enforcment Response Plan was originally submitted to USEPA, Region IX in August 1993. It was subsequently revised on December 15, 1993 and December 1, 1999 and can be found at https://www.sandiego.gov/sites/default/files/legacy/mwwd/environment/iwcp/pdf/enf_resp_plan.pdf

v. By March 1 of each year, the Discharger shall submit an annual pretreatment report to the USEPA, Region IX by email (R9Pretreatment@epa.gov) and to the San Diego Water Board via the State Water Board's CIWQS program website (http://www.waterboards.ca.gov/water_issues/programs/ciwqs/) and the San Diego County Department of Environmental Health Services, Hazardous Materials Division, describing its pretreatment activities over the previous calendar year. In the event the Discharger is not in compliance with any condition or requirement of this Order/Permit, or any pretreatment compliance inspection/audit requirements, the Discharger shall include the reasons for noncompliance and state how and when it will comply with such conditions and requirements. The annual pretreatment report shall contain, but not be limited to, the following information:

(a) A summary of analytical results from representative flow-proportioned 24-hour composite sampling of the Discharger's influent and effluent for those pollutants USEPA has identified under CWA section 307(a), which are known or suspected to be discharged by nondomestic users. Wastewater sampling and analysis shall be performed in accordance with the minimum frequency of analysis required by the MRP (Attachment E). The Discharger shall also provide influent and effluent monitoring data for non-priority pollutants, which the Discharger believes may be causing or contributing to interference or pass through. The Discharger is not required to sample and analyze for asbestos. Sludge sampling and analysis is addressed elsewhere in section VI.C.5.b.iii this Order/Permit. Wastewater sampling and analysis shall be performed in accordance with 40 CFR part 136.

(b) A discussion of upset, interference, or pass through, if any, at the Discharger's Facilities, which the Discharger knows or suspects were caused by nondomestic users of the POTW system. The discussion shall include the reasons why the incidents occurred, any corrective actions taken, and, if known, the name and address of the responsible nondomestic user(s). The discussion shall also include a review of the applicable local pollutant limitations to determine whether any additional limitations or changes to existing limitations are necessary to prevent pass-through, interference, or noncompliance with sludge disposal requirements.

(c) An updated list of the Discharger's SIUs including their names and addresses, and a list of deletions, additions, and SIU name changes keyed to the previously submitted list. The Discharger shall provide a brief explanation for each change. The list shall identify the SIUs subject to federal categorical standards by specifying which set(s) of standards are applicable to each SIU. The list shall also indicate which SIUs are subject to local limits.

(d) The Discharger shall characterize the compliance status of each SIU by providing a list or table for the following:

(1) Name of SIU;

(2) Category, if subject to categorical standards;

(3) Type of wastewater treatment or control processes in place;

(4) Number of samples taken by SIU during the year;

(5) Number of samples and inspections by Discharger during the year;

(6) For an SIU subject to discharge requirements for total toxic organics, whether all required certifications were provided;

(7) A list of pretreatment standards (categorical or local) violated during the year, or any other violations;

(8) SIUs in SNC as defined at 40 CFR section 403.8(f)(2)(viii), at any time during the year;

(9) A summary of enforcement actions or any other actions taken against SIUs during the year. Describe the type of action, final compliance date, and the amount of fines and/or penalties collected, if any. Describe any proposed actions for bringing SIUs into compliance;

(10) The names of any SIUs required to prepare and/or implement a pollution prevention plan pursuant to CA SB 709 and SB 2165.

(e) A brief description of any programs the Discharger implements to reduce pollutants from nondomestic users not classified as SIUs.

(f) A brief description of any significant changes in operating the pretreatment program which differ from the previous year, including, but not limited to, changes in the program's administrative structure, local limits, monitoring program, legal authority, enforcement policy, funding, and staffing levels.

(g) A summary of the annual pretreatment program budget, including the cost of pretreatment program functions and equipment purchases.

(h) A summary of activities to involve and inform the public of the pretreatment program, including a copy of the newspaper notice, if any, required by 40 CFR section 403.8(f)(2)(vii).

(i) A description of any changes in sludge disposal methods.

(j) A description of the program to quantify, characterize, regulate, and treat flow from low-flow urban runoff diversion systems and "first flush" industrial storm water diversion systems that are routed to the sanitary sewer collection system.

(k) A discussion of any concerns not described elsewhere in the annual pretreatment report.

vi. Non-industrial Source Control Program. In accordance with CWA section 301(h)(7) and 40 CFR section 125.66(d), the Discharger shall continue to develop and implement its non-industrial source control program and public education program. The purpose of these programs is to eliminate the entrance of non-industrial toxic pollutants and pesticides into the POTW. These programs shall be periodically reviewed and addressed in the annual pretreatment report.

e. **Sewage Collection System**

The Discharger is subject to the requirements of, and must comply with *State Water Resources Control Board Order No. 2006-0003-DWQ, Statewide General Waste Discharge Requirements for Sanitary Sewer Systems* (Statewide General SSO Order), including monitoring and reporting requirements as amended by State Water Board Order WQ 2013-0058-EXEC and any subsequent amendment/order. The Discharger is also subject to the requirements of, and must comply with the *California Regional Water Quality Control Board Region 9, San Diego Region, Order R9-2007-0005, Waste Discharge Requirements for Sewage Collection Agencies in the San Diego Region* (Regional General SSO Order), and any subsequent amendment/order.

Regardless of the coverage obtained under Order No. 2006-0003-DWQ or Order No. R9-2007-0005, the Discharger's collection system is part of the treatment system that is subject to this Order/Permit. As such, pursuant to federal regulations, the Discharger must report any noncompliance (40 CFR sections 122.44(1)(6) and (7)), properly operate and maintain its collection system [40 CFR 122.41(e)], and mitigate or prevent any discharge from the collection system in violation of this Order/Permit [40 CFR 122.41(d)].

6. Other Special Provisions ~~– Not Applicable~~

~~7. Compliance Schedules~~

a. **~~Compliance~~ Schedule for *Pure Water San Diego* Potable Reuse Tasks.**

~~As a condition of this CWA section 301(h) waiver, the~~ The Discharger has committed to implementing a comprehensive water reuse program called "*Pure Water San Diego*" (also referred to as Pure Water Program). The Pure Water Program ~~proses~~ proposes to use advanced water purification technology to produce potable water from recycled water and provide a safe, reliable and cost-effective drinking water supply for San Diego area. The Pure Water Program would eventually produce up to~~create~~ 83 MGD of potable reuse water and reduce flows to the Facility, which in turn would reduce wastewater flows and pollutant loads discharged to the ocean. The Pure Water Program consists of the design and construction of new advanced water purification facilities and a new water reclamation plant; upgrades to existing water reclamation and wastewater treatment facilities; and design and construction of new pump stations and pipelines. The constructed facilities would have the ability to produce and deliver purified water to local reservoirs in volumes of at least ~~15~~ 30 MGD by ~~2023~~2022~~, 30 MGD by 2027~~ and 83 MGD by December 31, 2035. The Pure Water Program is the result of collaboration between the Discharger, Metro Wastewater Joint Powers Authority (JPA)[2], and a diverse array of regional stakeholders.

To demonstrate its commitment~~ensure that the Discharger continues~~ to move forward with implementation of *Pure Water San Diego*, the Discharger has committed to~~shall~~ complete ~~all compliance~~the tasks set forth in Table 8 below no later than the specified ~~compliance~~ completion date.

[2] The Metro Wastewater JPA includes the ~~Discharger,~~ City of Chula Vista, City of La Mesa, City of Del Mar, City of El Cajon, City of Lemon Grove, City of Poway, City of Coronado, City of Imperial Beach, City of National City, Padre Dam Municipal Water District, and Otay Water District.

Table 8. *Pure Water San Diego* Potable Reuse Tasks~~1~~, Phase I, 30-MGD Potable Reuse, ~~2015-2020~~2017-2022

Category	Task	~~Compliance~~ Completion Date[1]	Task Report Due Date (14 days after the ~~compliance~~ date)
~~*Pure Water San Diego* Environmental Review~~	~~Issue Notice of Preparation for Program Environmental Impact Report (EIR)~~	~~Complete~~	~~N/A~~
	~~Publish Draft Program EIR for Public Review~~	~~Complete~~	~~N/A~~
	~~Certify Final Program EIR~~	~~January 31, 2018~~	~~February 14, 2018~~
~~Conveyance Pipeline from the North City Water Reclamation Plant (NCWRP)~~	~~Issue Notice to Proceed-Final Design of 15 MGD purified water conveyance pipeline from the NCWRP~~	~~January 31, 2017~~	~~February 14, 2017~~
	~~Complete 30% Design Deliverables of 15 MGD purified water conveyance pipeline from NCWRP~~	~~May 31, 2018~~	~~June 14, 2018~~
	~~Complete design of the 15 MGD purified water conveyance pipeline from the NCWRP~~	~~October 31, 2019~~	~~November 14, 2019~~
~~15 MGD Potable Reuse Purification Facility~~	~~Issue Notice to Proceed on final design of a 15 MGD Potable Reuse Purification Facility (advanced water treatment facility) for the NCWRP site~~	~~May 31, 2017~~	~~June 14, 2017~~
	~~Complete 30% Design Deliverables for 15 MGD Potable Reuse Purification Facility (advanced water treatment facility) for the NCWRP site~~	~~January 31, 2018~~	~~February 14, 2018~~
	~~Complete 60% Design Deliverables for 15 MGD Potable Reuse Purification Facility (advanced water treatment facility) for the NCWRP site~~	~~January 31, 2019~~	~~February 14, 2019~~
	~~Complete design of 15 MGD Potable Reuse Purification Facility (advanced water treatment facility)~~	~~January 31, 2020~~	~~February 14, 2020~~
Environmental Impact Report (EIR)	Certify Final Program EIR for *Pure Water San Diego*	Task Completed	N/A
	Issue Notice of Preparation for North City Project EIR	Task Completed	N/A
	Certify Final North City Project EIR	October 31, 2018	November 14, 2018
32-MGD Morena Blvd. Wastewater Pump Station and Forcemain to North City Water Reclamation Expansion	Issue Notice to Proceed for final design	Task Completed	N/A
	Complete design	December 31, 2018	January 14, 2019
	Complete construction[2]	July 31, 2022	August 15, 2022
North City Water Reclamation Expansion	Issue Notice to Proceed for final design	Task Completed	N/A
	Complete design	December 31, 2018	January 14, 2019

Category	Task	~~Compliance~~ Completion Date[1]	Task Report Due Date (14 days after the ~~compliance~~ date)
	Complete construction[2]	July 31, 2022	August 15, 2022
Metro Biosolids Center Improvements	Complete design	December 31, 2018	January 14, 2019
	Complete construction[2]	July 31, 2022	August 15, 2022
30-MGD Potable Reuse Purification Facility	Complete design	March 31, 2019	April 15, 2019
	Complete construction[2]	July 31, 2022	August 15, 2022
~~North City Renewable Energy Facility~~	~~Complete design~~	~~September 30, 2020~~	~~October 14, 2020~~
	~~Complete construction[2]~~	~~July 31, 2022~~	~~August 15, 2022~~
30-MGD Purified Water Pump Station and Pipeline from North City Water Reclamation Expansion to Miramar Reservoir	Issue Notice to Proceed for final design	Task Completed	N/A
	Complete design	October 31, 2018	November 14, 2018
	Complete construction[2]	July 31, 2022	August 15, 2022
Commissioning	Initiate equipment testing and commissioning of potable reuse purification systems associated with start-up and eventual ramp-up to full capacity in accordance with regulatory requirements	August 1, 2022	August 15, 2022

1 Facilities planning, including the potential to accelerate the implementation schedule, has been aggressively pursued by the Discharger since the submittal of the Report of Waste Discharge for renewal of the Facility NPDES modified permit. Implementation of *Pure Water San Diego* faces a unique challenge, well beyond what a normal expansion of the water and wastewater infrastructure would experience. The detailed schedule included in Table 8 was provided by the Discharger on January 30, 2017. The Discharger has noted that **this schedule is based on current progress and the completion dates may be modified based on issues related to the regulatory approval schedule, environmental review issues, or legal challenges to the proposed program or projects.** ~~the Discharger may request modification of these dates based on issues related to regulatory approval, environmental review, or legal challenges.~~ ~~In recognition of this, the enforceable milestones and schedule originally presented by the Discharger remains applicable for use in this Order/Permit, while realizing that the Discharger is using its best efforts to achieve its goals ahead of schedule. Updates on the progress of the implementation of *Pure Water San Diego* are available at https://www.sandiego.gov/water/purewater/purewatersd, as of September 21, 2016.~~

~~1~~2 These tasks are dependent upon future approval by the Mayor and City Council of San Diego.

b. **Task Report.** The Discharger shall prepare and submit Task Reports to the San Diego Water Board and USEPA, Region IX by the due dates ~~listed~~ set forth in Table 8 above (last column) for each specified task. The Task Reports shall detail ~~compliance or noncompliance with~~ the status of completion of the specified task ~~and compliance date~~. If non-completion of the specific task is~~noncompliance is being~~ reported, the reasons for such non-completion~~noncompliance~~ shall be stated, and ~~shall include~~ an estimate of the date when the ~~Discharger~~ task will be completed shall be provided~~in compliance~~. Within 14 days of completing~~coming into compliance with~~ the specified task, the Discharger shall notify the San Diego Water Board and USEPA, Region IX by letter.

c. **Semiannual Progress Reports.** The Discharger shall prepare and submit Semiannual Progress Reports of efforts taken by the Discharger towards completing the tasks in Table 8 above. The reports shall summarize the following: 1) the progress to date; 2) the activities conducted during those six months; 3) the activities planned for the next six months; 4) information regarding all delays encountered or anticipated that may affect the future schedule for completion of the tasks~~ required~~; and 5) a description of all efforts made to mitigate those delays or anticipated delays. Each semiannual progress report shall be received by the San Diego Water Board and USEPA, Region IX by the 14th day of the first month following the reporting period (January 14 and July 14). If the 14th falls on a weekend or holiday, the due date will be the following workday. The first Semiannual Progress Report shall be received by the San Diego Water Board and USEPA, Region IX on the closest January 14 or July 14 following the permit effective date ~~(~~identified in Tables 3 and 4 of this Order/Permit~~)~~.

d. ***Pure Water San Diego* Potable Reuse Goal~~s~~.** The Discharger intends to expand *Pure Water San Diego* capacity ~~potable reuse goals from January 2021 to December 2035~~to achieve 83 MGD of potable reuse by December 2035. ~~The possible locations for new recycled water/advanced purification treatment facilities include Habor Drive, Camino Del Rio, and/or Mission Gorge are set forth in Table 9 below~~. Because the Discharger has committed[3] to implementing the *Pure Water San Diego* program~~ as a condition of this CWA section 301(h) waiver~~, the 2035 goal~~s~~ that post-dates the term of this Order/Permit ~~are~~ is included~~ below~~, with the expectation that details associated with ~~each~~ the 2035 goal and necessary additional or interim goals will be provided and ~~included~~ described in ~~compliance schedules in~~ subsequent Orders/Permits~~ as required tasks, so as to comply with the State and federal compliance schedule policies (State Water Board Resolution No. 2008-0025, *Policy for Compliance Schedules in National Pollutant Discharge Elimination System Permits*, and 40 CFR section 122.47)~~. The Discharger is committed to implementing ~~these goals~~the 2035 goal with the collaboration of the other members of the Metro Wastewater JPA.

~~**Table 9. Potable Reuse Implementation Goals, 2021 -2035[1]**~~

~~Phase~~	~~Goal~~	~~Possible Location of Recycled Water/Advanced Purification Treatment Facility[2]~~	~~Target Implementation Date[1]~~
~~Phase 1~~	~~Implement first 15 MGD of purified water treatment~~ ~~Implement cumulative potable reuse capacity: 15 MGD~~	~~NCWRP~~	~~December 31, 2023~~
~~Phase 2~~	~~Implement additional 15 MGD purified water treatment~~ ~~Implement cumulative potable reuse capacity: 30 MGD~~	~~NCWRP or South Bay Water Reclamation Plant (SBWRP)~~	~~December 31, 2027~~
~~Phase 3~~	~~Implement additional 53 MGD purified water treatment~~ ~~Implement cumulative potable reuse capacity: 83 MGD~~	~~Possible locations include Harbor Drive, Camino Del Rio, and/or Mission Gorge~~	~~December 31, 2035~~

[3] Pursuant to the 2014 Cooperative Agreement between the Discharger and San Diego Coastkeeper, San Diego County Surfrider, the Coastal Environmental Rights Foundation, and the San Diego Audubon Society.

1. ~~Facilities planning, including the potential to accelerate the implementation schedule, has been aggressively pursued by the Discharger since the submittal of the Report of Waste Discharge for renewal of the Facility NPDES modified permit. Implementation of *Pure Water San Diego* faces a unique challenge, well beyond what a normal expansion of the water and wastewater infrastructure would experience. In recognition of this, the enforceable milestones and schedule originally presented by the Discharger remains applicable for use in this Order/Permit, while realizing that the Discharger is using its best efforts to achieve its goals ahead of schedule. Updates on the progress of the implementation of *Pure Water San Diego* are available at https://www.sandiego.gov/water/purewater/purewatersd, as of September 21, 2016.~~
2. ~~Locations are subject to change by the Discharger.~~

7. Compliance Schedules – Not Applicable

VII. COMPLIANCE DETERMINATION

Compliance with the effluent limitations contained in section IV of this Order/Permit will be determined as specified below:

A. Compliance with Average Annual Effluent Limitation (AAEL)

If the average of daily discharges over a 12-month period exceeds the AAEL for a given parameter, this will represent a single violation for the purpose of assessing mandatory minimum penalties under Water Code Section 13385. Because the AAEL is a rolling average calculated once each month, the Discharger will be considered out of compliance for each discharge day of that month for that parameter (e.g., resulting in 31 days of noncompliance in a 31-day month) for discretionary penalties. Each discharge day of the year is determined to be either in compliance or out of compliance for the AAEL only once, during the month in which the day falls. For any one calendar month during which no sample (daily discharge) is taken, no compliance determination can be made for that calendar month and no penalty assessed.

B. Compliance with Average Monthly Effluent Limitation (AMEL)

If the average of daily discharges over a calendar month exceeds the AMEL for a given parameter, an alleged violation will be flagged and the Discharger will be considered out of compliance for each day of that month for that parameter (e.g., resulting in 31 days of noncompliance in a 31-day month). The average of daily discharges over the calendar month that exceeds the AMEL for a parameter will be considered out of compliance for the month only. If only a single sample is taken during the calendar month and the analytical result for that sample exceeds the AMEL, the Discharger will be considered out of compliance for that calendar month. For any one calendar month during which no sample (daily discharge) is taken, no compliance determination can be made for that calendar month.

C. Compliance with Average Weekly Effluent Limitation (AWEL)

If the average of daily discharges over a calendar week (Sunday through Saturday) exceeds the AWEL for a given parameter, an alleged violation will be flagged and the Discharger will be considered out of compliance for each day of that week for that parameter, resulting in seven days of noncompliance. The average of daily discharges over the calendar week that exceeds the AWEL for a parameter will be considered out of compliance for that week only. If only a single sample is taken during the calendar week and the analytical result for that sample exceeds the AWEL, the Discharger will be considered out of compliance for that calendar week. For any one calendar week during which no sample (daily discharge) is taken, no compliance determination can be made for that calendar week.

D. Compliance with Maximum Daily Effluent Limitation (MDEL)

The MDEL shall apply to flow weighted 24-hour composite samples, or grab samples, as specified in the MRP (Attachment E). If a daily discharge exceeds the MDEL for a given parameter, an alleged violation will be flagged and the Discharger will be considered out of compliance for that parameter for that one day only within the reporting period. For any one day during which no sample is taken, no compliance determination can be made for that day.

E. Compliance with Instantaneous Minimum Effluent Limitation

The instantaneous minimum effluent concentration limitation shall apply to grab samples. If the analytical result of a single grab sample is lower than the instantaneous minimum effluent limitation for a parameter, a violation will be flagged and the Discharger will be considered out of compliance for that parameter for that single sample. Noncompliance for each sample will be considered separately (e.g., the results of two grab samples taken within a calendar day that are both lower than the instantaneous minimum effluent limitation would result in two instances of noncompliance with the instantaneous minimum effluent limitation.)

F. Compliance with Instantaneous Maximum Effluent Limitation

The instantaneous maximum effluent concentration limitation shall apply to grab samples. If the analytical result of a single grab sample is higher than the instantaneous maximum effluent limitation for a parameter, a violation will be flagged and the Discharger will be considered out of compliance for that parameter for that single sample. Noncompliance for each sample will be considered separately (e.g., the results of two grab samples taken within a calendar day that both exceed the instantaneous maximum effluent limitation would result in two instances of noncompliance with the instantaneous maximum effluent limitation.

G. Compliance with Percent Removal Limitation

Compliance with percent removal requirements for average monthly percent removals of TSS and BOD_5 shall be determined separately for each wastewater treatment facility discharging through an outfall. For each wastewater treatment facility, the monthly average percent removal is the average of the calculated daily discharge percent removals only for days on which the constituent concentration is monitored in both the influent and effluent of the wastewater treatment facility at the location specified in the MRP (Attachment E) within a calendar month.

The Facility percent removal of TSS shall be calculated according to the following equation:

$$Daily\ discharge\ \%\ removal\ = \frac{Influent\ Concentration\ -\ Effluent\ Concentration}{Influent\ Concentration} \times 100\%$$

The system-wide percent removals of TSS and BOD_5 shall be calculated using the following equation (mass emissions in metric tons):

$$\%\ removal\ = \frac{(System\ Influents - Return\ Streams) - Outfall\ Discharge}{System\ Influents - Return\ Stream} \times 100\%$$

Where:

System Influents: Facility Influent, NCWRP Influent Pump Station, and NCWRP Influent from Penasquitos Pump Station.

Return Streams: NCWRP Filter Backwash, NCWRP Plant Drain, NCWRP Secondary and Un-disinfected Filtered Effluent Bypass, NCWRP Final Effluent, and MBC Centrate.

H. Compliance with Six-month Median Effluent Limitation

If the median concentration of daily discharges over any 180-day period exceeds the six-month median effluent limitation for a given parameter, an alleged violation will be flagged and the Discharger will be considered out of compliance for each day of that 180-day period for that parameter. The next assessment of compliance will occur after the next sample is taken. If only a single sample is taken during a given 180-day period and the analytical result for that sample exceeds the six-month median effluent limitation, the Discharger will be considered out of compliance for that 180-day period. For any 180-day period during which no sample is taken, no compliance determination can be made for that 180-day period.

I. Mass and Concentration Limitations

Compliance with mass and concentration effluent limitations for the same parameter shall be determined separately with their respective limitations. When the concentration of a parameter in an effluent sample is determined to be ND or DNQ, the corresponding MER determined from that sample concentration shall also be reported as ND or DNQ.

J. Ocean Plan Provisions for Table 1 Parameters

Sufficient sampling and analysis shall be required to determine compliance with the effluent limitations.

1. Compliance with Single-constituent Effluent Limitations

The Discharger shall be deemed out of compliance with an effluent limitation or discharge specification if the concentration of the constituent in the monitoring sample is greater than the effluent limitation or discharge specification and greater than or equal to the ML.

2. Compliance with Effluent Limitations Expressed as a Sum of Several Parameters

The Discharger is out of compliance with an effluent limitation that applies to the sum of a group of chemicals (e.g., PCBs) if the sum of the individual pollutant concentrations is greater than the effluent limitation. Individual pollutants of the group will be considered to have a concentration of zero if the constituent is reported as ND or DNQ.

3. Multiple Sample Data Reduction

The concentration of the pollutant in the effluent may be estimated from the result of a single sample analysis or by a measure of central tendency (arithmetic mean, geometric mean, median, etc.) of multiple sample analyses when all sample results are quantifiable (i.e., greater than or equal to the reported ML). When one or more sample results are reported as ND or DNQ, the central tendency concentration of the pollutant shall be the median (middle) value of the multiple samples. If, in an even number of samples, one or both of the middle values is ND or DNQ, the median will be the lower of the two middle values.

4. Mass Emission Rate (MER)

The MER, in lbs/day, shall be obtained from the following calculation for any calendar day:

MER (lbs/day) = 8.34 x Q x C

In which Q and C are the flow rate in MGD and the constituent concentration in mg/L, respectively, and 8.34 is a conversion factor (lbs/gallon of water). If a composite sample is taken, then C is the concentration measured in the composite sample and Q is the average flow rate occurring during the period over which the samples are composited.

K. Bacteriological Standards and Analysis

1. The geometric mean used for determining compliance with bacteriological standards is calculated with the following equation:

   Geometric Mean = (C1 x C2 x … x Cn)1/n

   Where n is the number of days samples were collected during the period and C is the density of bacteria (CFU/100 ml) found on each day of sampling.

2. For all bacterial analyses, sample dilutions should be performed so the range of values extends from 2 to 16,000 CFU/100 ml. The detection methods used for each analysis shall be reported with the results of the analysis. Detection methods used for coliforms (total and fecal) shall be those listed in 40 CFR part 136 or any improved method determined by the San Diego Water Board and USEPA, Region IX to be appropriate. Detection methods used for enterococcus shall be those presented in USEPA publication EPA/600/4-85/076, *Test Methods for Escherichia coli and Enterococci in Water by Membrane Filter Procedure*, listed under 40 CFR part 136, and any other method approved by the San Diego Water Board and USEPA, Region IX.

L. Single Operational Upset (SOU)

A SOU that leads to simultaneous violations or more than one pollutant parameter shall be treated as a single violation, and limits the Discharger's liability in accordance with the following conditions:

1. A SOU is broadly defined as a single unusual event that temporarily disrupts the usually satisfactory operation of a system in such a way that it results in violation of multiple pollutant parameters.
2. The Discharger may assert SOU to limit liability only for those violations which the Discharger submitted notice of the upset as required in section I.H of the Standard Provisions (Attachment D);
3. For purposes outside of Water Code sections 13385(h) and (i), determination of compliance and civil liability (including any more specific definition of SOU), the requirements for the Discharger to assert the SOU limitation of liability, and the manner of counting violations, shall be in accordance with the USEPA Memorandum, *Issuance of Guidance Interpreting Single Operational Upset* (September 27, 1989); and
4. For purposes of Water Code sections 13385(h) and (i), determination of compliance and civil liability (including any more specific definition of SOU), the requirements for the Discharger to assert the SOU limitation of liability, and the manner of counting violations shall be in accordance with Water Code section 13385(f)(2).

M. Chronic Toxicity

The discharge is subject to determination of "Pass" or "Fail" from a chronic toxicity test using the Test of Significant Toxicity (TST) statistical t-test approach described in *National Pollutant Discharge Elimination System Test of Significant Toxicity Implementation Document* (EPA 833-R-10-004, 2010), Appendix A, Figure A-1 and Table A-1, and Appendix B, Table B-1. The null hypothesis (Ho) for the TST statistical approach is:

Mean discharge "in-stream" waste concentration (IWC) response ≤0.75 × Mean control response.

A test result that rejects this null hypothesis is reported as “Pass.” A test result that does not reject this null hypothesis is reported as “Fail.” This is a t-test (formally Student’s t-test), a statistical analysis comparing two sets of replicate observations—in the case of whole effluent toxicity (WET) test, only two test concentrations (i.e., a control and IWC). The purpose of this statistical test is to determine if the means of the two sets of observations are different (i.e., if the IWC or receiving water concentration differs from the control (the test result is “Pass” or “Fail”)). The Welch’s t-test employed by the TST statistical approach is an adaptation of Student’s t-test and is used with two samples having unequal variances.

The MDEL for chronic toxicity is exceeded and a violation will be flagged when a chronic toxicity test, analyzed using the TST statistical approach, results in “Fail.”.

The chronic toxicity MDEL is set at the IWC for the discharge (0.49% effluent) and expressed in units of the TST statistical approach (“Pass” or “Fail”). All NPDES effluent compliance monitoring for the chronic toxicity MDEL shall be reported using the IWC effluent concentration and negative control, expressed in units of the TST. The TST hypothesis (Ho) (see above) is statistically analyzed using the IWC and a negative control. Effluent toxicity tests shall be run using *Short-Term Methods for Estimating the Chronic Toxicity of Effluent and Receiving Waters to West Coast Marine Estuarine Organisms* (EPA/600/R-95/136, 1995). The San Diego Water Board’s and USEPA, Region IX’s review of reported toxicity test results will include review of concentration-response patterns as appropriate (see section IV.C.5 of the Fact Sheet (Attachment F)). As described in the laboratory audit directives to the San Jose Creek Water Quality Laboratory from the State Water Board dated August 07, 2014, and from USEPA dated December 24, 2013, the Percent Minimum Significant Difference (PMSD) criteria only apply to compliance reporting for the no-observed-effect-concentration (NOEC) and the sublethal statistical endpoints of the NOEC, and therefore are not used to interpret TST results. SOPs used by the toxicity testing laboratory to identify and report valid, invalid, anomalous, or inconclusive effluent (and receiving water) toxicity test measurement results from the TST statistical approach, including those that incorporate a consideration of concentration-response patterns, must be submitted to the San Diego Water Board and USEPA, Region IX (40 CFR section 122.41(h)). The San Diego Water Board and USEPA, Region IX will make a final determination as to whether a toxicity test result is valid, and may consult with the Discharger, USEPA, Region IX, the State Water Board’s Quality Assurance Officer, or the State Water Board, Division of Drinking Water (DDW) Environmental Laboratory Accreditation Program (ELAP) as needed.

ATTACHMENT A – ABBREVIATIONS AND DEFINITIONS

Part 1. – Abbreviations

Abbreviation	Definition
40 CFR	Title 40 of the Code of Federal Regulations
AAEL	Average Annual Effluent Limitation
AMEL	Average Monthly Effluent Limitation
AWEL	Average Weekly Effluent Limitation
ASBS	Areas of Special Biological Significance
AUV	Autonomous Underwater Vehicle
Basin Plan	Water Quality Control Plan for the San Diego Basin
BOD_5	Biochemical Oxygen Demand (5-Day @ 20°C)
°C	Degrees Celsius
CCR	California Code of Regulations
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CFU	Colony Forming Units
CIWQS	California Integrated Water Quality System
cm^3	Centimeter Cubed
COD	Chemical Oxygen Demand
CSO	Combined Sewer Overflow
CWA	Clean Water Act
DDT	Dichlorodiphenyltrichloroethane
DDW	State Water Board, Division of Drinking Water
Discharger	City of San Diego
DMR	Discharge Monitoring Report
DNQ	Detected, But Not Quantified
EC25	Effects Concentration at 25 Percent
EIR	Environmental Impact Report
ELAP	Environmental Laboratory Accreditation Program
EMAP	Environmental Monitoring and Assessment Program
eSMR	Electronic Self-Monitoring Reports
Facilities	E.W. Blom Point Loma Wastewater Treatment Plant, Pump Station No. 2, Metro Biosolids Center (MBC), Point Loma Ocean Outfall (PLOO), and Other Associated Infrastructure
Facility	E.W. Blom Point Loma Wastewater Treatment Plant
FCD	Flood Control District
F/M	Food-To-Microorganism
GPS	Global Positioning System
HCH	Hexachlorocyclohexane
Ho	Hypothesis
IU	Industrial User
IWC	“In-Stream” Waste Concentration
IWS	Industrial Waste Survey
JPA	Joint Powers Authority
lbs/day	Pounds per Day
LC	Lethal Concentration

Abbreviation	Definition
LC 50	Percent Waste Giving 50 Percent Survival of Test Organisms
MBC	Metro Biosolids Center
MCRT	Mean Cell Residence Time
MDEL	Maximum Daily Effluent Limitation
MDL	Method Detection Limit
MER	Mass Emission Rate
Metro System	San Diego Metropolitan Sewerage System
mg/kg	Milligram per Kilogram
mg/L	Milligram per Liter
MGD	Million Gallons per Day
ML	Minimum Level
ml	Milliliter
ml/L	Milliliter per Liter
MLSS	Mixed Liquor Suspended Solids
mmhos/cm	Millimhos per Centimeter
MRP	Monitoring and Reporting Program
mt/yr	Metric ton per Year
NCWRP	North City Water Reclamation Plant
ND	Not Detected
ng/L	Nanogram per Liter
NOAA's	National Oceanic and Atmospheric Administration's
NOEC	No-Observed-Effect-Concentration
NOEL	No Observed Effect Level
NPDES	National Pollutant Discharge Elimination System
NTU	Nephelometric Turbidity Unit
Ocean Plan	*California Ocean Plan, Water Quality Control Plan Ocean Waters of California*
PAHs	Polynuclear Aromatic Hydrocarbons
PCBs	Polychlorinated Biphenyls
pCi/L	Picocuries per Liter
pg/L	Picograms per Liter
PLOO	Point Loma Ocean Outfall
PMP	Pollutant Minimization Program
Plume Study	Peter Rogowski et al., *Final Report Point Loma Ocean Outfall Plume Behavior Study*, dated September 14, 2012, prepared by the University of California San Diego, Scripps Institution of Oceanography.
PMSD	Percent Minimum Significant Difference
POTWs	Publicly-Owned Treatment Works
ppm	Parts per Million
ppt	Parts per Thousand
QA	Quality Assurance
QC	Quality Control
REC-1	Contact Water Recreation
RCRA	Resource Conservation and Recovery Act
Regional General SSO Order	California Regional Water Quality Control Board Region 9, San Diego Region Order No. R9-2007-0005, *Waste Discharge Requirements for Sewage Collection Agencies in the San Diego Region*

Abbreviation	**Definition**
RL	Reporting Level
ROWD	Report of Waste Discharge
RPA	Reasonable Potential Analysis
San Diego Water Board	California Regional Water Quality Control Board, San Diego Region
SBOO	South Bay Ocean Outfall
SBWRP	South Bay Water Reclamation Plant
SCCWRP	Southern California Coastal Waters Research Project
Sediment Toxicity Plan	*Sediment Toxicity Monitoring Plan for the South Bay Ocean Outfall and Point Loma Ocean Outfall Monitoring Regions, San Diego, California*, *Submitted by City of San Diego Public Utilities Department Environmental Monitoring & Technical Services Division, August 28, 2015*
SIC	Standard Industrial Classification
SIUs	Significant Industrial Users
SMR	Self-Monitoring Report
SNC	Significant Noncompliance
SOPs	Standard Operating Procedures
SOU	Single Operational Upset
SPP	Spill Prevention Plan
SRP	Spill Response Plan
SS	Suspended Solids
SSMPs	Sanitary Sewer Management Plans
State Water Board	State Water Resources Control Board
Statewide General SSO Order	State Water Resources Control Board Order No. 2006-0003-DWQ, *Statewide General Waste Discharge Requirements for Sanitary Sewer Systems*
STV	Statistical Threshold Value
TAC	Test Acceptability Criteria
TBELs	Technology-Based Effluent Limitations
TCDD	Tetrachlorodibenzodioxin
TCLP	Toxicity Characteristic Leaching Procedure
TDD	Tentative Decision Document
TDS	Total Dissolved Solids
TIE	Toxicity Identification Evaluation
TMDL	Total Maximum Daily Load
TRE	Toxicity Reduction Evaluation
TSD	Technical Support Document
TSS	Total Suspended Solids
TST	Test Of Significant Toxicity
TUc	Toxic Units Chronic
U.S.C.	United States Code
µg	Microgram
µg/kg	Microgram per Kilogram
µg/L	Microgram per Liter
µm	Micrometer
UM3	USEPA Modeling Application Visual Plumes
USEPA	United Stated Environmental Protection Agency
U.S.	United States

Abbreviation	Definition
USIBWC	U.S. Section of the International Boundary and Water Commission
Water Code	California Water Code
WDRs	Waste Discharge Requirements
WET	Whole Effluent Toxicity
WQBELs	Water Quality-Based Effluent Limitations
WRP	Water Reclamation Plant
ZID	Zone of Initial Dilution

Part 2. – Glossary of Common Terms

30-day average
The arithmetic mean of pollutant parameter values of samples collected in a period of 30 consecutive days.

Acute Toxicity
The ability of a substance to cause severe biological harm or death soon after a single exposure or dose. The term acute toxicity also encompasses any poisonous effect resulting from a single short-term exposure to a toxic substance.

Anaerobically Digestible Material
Inedible kitchen grease as defined in section 19216 of the Food and Agricultural Code and food material as defined in title 14,division 7, chapter 3.1, article 1, section 17582(a)(20) of the CCR.

Areas of Special Biological Significance (ASBS)
Those areas designated by the State Water Board as ocean areas requiring protection of species or biological communities to the extent that alteration of natural water quality is undesirable. All ASBS are also classified as a subset of State water quality protection areas.

Average Annual Effluent Limitation (AAEL)
The highest allowable average of daily discharges over a 12-month period, calculated as the sum of all daily discharges measured during a 12-month period divided by the number of daily discharges measured during that 12-month period.

Average Monthly Effluent Limitation (AMEL)
The highest allowable average of daily discharges over a calendar month, calculated as the sum of all daily discharges measured during a calendar month divided by the number of daily discharges measured during that month.

Average Weekly Effluent Limitation (AWEL)
The highest allowable average of daily discharges over a calendar week (Sunday through Saturday), calculated as the sum of all daily discharges measured during a calendar week divided by the number of daily discharges measured during that week.

Biosolids
Nutrient-rich organic materials resulting from the treatment of sewage sludge. When treated and processed, sewage sludge becomes biosolids which can be safely recycled and applied as fertilizer to sustainably improve and maintain productive soils and stimulate plant growth.

Bypass
The intentional diversion of waste streams from any portion of a treatment facility. (40 CFR section 122.41(m)(1)(i).)

Chlordane
The sum of chlordane-alpha, chlordane-gamma, chlordene-alpha, chlordene-gamma, nonachlor-alpha, nonachlor-gamma, and oxychlordane.

Chronic Toxicity
The capacity of a substance to cause long-term poisonous health effects in humans, animals, fish, and other organisms. This parameter shall be used to measure the acceptability of waters for supporting a healthy marine biota until improved methods are developed to evaluate biological response. The Ocean Plan determines chronic toxicity through the use of the following equations.

a. Chronic Toxicity (TUc) (effluent limitations expressed in TUc in the previous Orders, including Order No. R9-2009-0001)

   Expressed as Toxic Units Chronic (TUc)

$$\text{TUc} = \frac{100}{\text{NOEL}}$$

   No Observed Effect Level (NOEL)

   The NOEL is expressed as the maximum percent effluent or receiving water that causes no observable effect on a test organism, as determined by the result of a critical life stage toxicity test listed in Ocean Plan Appendix II.

b. “Pass” or “Fail” and “Percent Effect” (effluent limitations for this Order)

   The discharge is subject to determination of “Pass” or “Fail” and “Percent Effect” from a chronic toxicity test using the Test of Significant Toxicity (TST) statistical t-test approach described in *National Pollutant Discharge Elimination System Test of Significant Toxicity Implementation Document* (EPA 833-R-10-004, 2010), Appendix A, Figure A-1 and Table A-1, and Appendix B, Table B-1. The null hypothesis (Ho) for the TST statistical approach is:

   Mean discharge “in-stream” waste concentration (IWC) response ≤0.75 × Mean control response.

Chlorinated phenolic compounds
The sum of 4-chloro-3-methylphenol, 2-chlorophenol, pentachlorophenol, 2,4,5-trichlorophenol, and 2,4,6-trichlorophenol.

Daily Discharge
Daily Discharge is defined as either: (1) the total mass of the constituent discharged over the calendar day (12:00 am through 11:59 pm) or any 24-hour period that reasonably represents a calendar day for purposes of sampling (as specified in the permit), for a constituent with limitations expressed in units of mass; or (2) the unweighted arithmetic mean measurement of the constituent over the day for a constituent with limitations expressed in other units of measurement (e.g., concentration).

The daily discharge may be determined by the analytical results of a composite sample taken over the course of one day (a calendar day or other 24-hour period defined as a day) or by the arithmetic mean of analytical results from one or more grab samples taken over the course of the day.

A composite sample is defined as a combination of at least eight sample aliquots of at least 100 ml, collected at periodic intervals during the operating hours of a. facility over a 24-hour period. For volatile pollutants, aliquots must be combined in the laboratory immediately before analysis. The composite must be flow proportional; either the time interval between each aliquot or the volume of each aliquot must be proportional to either the stream flow at the time of sampling or the total stream flow since the collection of the previous aliquot. Aliquots may be collected manually or automatically. The 100 ml minimum volume of an aliquot does not apply to automatic self-purging samplers. If one day is defined as a 24-hour period other than a calendar day, the analytical result for the 24-hour period will be considered as the result for the calendar day in which the 24-hour period ends.

A grab sample is an individual sample of at least 100 ml collected over a period not exceeding 15 minutes that is representative of conditions at the time the sample is collected.

Degrade
Degradation shall be determined by comparison of the waste field and reference site(s) for characteristic species diversity, population density, contamination, growth anomalies, debility, or supplanting of normal species by undesirable plant and animal species. Degradation occurs if there are significant differences in any of three major biotic groups, namely, demersal fish, benthic invertebrates, or attached algae. Other groups may be evaluated where benthic species are not affected, or are not the only ones affected.

Detected, But Not Quantified (DNQ)
Sample results that are less than the reported ML, but greater than or equal to the laboratory's MDL. Sample results reported as DNQ are estimated concentrations.

Dichlorobenzenes
Shall mean the sum of 1,2- and 1,3-dichlorobenzene.

Dichlorodiphenyltrichloroethane (DDT)
Shall mean the sum of 4,4'DDT, 2,4'DDT, 4,4'DDE, 2,4'DDE, 4,4'DDD, and 2,4'DDD.

Dredged Material
Any material excavated or dredged from the navigable waters of the U.S., including material otherwise referred to as "spoil."

Dry Weather
Weather is considered dry if the preceding 72 hours have been without precipitation greater than 0.1 inch (>0.1 inch).

Enclosed Bays
Indentations along the coast that enclose an area of oceanic water within distinct headlands or harbor works. Enclosed bays include all bays where the narrowest distance between headlands or outermost harbor works is less than 75 percent of the greatest dimension of the enclosed portion of the bay. This definition includes but is not limited to: Humboldt Bay, Bodega Harbor, Tomales Bay, Drakes Estero, San Francisco Bay, Morro Bay, Los Angeles Harbor, Upper and Lower Newport Bay, Mission Bay, and San Diego Bay.

Endosulfan
The sum of endosulfan-alpha and -beta and endosulfan sulfate.

Estuaries and Coastal Lagoons
Estuaries and Coastal Lagoons are waters at the mouths of streams that serve as mixing zones for fresh and ocean waters during a major portion of the year. Mouths of streams that are temporarily separated from the ocean by sandbars shall be considered as estuaries. Estuarine waters will generally be considered to extend from a bay or the open ocean to the upstream limit of tidal action but may be considered to extend seaward if significant mixing of fresh and salt water occurs in the open coastal waters. The waters described by this definition include but are not limited to the Sacramento-San Joaquin Delta as defined by Section 12220 of the Water Code, Suisun Bay, Carquinez Strait

downstream to Carquinez Bridge, and appropriate areas of the Smith, Klamath, Mad, Eel, Noyo, and Russian Rivers.

Facility
E.W. Blom Point Loma Wastewater Treatment Plant.

Facilities
E.W. Blom Point Loma Wastewater Treatment Plant (Facility), Pump Station No. 2, Metro Biosolids Center (MBC), Point Loma Ocean Outfall (PLOO), and other associated infrastructure.

Halomethanes
The mean the sum of bromoform, bromomethane (methyl bromide) and chloromethane (methyl chloride).

HCH
The mean the sum of the alpha, beta, gamma (lindane) and delta isomers of hexachlorocyclohexane.

Initial Dilution
The process that results in the rapid and irreversible turbulent mixing of wastewater with ocean water around the point of discharge.

For a submerged buoyant discharge, characteristic of most municipal and industrial wastes that are released from the submarine outfalls, the momentum of the discharge and its initial buoyancy act together to produce turbulent mixing. Initial dilution in this case is completed when the diluting wastewater ceases to rise in the water column and first begins to spread horizontally.

For shallow water submerged discharges, surface discharges, and non-buoyant discharges, characteristic of cooling water wastes and some individual discharges, turbulent mixing results primarily from the momentum of discharge. Initial dilution, in these cases, is considered to be completed when the momentum induced velocity of the discharge ceases to produce significant mixing of the waste, or the diluting plume reaches a fixed distance from the discharge to be specified by the San Diego Water Board, whichever results in the lower estimate for initial dilution.

Instantaneous Maximum Effluent Limitation
The highest allowable value for any single grab sample or aliquot (i.e., each grab sample or aliquot is independently compared to the instantaneous maximum limitation).

Instantaneous Minimum Effluent Limitation
The lowest allowable value for any single grab sample or aliquot (i.e., each grab sample or aliquot is independently compared to the instantaneous minimum limitation).

"In-stream" Waste Concentration (IWC)
The concentration of a toxicant of effluent in the receiving water after mixing (the inverse of the dilution factor). A discharge of 100% effluent will be considered the IWC whenever mixing zones or dilution credits are not authorized by the applicable Water Board.

Interference
A discharge which, alone or in conjunction with a discharge or discharges from other sources, both:

(1) Inhibits or disrupts the POTW, its treatment processes or operations, or its sludge processes, use or disposal; and

(2) Therefore is a cause of a violation of any requirement of the POTW's NPDES permit (including an increase in the magnitude or duration of a violation) or of the prevention of sewage sludge use or disposal in compliance with the following statutory provisions and regulations or permits issued thereunder (or more stringent State or local regulations): Section 405 of the CWA, the Solid Waste Disposal Act (SWDA) (including title II, more commonly referred to as the Resource Conservation and Recovery Act (RCRA), and including State regulations contained in any State sludge management plan prepared pursuant to subtitle D of the SWDA), the Clean Air Act, the Toxic Substances Control Act, and the Marine Protection, Research and Sanctuaries Act.

Kelp Beds
For purposes of the bacteriological standards of the Ocean Plan, are significant aggregations of marine algae of the genera Macrocystis and Nereocystis. Kelp beds include the total foliage canopy of Macrocystis and Nereocystis plants throughout the water column.

Litter
Encompasses all improperly discarded waste material including, but not limited to, convenience food, beverage, and other product packages, or containers constructed of steel, aluminum, glass, paper, plastic, and other natural and synthetic materials, thrown or deposited on the lands and waters of the State.

Mariculture
The culture of plants and animals in marine waters independent of any pollution source.

Material
(a) In common usage: (1) the substance or substances of which a thing is made or composed (2) substantial; (b) For purposes of the Ocean Plan relating to waste disposal, dredging and the disposal of dredged material and fill, material means matter of any kind or description which is subject to regulation as waste, or any material dredged from the navigable waters of the U.S. See also, dredged material.

Maximum Daily Effluent Limitation (MDEL)
The highest allowable daily discharge of a pollutant.

Method Detection Limit (MDL)
The minimum concentration of a substance that can be measured and reported with 99 percent confidence that the analyte concentration is greater than zero, as defined in 40 CFR part 136, Attachment B.

Minimum Level (ML)
The concentration at which the entire analytical system must give a recognizable signal and acceptable calibration point. The ML is the concentration in a sample that is equivalent to the concentration of the lowest calibration standard analyzed by a specific analytical procedure, assuming that all the method specified sample weights, volumes, and processing steps have been followed.

Natural Light
Reduction of natural light may be determined by the San Diego Water Board by measurement of light transmissivity or total irradiance, or both, according to the monitoring needs of the San Diego Water Board.

Not Detected (ND)
Those sample results less than the laboratory's MDL.

Ocean Waters
The territorial marine waters of the State as defined by California law to the extent these waters are outside of enclosed bays, estuaries, and coastal lagoons. If a discharge outside the territorial waters of the State could affect the quality of the waters of the State, the discharge may be regulated to assure no violation of the Ocean Plan will occur in ocean waters.

Pass Through
A discharge which exits the POTW into waters of the U.S. in quantities or concentrations which, alone or in conjunction with a discharge or discharges from other sources, is a cause of a violation of any requirement of the POTW's NPDES permit (including an increase in the magnitude or duration of a violation).

Percent Removal
A percentage expression of the removal efficiency across a treatment plant for a given pollutant parameter, as determined from the average values of the raw wastewater influent pollutant concentrations to the facility and the average values of the effluent pollutant concentrations for a given time period.

Pollutant Minimization Program (PMP)
PMP means waste minimization and pollution prevention actions that include, but are not limited to, product substitution, waste stream recycling, alternative waste management methods, and education of the public and businesses. The goal of the PMP shall be to reduce all potential sources of a pollutant through pollutant minimization (control) strategies, including pollution prevention measures as appropriate, in order to maintain the effluent concentration at or below the effluent limitation. Pollution prevention measures may be particularly appropriate for persistent bioaccumulative priority pollutants where there is evidence that beneficial uses are being impacted. The San Diego Water Board may consider cost effectiveness when establishing the requirements of a PMP. The completion and implementation of a Pollution Prevention Plan, if required pursuant to California Water Code section 13263.3(d), shall be considered to fulfill the PMP requirements in Ocean Plan section III.C.9.

Polychlorinated Biphenyls (PCBs)
The sum of chlorinated biphenyls whose analytical characteristics resemble those of Aroclor-1016, Aroclor-1221, Aroclor-1232, Aroclor-1242, Aroclor-1248, Aroclor-1254 and Aroclor-1260.

Polynuclear Aromatic Hydrocarbons (PAHs)
The sum of acenaphthylene, anthracene, 1,2-benzanthracene, 3,4-benzofluoranthene, benzo[k]fluoranthene, 1,12-benzoperylene, benzo[a]pyrene, chrysene, dibenzo[ah]anthracene, fluorene, indeno[1,2,3-cd]pyrene, phenanthrene and pyrene.

Phenolic Compounds (non-chlorinated)
The sum of 2,4-dimethylphenol, 4,6-Dinitro-2-methylphenol, 2,3-dinitrophenol, 2-methylphenol, 4-methylphenol, 2-nitropheneol, 4-nitrophenol, and phenol.

Reported Minimum Level (also known as the Reporting Level or RL)
The reported ML (also known as the Reporting Level or RL) is the ML (and its associated analytical method) chosen by the Discharger for reporting and compliance determination from the MLs included in this Order/Permit, including an additional factor if applicable as discussed herein. The MLs included in this Order/Permit correspond to approved analytical methods for reporting a sample result that are selected by the San Diego Water Board either from Appendix II of the Ocean Plan in accordance with section III.C.5.a of the Ocean Plan or established in accordance with section III.C.5.b of the Ocean Plan. The ML is based on the proper application of method-based analytical procedures for sample

preparation and the absence of any matrix interferences. Other factors may be applied to the ML depending on the specific sample preparation steps employed. For example, the treatment typically applied in cases where there are matrix-effects is to dilute the sample or sample aliquot by a factor of ten. In such cases, this additional factor must be applied to the ML in the computation of the reported ML.

Severe Property Damage
Substantial physical damage to property, damage to the treatment facilities, which causes them to become inoperable, or substantial and permanent loss of natural resources that can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production. (40 CFR section 122.41(m)(1)(ii))

Shellfish
Organisms identified by the California Department of Health Services as shellfish for public health purposes (i.e., mussels, clams and oysters).

Significant Difference
Defined as a statistically significant difference in the means of two distributions of sampling results at the 95 percent confidence level.

Six-Month Median Effluent Limitation
The highest allowable moving median of all daily discharges for any 180-day period.

Sludge
Any solid, semisolid, or liquid waste generated from a municipal, commercial, or industrial wastewater treatment plant, water supply treatment plant, or air pollution control facility or any other such waste having similar characteristics and effect.

State Water Quality Protection Areas (SWQPAs)
Non-terrestrial marine or estuarine areas designated to protect marine species or biological communities from an undesirable alteration in natural water quality. All ASBS that were previously designated by the State Water Board in Resolutions 74-28, 74-32, and 75-61 are now also classified as a subset of State Water Quality Protection Areas and require special protections afforded by the Ocean Plan.

TCDD Equivalents
The sum of the concentrations of chlorinated dibenzodioxins (2,3,7,8-CDDs) and chlorinated dibenzofurans (2,3,7,8-CDFs) multiplied by their respective toxicity factors, as shown in the table below.

Isomer Group	Toxicity Equivalence Factor
2,3,7,8-tetra CDD	1.0
2,3,7,8-penta CDD	0.5
2,3,7,8-hexa CDDs	0.1
2,3,7,8-hepta CDD	0.01
octa CDD	0.001
2,3,7,8 tetra CDF	0.1
1,2,3,7,8 penta CDF	0.05
2,3,4,7,8 penta CDF	0.5
2,3,7,8 hexa CDFs	0.1
2,3,7,8 hepta CDFs	0.01
octa CDF	0.001

Thirty-Day Average
See 30-day average above for definition of this term.

Toxicity Identification Evaluation (TIE)
A set of procedures conducted to identify the specific chemical(s) responsible for toxicity. These procedures are performed in three phases (characterization, identification, and confirmation) using aquatic organism toxicity tests.)

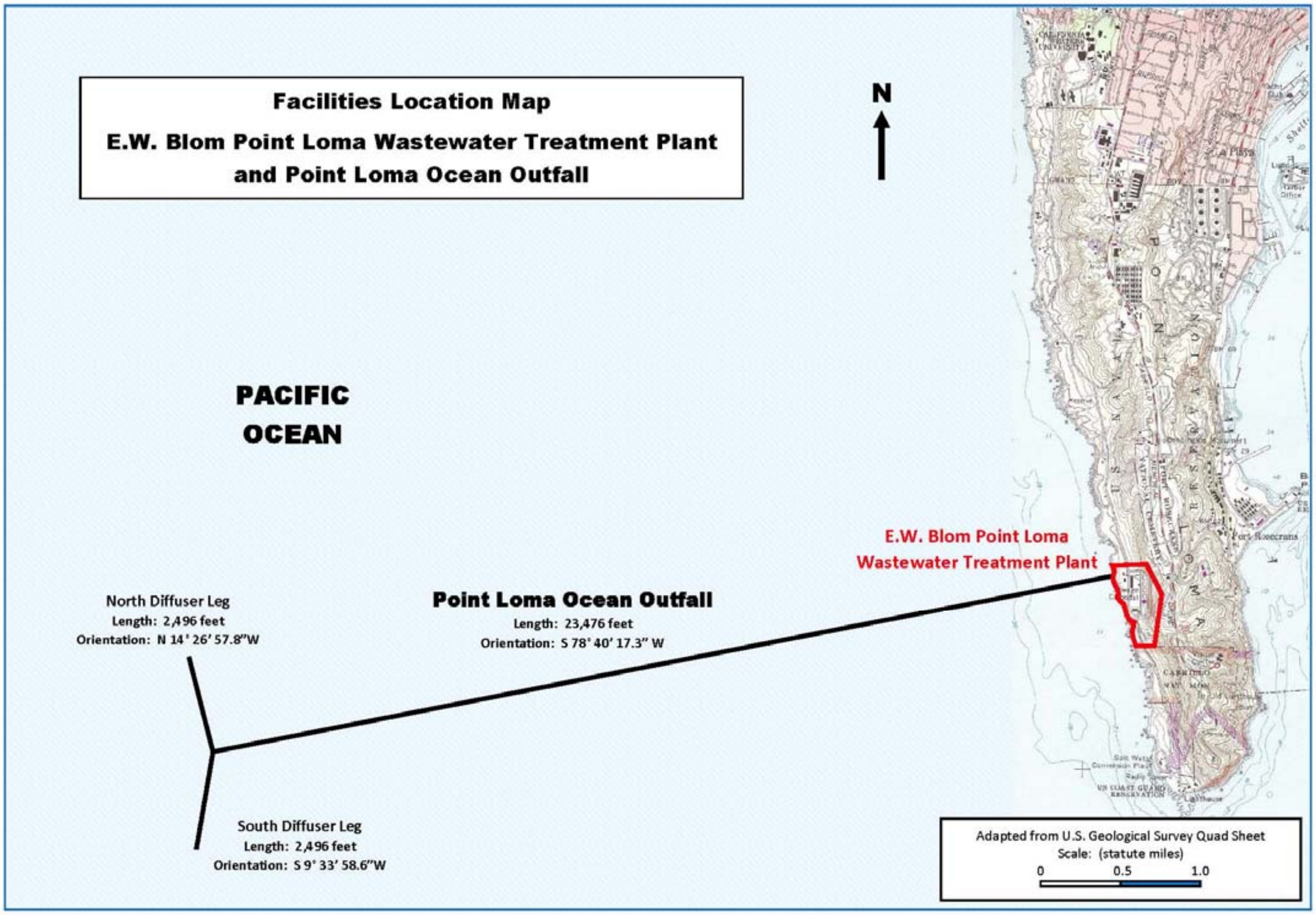
Toxicity Reduction Evaluation (TRE)
A study conducted in a step-wise process designed to identify the causative agents of effluent or ambient toxicity, isolate the sources of toxicity, evaluate the effectiveness of toxicity control options, and then confirm the reduction in toxicity. The first steps of the TRE consist of the collection of data relevant to the toxicity, including additional toxicity testing, and an evaluation of facility operations and maintenance practices, and best management practices. A Toxicity Identification Evaluation (TIE) may be required as part of the TRE, if appropriate. (A TIE is a set of procedures to identify the specific chemical(s) responsible for toxicity. These procedures are performed in three phases (characterization, identification, and confirmation) using aquatic organism toxicity tests.)

Waste
As used in the Ocean Plan, waste includes a Discharger's total discharge, of whatever origin, i.e., gross, not net, discharge.

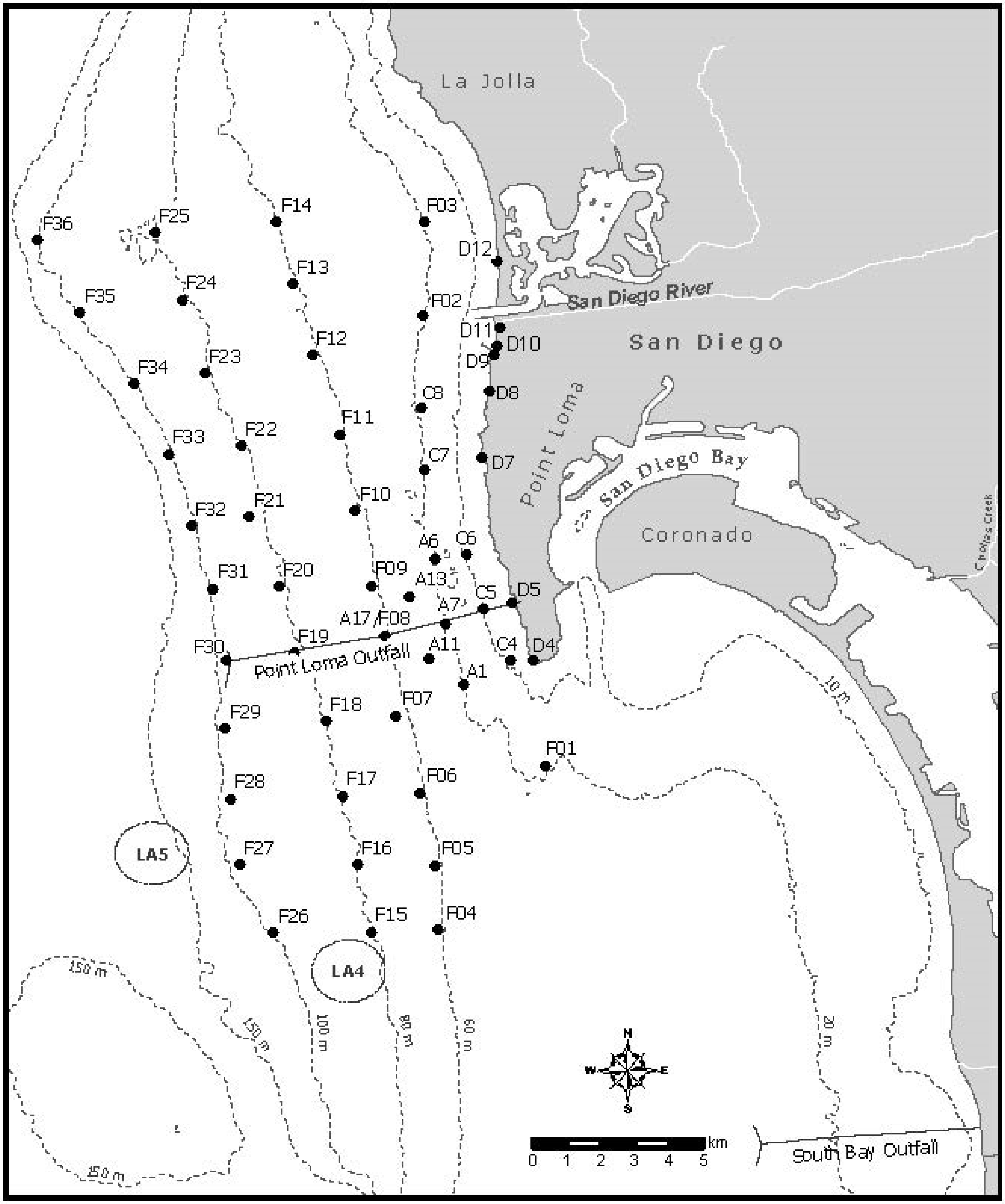
Wet Weather
Wet weather is the period of time of a storm event of 0.1 inches or greater plus 72 hours after cessation of precipitation, unless otherwise defined by another regulatory mechanism (e.g., a TMDL).

ATTACHMENT B – MAP
Map B-1. San Diego Metropolitan Sewerage System (Metro System)

Map B-2. Facility Location Map



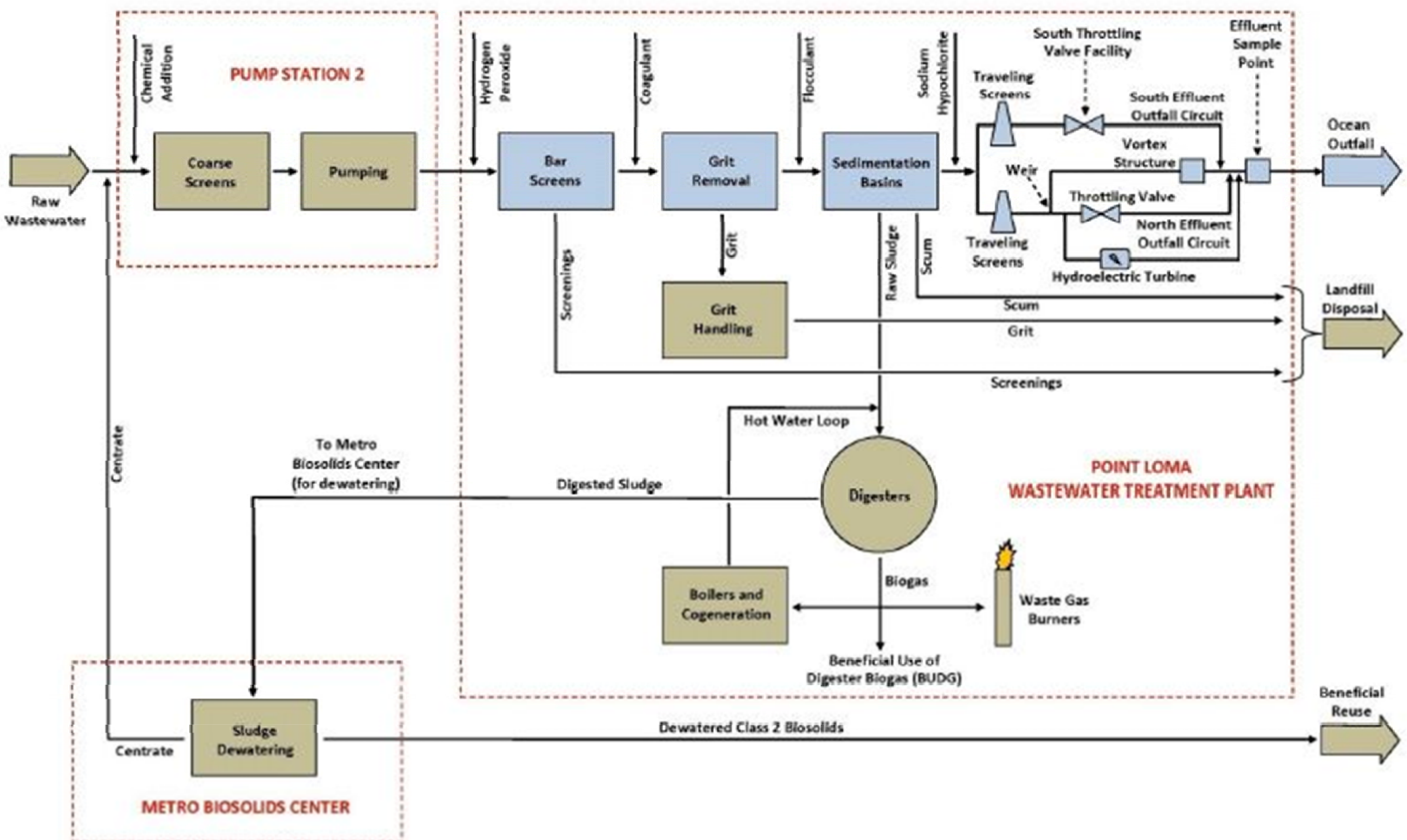
Map B-3. Offshore, Kelp, and Shoreline Monitoring Stations



City of San Diego
E.W. Blom Point Loma Wastewater Treatment Plant
Tentative ORDER R9-2017-0007
NPDES NO. CA0107409

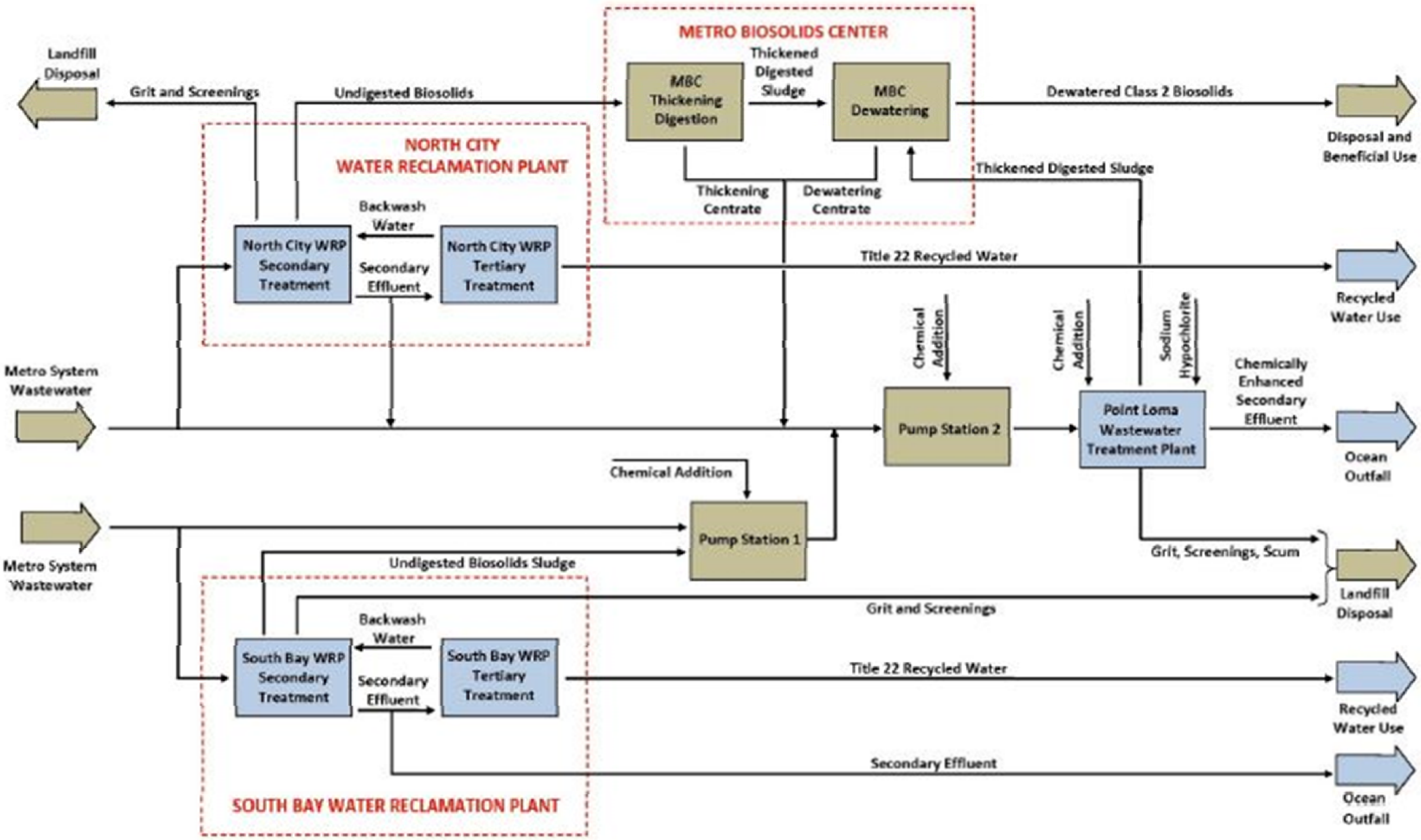
ATTACHMENT C – FLOW SCHEMATIC

Flow Schematic C-1.
Pump Station No. 2, E.W. Blom Point Loma Wastewater Treatment Plant (Facility), and Metro Biosolids Center (MBC)



City of San Diego
E.W. Blom Point Loma Wastewater Treatment Plant
Tentative ORDER R9-2017-0007
NPDES NO. CA0107409

Flow Schematic C-2. San Diego Metropolitan Sewerage System (Metro System)



ATTACHMENT D – STANDARD PROVISIONS

I. STANDARD PROVISIONS – PERMIT COMPLIANCE

A. Duty to Comply

1. The Discharger must comply with all of the terms, requirements, and conditions of this Order/Permit. Any noncompliance constitutes a violation of the Clean Water Act (CWA) and the California Water Code (Water Code) and is grounds for enforcement action; permit termination, revocation and reissuance, or modification; denial of a permit renewal application; or a combination thereof. (title 40 of the Code of Federal Regulations (40 CFR) section 122.41(a); and Water Code, sections 13261, 13263, 13265, 13268, 13000, 13001, 13304, 13350, and 13385.)
2. The Discharger shall comply with effluent standards or prohibitions established under section 307(a) of the CWA for toxic pollutants and with standards for sewage sludge use or disposal established under section 405(d) of the CWA within the time provided in the regulations that establish these standards or prohibitions, even if this Order/Permit has not yet been modified to incorporate the requirement. (40 CFR section 122.41(a)(1).)

B. Need to Halt or Reduce Activity Not a Defense

It shall not be a defense for a Discharger in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this Order/Permit. (40 CFR section 122.41(c).)

C. Duty to Mitigate

The Discharger shall take all reasonable steps to minimize or prevent any discharge or sludge use or disposal in violation of this Order/Permit that has a reasonable likelihood of adversely affecting human health or the environment. (40 CFR section 122.41(d).)

D. Proper Operation and Maintenance

The Discharger shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the Discharger to achieve compliance with the conditions of this Order/Permit. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance (QA) procedures. This provision requires the operation of backup or auxiliary facilities or similar systems that are installed by a Discharger only when necessary to achieve compliance with the conditions of this Order/Permit. (40 CFR section 122.41(e).)

E. Property Rights

1. This Order/Permit does not convey any property rights of any sort or any exclusive privileges. (40 CFR section 122.41(g).)
2. The issuance of this Order/Permit does not authorize any injury to persons or property or invasion of other private rights, or any infringement of State or local law or regulations. (40 CFR section 122.5(c).)

F. Inspection and Entry

The Discharger shall allow the San Diego Water Board, State Water Resources Control Board (State Water Board), U.S. Environmental Protection Agency (USEPA), and/or their authorized representatives (including an authorized contractor acting as their representative), upon the presentation of credentials and other documents, as may be required by law, to (33

U.S. Code (U.S.C.) section 1318(a)(4)(b); 40 CFR section 122.41(i); and Water Code, sections 13267 and 13383):

1. Enter upon the Discharger's premises where a regulated facility or activity is located or conducted, or where records are kept under the conditions of this Order/Permit (33 U.S.C. section 1318(a)(4)(b)(i); 40 CFR section 122.41(i)(1); and Water Code, sections 13267 and 13383);
2. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this Order/Permit (33 U.S.C. section 1318(a)(4)(b)(ii); 40 CFR section 122.41(i)(2); and Water Code, sections 13267 and 13383);
3. Inspect and photograph, at reasonable times, any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this Order/Permit (33 U.S.C. section 1318(a)(4)(b)(ii); 40 CFR section 122.41(i)(3); and Water Code, sections 13267 and 13383); and
4. Sample or monitor, at reasonable times, for the purposes of assuring Order/Permit compliance or as otherwise authorized by the CWA or the Water Code, any substances or parameters at any location. (33 U.S.C. section 1318(a)(4)(b); 40 CFR section 122.41(i)(4); and Water Code, sections 13267 and 13383.)

G. Bypass

1. Definitions
   a. “Bypass” means the intentional diversion of waste streams from any portion of a treatment facility. (40 CFR section 122.41(m)(1)(i).)
   b. “Severe property damage” means substantial physical damage to property, damage to the treatment facilities, which causes them to become inoperable, or substantial and permanent loss of natural resources that can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production. (40 CFR section 122.41(m)(1)(ii).)
2. Bypass not exceeding limitations. The Discharger may allow any bypass to occur which does not cause exceedances of effluent limitations, but only if it is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions listed in Standard Provisions – Permit Compliance I.G.3, I.G.4, and I.G.5 below. (40 CFR section 122.41(m)(2).)
3. Prohibition of bypass. Bypass is prohibited, and the San Diego Water Board or USEPA, Region IX may take enforcement action against a Discharger for bypass, unless (40 CFR section 122.41(m)(4)(i)):
   a. Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage (40 CFR section 122.41(m)(4)(i)(A));
   b. There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass that occurred during normal periods of equipment downtime or preventive maintenance (40 CFR section 122.41(m)(4)(i)(B)); and
   c. The Discharger submitted notice to the San Diego Water Board and USEPA, Region IX as required under Standard Provisions – Permit Compliance I.G.5 below. (40 CFR section 122.41(m)(4)(i)(C).)

4. The San Diego Water Board and USEPA, Region IX may approve an anticipated bypass, after considering its adverse effects, if the San Diego Water Board and USEPA, Region IX determine that it will meet the three conditions listed in Standard Provisions – Permit Compliance I.G.3 above. (40 CFR section 122.41(m)(4)(ii).)

5. Notice

   a. Anticipated bypass. If the Discharger knows in advance of the need for a bypass, it shall submit prior notice, if possible at least 10 days before the date of the bypass. The notice shall be sent to the San Diego Water Board. As of December 21, 2020, all notices must be submitted electronically to the initial recipient defined in Standard Provisions – Reporting section V.J below. Notices shall comply with 40 CFR part 3, 40 CFR section 122.22, and 40 CFR part 127. (40 CFR section 122.41(m)(3)(i).)

   b. Unanticipated bypass. The Discharger shall submit a notice of an unanticipated bypass as required in Standard Provisions - Reporting V.E below (24-hour notice). The notice shall be sent to the San Diego Water Board. As of December 21, 2020, all notices must be submitted electronically to the initial recipient, defined in Standard Provisions – Reporting section V.J below. Notices shall comply with 40 CFR part 3, 40 CFR section 122.22, and 40 CFR part 127. (40 CFR section 122.41(m)(3)(ii).)

H. Upset

Upset means an exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the Discharger. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation. (40 CFR section 122.41(n)(1).)

1. Effect of an upset. An upset constitutes an affirmative defense to an action brought for noncompliance with such technology-based permit effluent limitations if the requirements of Standard Provisions – Permit Compliance I.H.2 below are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review. (40 CFR section 122.41(n)(2).)

2. Conditions necessary for a demonstration of upset. A Discharger who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs or other relevant evidence that (40 CFR section 122.41(n)(3)):

   a. An upset occurred and that the Discharger can identify the cause(s) of the upset (40 CFR section 122.41(n)(3)(i));

   b. The permitted facility was, at the time, being properly operated (40 CFR section 122.41(n)(3)(ii));

   c. The Discharger submitted notice of the upset as required in Standard Provisions – Reporting V.E.2.b below (24-hour notice) (40 CFR section 122.41(n)(3)(iii)); and

   d. The Discharger complied with any remedial measures required under Standard Provisions – Permit Compliance I.C above. (40 CFR section 122.41(n)(3)(iv))

3. Burden of proof. In any enforcement proceeding, the Discharger seeking to establish the occurrence of an upset has the burden of proof. (40 CFR section 122.41(n)(4).)

II. STANDARD PROVISIONS – PERMIT ACTION

A. General

This Order/Permit may be modified, revoked and reissued, or terminated for cause. The filing of a request by the Discharger for modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any Order/Permit condition. (40 CFR section 122.41(f).)

B. Duty to Reapply

If the Discharger wishes to continue an activity regulated by this Order/Permit after the expiration date of this Order/Permit, the Discharger must apply for and obtain a new permit. (40 CFR section 122.41(b).)

C. Transfers

This Order/Permit is not transferable to any person except after notice to the San Diego Water Board and USEPA, Region IX. The San Diego Water Board and USEPA, Region IX may require modification or revocation and reissuance of the Order/Permit to change the name of the Discharger and incorporate such other requirements as may be necessary under the CWA and the Water Code. (40 CFR sections 122.41(l)(3), 122.61.)

III. STANDARD PROVISIONS – MONITORING

A. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity. (40 CFR section 122.41(j)(1).)

B. Monitoring must be conducted according to test procedures approved under 40 CFR part 136 for the analyses of pollutants unless another method is required under 40 CFR chapter 1, subchapters N or O. Monitoring must be conducted according to sufficiently sensitive test methods approved under 40 CFR part 136 for the analysis of pollutants or pollutant parameters or as required under 40 CFR chapter 1, subchapter N or O. For the purposes of this paragraph, a method is sufficiently sensitive when:

1. The method Minimum Level (ML) is at or below the level of the most stringent effluent limitation established in this Order/Permit for the measured pollutant or pollutant parameter, and either the method ML is at or below the level of the most stringent applicable water quality criterion for the measured pollutant or pollutant parameter or the method ML is above the applicable water quality criterion but the amount of the pollutant or pollutant parameter in the facility's discharge is high enough that the method detects and quantifies the level of the pollutant or pollutant parameter in the discharge; or

2. The method has the lowest ML of the analytical methods approved under 40 CFR part 136 or required under 40 CFR chapter 1, subchapter N or O for the measured pollutant or pollutant parameter.

In the case of pollutants or pollutant parameters for which there are no approved methods under 40 CFR part 136 or otherwise required under 40 CFR chapter 1, subchapters N or O, monitoring must be conducted according to a test procedure specified in this Order/Permit for such pollutants or pollutant parameters. (40 CFR sections 122.21(e)(3),122.41(j)(4), 122.44(i)(1)(iv).)

IV. STANDARD PROVISIONS – RECORDS

A. Except for records of monitoring information required by this Order/Permit related to the Discharger's sewage sludge use and disposal activities, which shall be retained for a period of at least five years (or longer as required by 40 CFR part 503), the Discharger shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this Order/Permit, and records of all data used to complete the application for this Order/Permit, for a period of at least three (3) years from the date of the sample, measurement, report or application. This period may be extended by request of the San Diego Water Board and USEPA, Region IX at any time. (40 CFR section 122.41(j)(2).)

B. Records of monitoring information shall include:

1. The date, exact place, and time of sampling or measurements (40 CFR section 122.41(j)(3)(i));
2. The individual(s) who performed the sampling or measurements (40 CFR section 122.41(j)(3)(ii));
3. The date(s) analyses were performed (40 CFR section 122.41(j)(3)(iii));
4. The individual(s) who performed the analyses (40 CFR section 122.41(j)(3)(iv));
5. The analytical techniques or methods used (40 CFR section 122.41(j)(3)(v)); and
6. The results of such analyses. (40 CFR section 122.41(j)(3)(vi).)

C. Claims of confidentiality for the following information will be denied (40 CFR section 122.7(b)):

1. The name and address of any permit applicant or Discharger (40 CFR section 122.7(b)(1)); and
2. Permit applications and attachments, permits and effluent data. (40 CFR section 122.7(b)(2).)

V. STANDARD PROVISIONS – REPORTING

A. Duty to Provide Information

The Discharger shall furnish to the San Diego Water Board, State Water Board, or USEPA within a reasonable time, any information which the San Diego Water Board, State Water Board, or USEPA may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this Order/Permit or to determine compliance with this Order/Permit. Upon request, the Discharger shall also furnish to the San Diego Water Board, State Water Board, or USEPA copies of records required to be kept by this Order/Permit. (40 CFR section 122.41(h); Water Code, sections 13267 and 13383.)

B. Signatory and Certification Requirements

1. All applications, reports, or information submitted to the San Diego Water Board, State Water Board, and/or USEPA shall be signed and certified in accordance with Standard Provisions – Reporting V.B.2, V.B.3, V.B.4, V.B.5, and V.B.6 below. (40 CFR section 122.41(k).)
2. All permit applications shall be signed by either a principal executive officer or ranking elected official. For purposes of this provision, a principal executive officer of a federal agency includes: (i) the chief executive officer of the agency, or (ii) a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrators of USEPA). (40 CFR section 122.22(a)(3).).

3. All reports required by this Order/Permit and other information requested by the San Diego Water Board, State Water Board, or USEPA shall be signed by a person described in Standard Provisions – Reporting V.B.2 above, or by a duly authorized representative of that person. A person is a duly authorized representative only if:

   a. The authorization is made in writing by a person described in Standard Provisions – Reporting V.B.2 above (40 CFR section 122.22(b)(1));

   b. The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position.) (40 CFR section 122.22(b)(2)); and

   c. The written authorization is submitted to the San Diego Water Board, State Water Board, and USEPA, Region IX. (40 CFR section 122.22(b)(3).)

4. If an authorization under Standard Provisions – Reporting V.B.3 above is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of Standard Provisions – Reporting V.B.3 above must be submitted to the San Diego Water Board, State Water Board, and USEPA, Region IX prior to or together with any reports, information, or applications, to be signed by an authorized representative. (40 CFR section 122.22(c).)

5. Any person signing a document under Standard Provisions – Reporting V.B.2 or V.B.3 above shall make the following certification:

   "I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations." (40 CFR section 122.22(d).)

6. Any person providing the electronic signature for documents described in Standard Provisions – V.B.1, V.B.2, or V.B.3 that are submitted electronically shall meet all relevant requirements of Standard Provisions – Reporting V.B, and shall ensure that all relevant requirements of 40 CFR part 3 (Cross-Media Electronic Reporting) and 40 CFR part 127 (NPDES Electronic Reporting Requirements) are met for that submission. (40 CFR section 122.22(e).)

C. Monitoring Reports

1. Monitoring results shall be reported at the intervals specified in the Monitoring and Reporting Program (MRP, Attachment E) in this Order/Permit. (40 CFR section 122.41(l)(4).)

2. Monitoring results must be reported on a Discharge Monitoring Report (DMR) form or forms provided or specified by the San Diego Water Board or State Water Board for reporting the results of monitoring, sludge use, or disposal practices. As of December 21,

2016, all reports and forms must be submitted electronically to the initial recipient defined in Standard Provisions – Reporting section V.J and comply with 40 CFR part 3, 40 CFR section 122.22, and 40 CFR part 127. (40 CFR section 122.41(l)(4)(i).)

3. If the Discharger monitors any pollutant more frequently than required by this Order/Permit using test procedures approved under 40 CFR part 136, or another method required for an industry-specific waste stream under 40 CFR chapter 1, subchapters N or O, the results of such monitoring shall be included in the calculation and reporting of the data submitted in the DMR or sludge reporting form specified by the San Diego Water Board and USEPA, Region IX. (40 CFR section 122.41(l)(4)(ii).)

4. Calculations for all limitations, which require averaging of measurements, shall utilize an arithmetic mean unless otherwise specified in this Order/Permit. (40 CFR section 122.41(l)(4)(iii).)

D. Compliance Schedules

Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this Order/Permit, shall be submitted no later than 14 days following each schedule date. (40 CFR section 122.41(l)(5).)

E. Twenty-Four Hour Reporting

1. The Discharger shall report any noncompliance which may endanger health or the environment. Any information shall be provided orally within 24 hours from the time the Discharger becomes aware of the circumstances. A report shall also be provided within five (5) days of the time the Discharger becomes aware of the circumstances. The report shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

   For noncompliance events related to combined sewer overflows, sanitary sewer overflows, or bypass events, these reports must include the data described above (with the exception of time of discovery) as well as the type of event (i.e., combined sewer overflow, sanitary sewer overflow, or bypass event), type of overflow structure (e.g., manhole, combined sewer overflow outfall), discharge volume untreated by the treatment works treating domestic sewage, types of human health and environmental impacts of the event, and whether the noncompliance was related to wet weather.

   As of December 21, 2020, all reports related to combined sewer overflows, sanitary sewer overflows, or bypass events must be submitted electronically to the initial recipient defined in Standard Provisions – Reporting V.J. The reports shall comply with 40 CFR part 3, 40 CFR section 122.22, and 40 CFR part 127. The San Diego Water Board and USEPA, Region IX may also require the Discharger to electronically submit reports not related to combined sewer overflows, sanitary sewer overflows, or bypass events under this section. (40 CFR section 122.41(l)(6)(i).)

2. The following shall be included as information that must be reported within 24 hours:

   a. Any unanticipated bypass that exceeds any effluent limitation in this Order/Permit. (40 CFR section 122.41(l)(6)(ii)(A).)

   b. Any upset that exceeds any effluent limitation in this Order/Permit. (40 CFR section 122.41(l)(6)(ii)(B).)

3. The San Diego Water Board may waive the above required written report on a case-by-case basis if an oral report has been received within 24 hours. (40 CFR section 122.41(l)(6)(ii)(B).)

F. Planned Changes

The Discharger shall give notice to the San Diego Water Board and USEPA, Region IX as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is required under this provision only when (40 CFR section 122.41(l)(1)):

1. The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source in section 122.29(b) (40 CFR section 122.41(l)(1)(i)); or
2. The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants that are not subject to effluent limitations in this Order/Permit. (40 CFR section 122.41(l)(1)(ii).)
3. The alteration or addition results in a significant change in the Discharger's sludge use or disposal practices, and such alteration, addition, or change may justify the application of permit conditions that are different from or absent in the existing permit, including notification of additional use or disposal sites not reported during the Order/Permit application process or not reported pursuant to an approved land application plan. (40 CFR section 122.41(l)(1)(iii).)

G. Anticipated Noncompliance

The Discharger shall give advance notice to the San Diego Water Board and USEPA, Region IX of any planned changes in the permitted facility or activity that may result in noncompliance with this Order/Permit's requirements. (40 CFR section 122.41(l)(2).)

H. Other Noncompliance

The Discharger shall report all instances of noncompliance not reported under Standard Provisions – Reporting sections V.C, V.D, and V.E above at the time monitoring reports are submitted. The reports shall contain the information listed in Standard Provision – Reporting section V.E above. For noncompliance events related to combined sewer overflows, sanitary sewer overflows, or bypass events, these reports shall contain the information described in Standard Provision – Reporting section V.E and the applicable required data in appendix A to 40 CFR part 127. The San Diego Water Board and/or USEPA, Region IX may also require the Discharger to electronically submit reports not related to combined sewer overflows, sanitary sewer overflows, or bypass events under this section. (40 CFR section 122.41(l)(7).)

I. Other Information

When the Discharger becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the San Diego Water Board, State Water Board, or USEPA, the Discharger shall promptly submit such facts or information. (40 CFR section 122.41(l)(8).)

J. Initial Recipient for Electronic Reporting Data

The owner, operator, or the duly authorized representative is required to electronically submit NPDES information specified in appendix A to 40 CFR part 127 to the initial recipient defined in 40 CFR section 127.2(b). USEPA will identify and publish the list of initial recipients on its website and in the Federal Register, by State and by NPDES data group [see 40 CFR section 127.2(c)]. USEPA will update and maintain this listing.
(40 CFR section 122.41(l)(9).)

VI. STANDARD PROVISIONS – ENFORCEMENT

The San Diego Water Board is authorized to enforce the terms of this Order/Permit under several provisions of the Water Code, including, but not limited to, sections 13268, 13385, 13386, and 13387.

VII. ADDITIONAL PROVISIONS – NOTIFICATION LEVELS

All publicly-owned treatment works (POTWs) shall provide adequate notice to the San Diego Water Board and USEPA, Region IX of the following (40 CFR section 122.42(b)):

A. Any new introduction of pollutants into the POTW from an indirect discharger that would be subject to sections 301 or 306 of the CWA if it were directly discharging those pollutants (40 CFR section 122.42(b)(1));

B. Any substantial change in the volume or character of pollutants being introduced into that POTW by a source introducing pollutants into the POTW at the time of adoption of the Order/Permit. (40 CFR section 122.42(b)(2).); and

C. Adequate notice shall include information on the quality and quantity of effluent introduced into the POTW as well as any anticipated impact of the change on the quantity or quality of effluent to be discharged from the POTW (40 CFR section 122.42(b)(3).).

ATTACHMENT E – MONITORING AND REPORTING PROGRAM

CONTENTS

TABLES

ATTACHMENT E – MONITORING AND REPORTING PROGRAM (MRP)

Section 308 of the federal Clean Water Act (CWA) and sections 122.41(h), (j)-(l), 122.44(i), and 122.48 of title 40 of the Code of Federal Regulations (40 CFR) require that all National Pollutant Discharge Elimination System (NPDES) permits specify monitoring and reporting requirements. California Water Code (Water Code) sections 13267 and 13383 also authorize the California Regional Water Quality Control Board, San Diego Region (San Diego Water Board) to establish monitoring, inspection, entry, reporting, and recordkeeping requirements. Pursuant to this authority this MRP establishes conditions for the City of San Diego (Discharger) to conduct routine or episodic self-monitoring of the discharges regulated under this Order/Permit at specified influent, internal operations, effluent, and receiving water monitoring locations. This MRP requires the Discharger to report the results to the San Diego Water Board and U.S. Environmental Protection Agency (USEPA), Region IX with information necessary to evaluate discharge characteristics and compliance status.

The purpose of this MRP is to determine and ensure compliance with effluent limitations and other requirements established in this Order/Permit, assess treatment efficiency, characterize effluents, and characterize the receiving water and the effects of the discharge on the receiving water. This MRP also specifies requirements concerning the proper use, maintenance, and installation of monitoring equipment and methods, and the monitoring type intervals and frequency necessary to yield data that are representative of the activities and discharges regulated under this Order/Permit.

Each monitoring section contains an introductory paragraph summarizing why the monitoring is needed and the key management questions the monitoring is designed to answer. In developing the list of key management questions the San Diego Water Board and USEPA, Region IX considered four basic types of information for each question:

(1) Management Information Need – Why does the San Diego Water Board and USEPA, Region IX need to know the answer?

(2) Monitoring Criteria – What monitoring will be conducted for deriving an answer to the question?

(3) Expected Product – How should the answer be expressed and reported?

(4) Possible Management Actions – What actions will be potentially influenced by the answer?

The framework for this monitoring program has three components that comprise a range of spatial and temporal scales: 1. core monitoring, 2. regional monitoring, and 3. special studies.

1. Core monitoring consists of the basic site-specific monitoring necessary to measure compliance with individual effluent limits and/or impacts to receiving water quality. Core monitoring is typically conducted in the immediate vicinity of the discharge by examining local scale spatial effects.

2. Regional monitoring provides information necessary to make assessments over large areas and serves to evaluate cumulative effects of all anthropogenic inputs. Regional monitoring data also assists in the interpretation of core monitoring studies. In the event that a regional monitoring effort takes place during this Order/Permit cycle in which this MRP does not specifically address regional monitoring, the San Diego Water Board and USEPA, Region IX may allow relief from aspects of core monitoring components in order to encourage participation pursuant to section V of this MRP.

3. Special studies are directed monitoring efforts designed in response to specific management or research questions identified through either core or regional monitoring programs. Often they are used to help understand core or regional monitoring results, where a specific environmental process is not well understood, or to address unique issues of local importance.

I. GENERAL MONITORING PROVISIONS

A. Samples and measurements taken as required herein shall be representative of the volume and nature of the monitored discharge. All samples shall be taken at the monitoring points specified in section II, Table E-1 below and, unless otherwise specified, before the monitored flow joins or is diluted by any other waste stream, body of water, or substance. Monitoring points shall not be changed without notification to and the approval of the San Diego Water Board and USEPA, Region IX.

B. Appropriate flow measurement devices and methods consistent with accepted scientific practices shall be selected and used to ensure the accuracy and reliability of measurements of the volume of monitored discharges. The devices shall be installed, calibrated, and maintained to ensure that the accuracy of the measurement is consistent with the accepted capability of that type of device. Devices selected shall be capable of measuring flows with a maximum deviation of less than ±5 percent from true discharge rates throughout the range of expected discharge volumes.

C. Monitoring must be conducted according to USEPA test procedures approved at 40 CFR part 136, *Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the CWA* as amended, or unless other test procedures are specified in this Order/Permit and attachments thereof or otherwise specified by the San Diego Water Board and USEPA, Region IX.

D. All analyses shall be performed in a laboratory certified to perform such analyses by the State Water Resources Control Board (State Water Board) Division of Drinking Water (DDW) or a laboratory approved by the San Diego Water Board and USEPA, Region IX. The laboratory must be accredited under the DDW Environmental Laboratory Accreditation Program (ELAP) to ensure the quality of analytical data used for regulatory purposes to meet the requirements of this Order/Permit. Additional information on ELAP can be accessed at http://www.waterboards.ca.gov/drinking_water/programs/elap/ELAPContacts.shtml.

E. Records of monitoring information shall include information required under section IV of the Standard Provisions (Attachment D).

F. All monitoring instruments and devices used by the Discharger to fulfill the prescribed monitoring program shall be properly maintained and calibrated as necessary to ensure their continued accuracy. All flow measurement devices shall be calibrated at least once per year, or more frequently, to ensure continued accuracy of the devices. Annually on July 1, the Discharger shall submit to the San Diego Water Board and USEPA, Region IX a written statement signed by a registered professional engineer certifying that all flow measurement devices have been calibrated and will reliably achieve an accuracy with a maximum deviation of less than ±5 percent from true discharge rates throughout the range of expected discharge volumes.

G. The Discharger shall have, and implement, an acceptable written quality assurance (QA) plan for laboratory analyses. Annually on April 1, the Discharger shall submit to the San Diego Water Board and USEPA, Region IX a report which summarizes the QA activities for the previous calendar year. Duplicate chemical analyses must be conducted on a minimum of 10 percent of the samples or at least one sample per month, whichever is greater. A similar frequency shall be maintained for analyzing spiked samples. When requested by San Diego

Water Board and/or USEPA, Region IX, the Discharger shall participate in a NPDES discharge monitoring report QA performance study. The Discharger shall have a success rate equal to or greater than 80 percent.

H. Analysis for toxic pollutants with effluent limitations or performance goals based on water quality objectives of the Water Quality Control Plan, Ocean Waters of California, California Ocean Plan (Ocean Plan) shall be conducted in accordance with procedures described in the Ocean Plan and restated in this MRP.

II. MONITORING LOCATIONS

The Discharger shall establish the following monitoring locations to demonstrate compliance with the effluent limitations, discharge specifications, and other requirements in this Order:

Table E-1. Monitoring Station Locations

Discharge Point Name	Monitoring Location Name	Monitoring Location Description	Depth (meter, m)
--	INF-001	At a location where all influent wastestream flows to E.W. Blom Point Loma Wastewater Treatment Plant (Facility) are accounted for in monitoring events; upstream of any in-plant return flows; and where representative samples of influent can be collected before any process or treatment that could alter the properties of the influent.	--
001	EFF-001	A location where a representative sample of the effluent can be obtained.	--
--	EMG-001	A location where a representative sample of the Tijuana Cross-Border Emergency Connection can be obtained.	--
--	RS-001	A location where a representative sample of a return stream can be obtained; for multiple return streams, the return streams shall be sampled and composited based on each return streams contributing flow (flow weighted).	--
OFFSHORE STATIONS			
--	F-001	Latitude: 32° 38' 15.659"N, Longitude: 117° 14' 25.138"W	18[1]
--	F-002	Latitude: 32° 45' 25.077"N, Longitude: 117° 16' 21.838"W	18[1]
--	F-003	Latitude: 32° 46' 54.598"N, Longitude: 117° 16' 20.698"W	18[1]
--	F-004	Latitude: 32° 35' 40.318"N, Longitude: 117° 16' 7.500"W	60[2]
--	F-005	Latitude: 32° 36' 42.058"N, Longitude: 117° 16' 10.739"W	60[2]
--	F-006	Latitude: 32° 37' 50.999"N, Longitude: 117° 16' 24.96"W	60[2]
--	F-007	Latitude: 32° 39' 4.082"N, Longitude: 117° 16' 47.978"W	60[2]
--	F-008	Latitude: 32° 40' 19.740"N, Longitude: 117° 16' 58.8"W	60[2]
--	F-009	Latitude: 32° 41' 7.979"N, Longitude: 117° 17' 10.737"W	60[2]
--	F-010	Latitude: 32° 42' 19.508"N, Longitude: 117° 17' 26.368"W	60[2]
--	F-011	Latitude: 32° 43' 31.958"N, Longitude: 117° 17' 40.675"W	60[2]
--	F-012	Latitude: 32° 44' 47.699"N, Longitude: 117° 18' 7.437"W	60[2]
--	F-013	Latitude: 32° 45' 55.378"N, Longitude: 117° 18' 25.919""W	60[2]
--	F-014	Latitude: 32° 46' 53.612"N, Longitude: 117° 18' 41.123"W	60[2]
--	F-015	Latitude: 32° 35' 38.759"N, Longitude: 117° 17' 11.22"W	80[3]
--	F-016	Latitude: 32° 36' 42.598"N, Longitude: 117° 17' 24.237"W	80[3]
--	F-017	Latitude: 32° 37' 48.057"N, Longitude: 117° 17' 38.998"W	80[3]
--	F-018	Latitude: 32° 38' 59.157"N, Longitude: 117° 17' 53.998"W	80[3]
--	F-019	Latitude: 32° 40' 4.26"N, Longitude: 117° 18' 24.598"W	80[3]
--	F-020	Latitude: 32° 41' 7.497"N, Longitude: 117° 18' 39.477"W	80[3]
--	F-021	Latitude: 32° 42' 13.68"N, Longitude: 117° 19' 7.273"W	80[3]
--	F-022	Latitude: 32° 43' 21.827"N, Longitude: 117° 19' 15.247"W	80[3]

Discharge Point Name	Monitoring Location Name	Monitoring Location Description	Depth (meter, m)
--	F-023	Latitude: 32° 44' 30.779"N, Longitude: 117° 19' 49.497"W	80[3]
--	F-024	Latitude: 32° 45' 40.377"N, Longitude: 117° 20' 11.219"W	80[3]
--	F-025	Latitude: 32° 46' 44.22"N, Longitude: 117° 20' 36.898"W	80[3]
--	F-026	Latitude: 32° 35' 37.558"N, Longitude: 117° 18' 43.92"W	98[4]
--	F-027	Latitude: 32° 36' 42.419"N, Longitude: 117° 19' 16.978"W	98[4]
--	F-028	Latitude: 32° 37' 45.433"N, Longitude: 117° 19' 25.391"W	98[4]
--	F-029	Latitude: 32° 38' 52.134"N, Longitude: 117° 19' 29.747"W	98[4]
--	F-030	Latitude: 32° 39' 56.411"N, Longitude: 117° 19' 29.388"W	98[4]
--	F-031	Latitude: 32° 41' 4.805"N, Longitude: 117° 19' 42.071"W	98[4]
--	F-032	Latitude: 32° 42' 5.098"N, Longitude: 117° 20' 2.997"W	98[4]
--	F-033	Latitude: 32° 43' 13.678"N, Longitude: 117° 20' 23.698"W	98[4]
--	F-034	Latitude: 32° 44' 20.04"N, Longitude: 117° 20' 57.718"W	98[4]
--	F-035	Latitude: 32° 45' 27.719"N, Longitude: 117° 21' 48.178"W	98[4]
--	F-036	Latitude: 32° 46' 36.419"N, Longitude: 117° 22' 28.438"W	98[4]
KELP STATIONS			
--	A-001	Latitude: 32° 39' 33.6"N, Longitude: 117° 15' 43.2"W	18[1]
--	A-006	Latitude: 32° 41' 33.6"N, Longitude: 117° 16' 10.8"W	18[1]
--	A-007	Latitude: 32° 40' 31.8"N, Longitude: 117° 16' 0.60"W	18[1]
--	C-004	Latitude: 32° 39' 57.0"N, Longitude: 117° 14' 58.8"W	9[5]
--	C-005	Latitude: 32° 40' 45.0"N, Longitude: 117° 15' 24.0"W	9[5]
--	C-006	Latitude: 32° 41' 37.19"N, Longitude: 117° 15' 40.8"W	9[5]
--	C-007	Latitude: 32° 42' 58.8"N, Longitude: 117° 16' 19.8"W	18[1]
--	C-008	Latitude: 32° 43' 57.6"N, Longitude: 117° 16' 24.0"W	18[1]
SHORELINE STATIONS			
--	D-004	At the southernmost tip of Point Loma just north of the lighthouse. Latitude: 32° 39' 56.39"N, Longitude: 117° 14' 37.2"W	--
--	D-005	Directly in front of the Point Lama Wastewater Treatment Plant where the outfall enters the ocean. Latitude: 32° 40' 51.0"N, Longitude: 117° 14' 56.4"W	--
--	D-007	Sunset Cliffs at the foot of the stairs seaward of Ladera Street. Latitude: 32° 43' 9.59"N, Longitude: 117° 15' 26.4"W	--
--	D-008	Ocean Beach at the foot of the stairs seaward of Bermuda Street. Latitude: 32° 44' 13.19"N, Longitude: 117° 15' 19.2"W	--
--	D-009	Just south of the Ocean Beach pier at the foot of the stairs seaward of Narragansett. Latitude: 32° 44' 48.0"N, Longitude: 117° 15' 14.4"W	--
--	D-010	Ocean Beach just north of west end of Newport Avenue, directly west of main lifeguard station. Latitude: 32° 44' 57.0"N, Longitude: 117° 15' 10.8"W	--
--	D-011	North Ocean Beach, directly west of south end of Dog Beach parking area at Voltaire St terminus, south of stub jetty. Latitude: 32° 45' 14.4"N, Longitude: 117° 15' 9.6"W	--
--	D-012	Mission Beach, directly west of main lifeguard station in Belmont Park located at the west end of Mission Bay Drive. Latitude: 32° 46' 16.8"N, Longitude: 117° 15' 12.6 "W	--

Discharge Point Name	Monitoring Location Name	Monitoring Location Description	Depth (meter, m)
OFFSHORE BENTHIC STATIONS			
Primary Core Stations			
--	B-009	Latitude: 32° 45' 19.8"N, Longitude: 117° 21' 42.0"W	98
--	B-012	Latitude: 32° 46' 21.6"N, Longitude: 117° 22' 18.0"W	98
--	E-002	Latitude: 32° 37' 27.0"N, Longitude: 117° 19' 5.40"W	98
--	E-005	Latitude: 32° 38' 22.8"N, Longitude: 117° 19' 16.8"W	98
--	E-008	Latitude: 32° 38' 54.6"N, Longitude: 117° 19' 20.4"W	98
--	E-011	Latitude: 32° 39' 24.0"N, Longitude: 117° 19' 25.2"W	98
--	E-014	Latitude: 32° 39' 56.4"N, Longitude: 117° 19' 29.4"W	98
--	E-017	Latitude: 32° 40' 28.8"N, Longitude: 117° 19' 32.4"W	98
--	E-020	Latitude: 32° 40' 57.6"N, Longitude: 117° 19' 40.2"W	98
--	E-023	Latitude: 32° 41' 28.2"N, Longitude: 117° 19' 46.2"W	98
--	E-025	Latitude: 32° 42' 22.8"N, Longitude: 117° 20' 4.20"W	98
--	E-026	Latitude: 32° 43' 49.2"N, Longitude: 117° 20' 34.2"W	98
Secondary Core Stations			
--	B-008	Latitude: 32° 45' 30.0"N, Longitude: 117° 20' 46.2"W	88
--	B-011	Latitude: 32° 46' 34.2"N, Longitude: 117° 21' 21.0"W	88
--	E-001	Latitude: 32° 37' 31.8"N, Longitude: 117° 18' 21.0"W	88
--	E-007	Latitude: 32° 39' 0.0"N, Longitude: 117° 18' 39.0"W	88
--	E-019	Latitude: 32° 41' 2.40"N, Longitude: 117° 19' 10.8"W	88
--	B-010	Latitude: 32° 45' 13.19"N, Longitude: 117° 22' 9.60"W	116
--	E-003	Latitude: 32° 37' 17.39"N, Longitude: 117° 20' 5.39"W	116
--	E-009	Latitude: 32° 38' 45"N, Longitude: 117° 20' 3.59"W	116
--	E-015	Latitude: 32° 39' 52.8""N, Longitude: 117° 19' 54.6"W	116
--	E-021	Latitude: 32° 40' 53.4"N, Longitude: 117° 20' 0.0"W	116
TRAWL STATIONS			
--	SD-007 (Zone 4)	Latitude: 32° 35' 3.6"N, Longitude: 117° 18' 23.4"W	100
--	SD-008 (Zone 3)	Latitude: 32° 37' 32.4"N, Longitude: 117° 19' 22.2"W	100
--	SD-010 (Zone 1)	Latitude: 32° 39' 9.60"N, Longitude: 117° 19' 30"W	100
--	SD-012 (Zone 1)	Latitude: 32° 40' 39.0"N, Longitude: 117° 19' 48.6"W	100
--	SD-013 (Zone 2)	Latitude: 32° 42' 49.8"N, Longitude: 117° 20' 15"W	100
--	SD-014 (Zone 2)	Latitude: 32° 44' 18.0"N, Longitude: 117° 20' 57.6"W	100
RIG FISHING STATIONS			
--	RF-001	Latitude: 32° 40' 19.2"N, Longitude: 117° 19' 46.8"W	107
--	RF-002	Latitude: 32° 45' 40.2"N, Longitude: 117° 22' 1.19"W	96

1. Discrete depths for bacteria samples include: 1m, 12m, and 18m.
2. Discrete depths for bacteria samples include: 1m, 25m, and 60m.
3. Discrete depths for bacteria samples include: 1m, 25m, 60m, and 80m.
4. Discrete depths for bacteria samples include: 1m, 25m, 60m, 80m, and 98m.
5. Discrete depths for bacteria samples include: 1m, 3m, and 9m.

The North latitude and West longitude information in Table E-1 are approximate for administrative purposes.

III. CORE MONITORING REQUIREMENTS

A. Influent, Emergency Connection, and Return Stream Monitoring Requirements

Influent monitoring is the collection and analysis of samples or measurements of wastewater prior to the treatment processes. Influent monitoring of a wastewater stream prior to entering the treatment plant is necessary to address the following questions:

(1) Is the pretreatment program effectively controlling pollutant loads from industrial facilities?

(2) What is the frequency of unexpected industrial discharges (or pollutants loads) which can cause or contribute to an upset in the wastewater process?

(3) Is the influent inhibiting or disrupting the plant, its treatment processes or operations, or its sludge processes, use, or disposal?

(4) Is the Facility complying with permit conditions including, but not limited to, biochemical oxygen demand (5-day @ 20 degrees Celsius (°C)) (BOD_5) and total suspended solids (TSS) percent removal limitations?

(5) Is the nonindustrial source control program adequately minimizing the entrance of nonindustrial toxic pollutants and pesticides into the sewage collection system?

The Discharger shall monitor the influent at Monitoring Locations INF-001 and EMG-001 (when flow is present) as follows:

Table E-2. Influent and Emergency Connection Monitoring[1]

Parameter	Units	Sample Type	Minimum Sampling Frequency	Required Analytical Test Method
Flow	million gallons per day (MGD)	Recorder/Totalizer	Continuous	--
BOD_5	milligram per liter (mg/L)	24-hr Composite	1/Day at INF-001 1/Week at EMG-001	2
TSS	mg/L	24-hr Composite	1/Day at INF-001 1/Week at EMG-001	2
Volatile Suspended Solids	mg/L	24-hr Composite	1/Day at INF-001 1/Week at EMG-001	2
Total Dissolved Solids (TDS)	mg/L	24-hr Composite	1/Day at INF-001 1/Week at EMG-001	2
Temperature	°C	Grab	1/Day at INF-001 1/Week at EMG-001	2
Floating Particulates	mg/L	24-hr Composite	1/Day at INF-001 1/Week at EMG-001	2
Grease and Oil	mg/L	Grab	1/Day at INF-001 1/Week at EMG-001	2

Parameter	Units	Sample Type	Minimum Sampling Frequency	Required Analytical Test Method
Settleable Solids	milliliter per liter (ml/L)	Grab	1/Day at INF-001 1/Week at EMG-001	[2]
Turbidity	nephelometric turbidity unit (NTU)	Grab	1/Day at INF-001 1/Week at EMG-001	[2]
pH	standard units	Grab	1/Day at INF-001 1/Week at EMG-001	[2]
Arsenic, Total Recoverable	microgram per liter (µg/L)	24-hr Composite	1/Week	[2]
Cadmium, Total Recoverable	µg/L	24-hr Composite	1/Week	[2]
Chromium (VI), Total Recoverable[3]	µg/L	24-hr Composite	1/Week	[2]
Copper, Total Recoverable	µg/L	24-hr Composite	1/Week	[2]
Lead, Total Recoverable	µg/L	24-hr Composite	1/Week	[2]
Mercury, Total Recoverable	µg/L	24-hr Composite	1/Week	[2,4]
Nickel, Total Recoverable	µg/L	24-hr Composite	1/Week	[2]
Selenium, Total Recoverable	µg/L	24-hr Composite	1/Week	[2]
Silver, Total Recoverable	µg/L	24-hr Composite	1/Week	[2]
Zinc, Total Recoverable	µg/L	24-hr Composite	1/Week	[2]
Cyanide, Total	µg/L	24-hr Composite	1/Week	[2,5]
Ammonia (as N)	µg/L	24-hr Composite	1/Week	[2]
Phenolic Compounds (nonchlorinated)	µg/L	24-hr Composite	1/Week	[2]
Phenolic Compounds (chlorinated)	µg/L	24-hr Composite	1/Week	[2]
Endosulfan	µg/L	24-hr Composite	1/Week	[2]
Endrin	µg/L	24-hr Composite	1/Week	[2]
Hexachlorocyclohexane (HCH)	µg/L	24-hr Composite	1/Week	[2]
Radioactivity	pico-curies per liter (pCi/L)	24-hr Composite	1/Month	[2]
Acrolein	µg/L	Grab	1/Month	[2]
Antimony, Total Recoverable	µg/L	24-hr Composite	1/Month	[2]
Bis (2-chloroethoxy) Methane	µg/L	24-hr Composite	1/Month	[2]
Bis (2-chloroisopropyl) Ether	µg/L	24-hr Composite	1/Month	[2]
Chlorobenzene	µg/L	Grab	1/Month	[2]
Chromium (III), Total ~~Recoverable[3]~~Recoverable[7]	µg/L	24-hr Composite	1/Month	[2]
Di-n-butyl Phthalate	µg/L	24-hr Composite	1/Month	[2]
Dichlorobenzenes	µg/L	Grab	1/Month	[2]
Diethyl Phthalate	µg/L	24-hr Composite	1/Month	[2]
Dimethyl Phthalate	µg/L	24-hr Composite	1/Month	[2]
4,6-dinitro-2-methylphenol	µg/L	24-hr Composite	1/Month	[2]
2,4-dinitrophenol	µg/L	24-hr Composite	1/Month	[2]
Ethylbenzene	µg/L	Grab	1/Month	[2]
Fluoranthene	µg/L	24-hr Composite	1/Month	[2]
Hexachlorocyclopentadiene	µg/L	24-hr Composite	1/Month	[2]
Nitrobenzene	µg/L	24-hr Composite	1/Month	[2]
Thallium, Total Recoverable	µg/L	24-hr Composite	1/Month	[2]

Parameter	Units	Sample Type	Minimum Sampling Frequency	Required Analytical Test Method
Toluene	µg/L	Grab	1/Month	2
Tributyltin	µg/L	24-hr Composite	1/Month	2
1,1,1-trichloroethane	µg/L	Grab	1/Month	2
Acrylonitrile	µg/L	Grab	1/Month	2
Aldrin	µg/L	24-hr Composite	1/Week	2
Benzene	µg/L	Grab	1/Month	2
Benzidine	µg/L	24-hr Composite	1/Month	2
Beryllium, Total Recoverable	µg/L	24-hr Composite	1/Month	2
Bis(2-chloroethyl) ether	µg/L	24-hr Composite	1/Month	2
Bis(2-ethylhexyl) phthalate	µg/L	24-hr Composite	1/Month	2
Carbon tetrachloride	µg/L	Grab	1/Month	2
Chlordane	µg/L	24-hr Composite	1/Week	2
Chlorodibromomethane (dibromochloromethane)	µg/L	Grab	1/Month	2
Chloroform	µg/L	Grab	1/Month	2
Dichlorodiphenyltrichloroethane (DDT)	µg/L	24-hr Composite	1/Week	2
1,4-Dichlorobenzene	µg/L	Grab	1/Month	2
3,3'-Dichlorobenzidine	µg/L	24-hr Composite	1/Month	2
1,2-Dichloroethane	µg/L	Grab	1/Month	2
1,1-Dichloroethylene	µg/L	Grab	1/Month	2
Dichlorobromomethane	µg/L	Grab	1/Month	2
Dichloromethane (Methylene Chloride)	µg/L	Grab	1/Month	2
1,3-Dichloropropene (1,3-Dichloropropylene)	µg/L	Grab	1/Month	2
Dieldrin	µg/L	24-hr Composite	1/Week	2
2,4-Dinitrotoluene	µg/L	24-hr Composite	1/Month	2
1,2-Diphenylhydrazine	µg/L	24-hr Composite	1/Month	2
Halomethanes	µg/L	Grab	1/Month	2
Heptachlor	µg/L	24-hr Composite	1/Month	2
Heptachlor Epoxide	µg/L	24-hr Composite	1/Month	2
Hexachlorobenzene	µg/L	24-hr Composite	1/Month	2
Hexachlorobutadiene	µg/L	24-hr Composite	1/Month	2
Hexachloroethane	µg/L	24-hr Composite	1/Month	2
Isophorone	µg/L	24-hr Composite	1/Month	2
N-nitrosodimethylamine	µg/L	24-hr Composite	1/Month	2
N-nitrosodi-N-propylamine	µg/L	24-hr Composite	1/Month	2
N-nitrosodiphenylamine	µg/L	24-hr Composite	1/Month	2
Polynuclear Aromatic Hydrocarbons (PAHs)	µg/L	24-hr Composite	1/Month	2
Polychlorinated Biphenyls (PCBs)	µg/L	24-hr Composite	1/Week	2
Tetrachlorodibenzodioxin (TCDD) Equivalents	µg/L	24-hr Composite	1/Month	2
1,1,2,2-Tetrachoroethane	µg/L	Grab	1/Month	2
Tetrachloroethylene (Tetrachloroethene)	µg/L	Grab	1/Month	2
Toxaphene	µg/L	24-hr Composite	1/Week	2

Parameter	Units	Sample Type	Minimum Sampling Frequency	Required Analytical Test Method
Trichloroethylene (Trichloroethene)	µg/L	Grab	1/Month	2
1,1,2-Trichloroethane	µg/L	Grab	1/Month	2
2,4,6-Trichlorophenol	µg/L	24-hr Composite	1/Month	2
Vinyl Chloride	µg/L	Grab	1/Month	2
Remaining priority pollutants[6]	µg/L	24-hr Composite	1/Month	2

1. See Attachment A for definitions of abbreviations and a glossary of common terms used in this Order/Permit.
2. As required under 40 CFR part 136.
3. The Discharger may, at their option, monitor for total chromium.
4. USEPA Method 1631E, with a quantitation level of 0.5 nanogram per liter (ng/L), shall be used to analyze total mercury.
5. If a Discharger can demonstrate to the satisfaction of the San Diego Water Board (subject to USEPA approval) that an analytical method is available to reliably distinguish between strongly and weakly complexed cyanide, effluent limitations for cyanide may be met by (or performance goals may be evaluated with) the combined measurement of free cyanide, simple alkali metals cyanides, and weakly complexed organometallic cyanide complexes. In order for the analytical method to be acceptable, the recovery of free cyanide from metal complexes must be comparable to that achieved by the approved method in 40 CFR part 136, as amended.
6. Also including the 301(h) pesticides listed at 40 CFR section 125.58(p).

~~6.~~7. Discharger may meet the performance goal for total recoverable chromium (III) by calculating the difference between total recoverable chromium and total recoverable chromium (VI).

The Discharger shall monitor return streams at Monitoring Location RS-001 as follows:

Table E-3. Return Stream Monitoring[1,2]

Parameter	Units[1]	Sample Type	Minimum Sampling Frequency	Required Analytical Test Method
Flow	MGD	Recorder/Totalizer	Continuous	--
BOD_5	mg/L	24-hr Composite	1/Day	3
TSS	mg/L	24-hr Composite	1/Day	3

1. See Attachment A for definitions of abbreviations and a glossary of common terms used in this Order/Permit.
2. Return Streams includes NCWRP Filter Backwash, NCWRP Plant Drain, NCWRP Secondary and Un-disinfected Filtered Effluent Bypass, NCWRP Final Effluent, and MBC Centrate.
3. As required under 40 CFR part 136.

B. Effluent Monitoring Requirements

Effluent monitoring is the collection and analysis of samples or measurements of effluents, after all treatment processes, to determine and quantify contaminants and to demonstrate compliance with applicable effluent limitations, standards, and other requirements of this Order/Permit.

Effluent monitoring is necessary to address the following questions:

(1) Does the effluent comply with permit effluent limitations, performance goals, and other requirements of this Order/Permit, thereby ensuring that water quality standards are achieved in the receiving water?

(2) What is the mass of constituents that are discharged daily, monthly, or annually?

(3) Is the effluent concentration or mass changing over time?

(4) Is the Facility being properly operated and maintained to ensure compliance with the conditions of this Order?

The Discharger shall monitor the effluent at Monitoring Location EFF-001 as follows:

Table E-4. Effluent Monitoring[1]

Parameter	Units	Sample Type	Minimum Sampling Frequency	Required Analytical Test Method
Flow	MGD	Recorder/Totalizer	Continuous[2]	--
BOD_5	mg/L	24-hr Composite	1/Day[3]	[5]
	system-wide percent removal	Calculate	1/Day	[5]
TSS	mg/L	24-hr Composite	1/Day[3]	[5]
	Facility and system-wide percent removal	Calculate	1/Day	[5]
Volatile Suspended Solids	mg/L	24-hr Composite	1/Day	[5]
TDS	mg/L	24-hr Composite	1/Day	[5]
Temperature	°C	Grab	1/Day	[5]
Floating Particles	mg/L	24-hr Composite	1/Day	[5]
Grease and Oil	mg/L	Grab	1/Day[3]	[5]
Settleable Solids	ml/L	Grab	1/Day	[5]
Turbidity	NTU	Grab	1/Day	[5]
pH	pH Units	Grab	1/Day	[5]
Total Coliform	~~colony forming~~ units ~~(CFU)~~/ 100 milliliter (ml)	Grab	1/Week	[5]
Fecal Coliform	~~CFU~~units/100 ml	Grab	1/Week	[5]
Enterococcus	~~CFU~~units/100 ml	Grab	1/Week	[5]
OCEAN PLAN TABLE 1 PARAMETERS FOR PROTECTION OF MARINE AQUATIC LIFE				
Arsenic, Total Recoverable	µg/L	24-hr Composite	1/Week[3,~~4,~~12]	[5]
Cadmium, Total Recoverable	µg/L	24-hr Composite	1/Week[3,~~4,~~12]	[5]
Chromium (VI), Total Recoverable[6]	µg/L	24-hr Composite	1/Week[3,~~4,~~12]	[5]
Copper, Total Recoverable	µg/L	24-hr Composite	1/Week[3,~~4,~~12]	[5]
Lead, Total Recoverable	µg/L	24-hr Composite	1/Week[3,~~4,~~12]	[5]
Mercury, Total Recoverable	µg/L	24-hr Composite	1/Week[3,~~4,~~12]	[5,7]
Nickel, Total Recoverable	µg/L	24-hr Composite	1/Week[3,~~4,~~12]	[5]
Selenium, Total Recoverable	µg/L	24-hr Composite	1/Week[3,~~4,~~12]	[5]
Silver, Total Recoverable	µg/L	24-hr Composite	1/Week[3,~~4,~~12]	[5]
Zinc, Total Recoverable	µg/L	24-hr Composite	1/Week[3,~~4,~~12]	[5]
Cyanide, Total	µg/L	24-hr Composite	1/Week[3,~~4,~~12]	[5,8]
Total Chlorine Residual	µg/L	Continuous	Continuous[3,4]	[5]
Ammonia Nitrogen, Total (as N)	µg/L	24-hr Composite	1/Week[3,~~4,~~12]	[5]
Chronic Toxicity	"Pass"/"Fail" (Test of Significant Toxicity)[10]	24-hr Composite	1/Month	[11]
Phenolic Compounds (nonchlorinated)	µg/L	24-hr Composite	1/Week[3,~~4,~~12]	[5]
Phenolic Compounds (chlorinated)	µg/L	24-hr Composite	1/Week[3,~~4,~~12]	[5]
Endosulfan	µg/L	24-hr Composite	1/Week[3,~~4,~~12]	[5]

Parameter	Units	Sample Type	Minimum Sampling Frequency	Required Analytical Test Method
Endrin	µg/L	24-hr Composite	1/Week[3,~~4,~~12]	[5]
HCH	µg/L	24-hr Composite	1/Week[3,~~4,~~12]	[5]
Radioactivity	pCi/L	24-hr Composite	1/Month[3,~~4~~]	[5]
OCEAN PLAN TABLE 1 PARAMETERS FOR PROTECTION OF HUMAN HEALTH – NONCARCINOGENS				
Acrolein	µg/L	Grab	1/Month[3,~~4,~~12]	[5]
Antimony, Total Recoverable	µg/L	24-hr Composite	1/Month[3,~~4,~~12]	[5]
Bis (2-chloroethoxy) Methane	µg/L	24-hr Composite	1/Month[3,~~4,~~12]	[5]
Bis (2-chloroisopropyl) Ether	µg/L	24-hr Composite	1/Month[3,~~4,~~12]	[5]
Chlorobenzene	µg/L	Grab	1/Month[3,~~4,~~12]	[5]
Chromium (III), Total ~~Recoverable[6]~~Recoverable[13]	µg/L	24-hr Composite	1/Month[3,~~4~~]	[5]
Di-n-butyl Phthalate	µg/L	24-hr Composite	1/Month[3,~~4,~~12]	[5]
Dichlorobenzenes	µg/L	Grab	1/Month[3,~~4,~~12]	[5]
Diethyl Phthalate	µg/L	24-hr Composite	1/Month[3,~~4,~~12]	[5]
Dimethyl Phthalate	µg/L	24-hr Composite	1/Month[3,~~4~~]	[5]
4,6-dinitro-2-methylphenol	µg/L	24-hr Composite	1/Month[3,~~4,~~12]	[5]
2,4-dinitrophenol	µg/L	24-hr Composite	1/Month[3,~~4,~~12]	[5]
Ethylbenzene	µg/L	Grab	1/Month[3,~~4,~~12]	[5]
Fluoranthene	µg/L	24-hr Composite	1/Month[3,~~4,~~12]	[5]
Hexachlorocyclopentadiene	µg/L	24-hr Composite	1/Month[3,~~4~~]	[5]
Nitrobenzene	µg/L	24-hr Composite	1/Month[3,~~4,~~12]	[5]
Thallium, Total Recoverable	µg/L	24-hr Composite	1/Month[3,~~4,~~12]	[5]
Toluene	µg/L	Grab	1/Month[3,~~4,~~12]	[5]
Tributyltin	µg/L	24-hr Composite	1/Month[3,~~4,~~12]	[5]
1,1,1-trichloroethane	µg/L	Grab	1/Month[3,~~4,~~12]	[5]
OCEAN PLAN TABLE 1 PARAMETERS FOR PROTECTION OF HUMAN HEALTH – CARCINOGENS				
Acrylonitrile	µg/L	Grab	1/Month[3,~~4,~~12]	[5]
Aldrin	µg/L	24-hr Composite	1/Week[3,12]	[5]
Benzene	µg/L	Grab	1/Month[3,~~4,~~12]	[5]
Benzidine	µg/L	24-hr Composite	1/Month[3,~~4,~~12]	[5]
Beryllium, Total Recoverable	µg/L	24-hr composite	1/Month[3,~~4,~~12]	[5]
Bis (2-chloroethyl) Ether	µg/L	24-hr composite	1/Month[3,~~4,~~12]	[5]
Bis (2-ethlyhexyl) Phthalate	µg/L	24-hr composite	1/Month[3,~~4,~~12]	[5]
Carbon Tetrachloride	µg/L	Grab	1/Month[3,~~4,~~12]	[5]
Chlordane	µg/L	24-hr Composite	1/Week[3,~~4~~]	[5]
Chlorodibromomethane (dibromochloromethane)	µg/L	Grab	1/Month[3,~~4~~]	[5]
Chloroform	µg/L	Grab	1/Month[3,~~4~~]	[5]
DDT	µg/L	24-hr Composite	1/Week[3,~~4~~]	[5]
1,4-dichlorobenzene	µg/L	Grab	1/Month[3,~~4~~]	[5]
3,3'-dichlorobenzidine	µg/L	24-hr Composite	1/Month[3,~~4~~]	[5]
1,2-dichloroethane	µg/L	Grab	1/Month[3,~~4~~]	[5]
1,1-dichloroethylene	µg/L	Grab	1/Month[3,~~4~~]	[5]
Dichlorobromomethane	µg/L	24-hr Composite	1/Month[3,~~4~~]	[5]
Dichloromethane (Methylene Chloride)	µg/L	Grab	1/Month[3,~~4~~]	[5]
1,3-dichloropropene (1,3-Dichloropropylene)	µg/L	Grab	1/Month[3,~~4~~]	[5]

Parameter	Units	Sample Type	Minimum Sampling Frequency	Required Analytical Test Method
Dieldrin	µg/L	24-hr Composite	1/Week[3~~,4~~]	[5]
2,4-dinitrotoluene	µg/L	24-hr Composite	1/Month[3~~,4~~]	[5]
1,2-diphenylhydrazine	µg/L	24-hr Composite	1/Month[3~~,4~~]	[5]
Halomethanes	µg/L	Grab	1/Month[3~~,4~~]	[5]
Heptachlor	µg/L	24-hr Composite	1/Month[3~~,4~~]	[5]
Heptachlor Epoxide	µg/L	24-hr Composite	1/Month[3~~,4~~,12]	[5]
Hexachlorobenzene	µg/L	24-hr Composite	1/Month[3~~,4~~,12]	[5]
Hexachlorobutadiene	µg/L	24-hr Composite	1/Month[3~~,4~~,12]	[5]
Hexachloroethane	µg/L	24-hr Composite	1/Month[3~~,4~~,12]	[5]
Isophorone	µg/L	24-hr Composite	1/Month[3~~,4~~,12]	[5]
N-nitrosodimethylamine	µg/L	24-hr Composite	1/Month[3~~,4~~,12]	[5]
N-nitrosodi-N-propylamine	µg/L	24-hr Composite	1/Month[3~~,4~~]	[5]
N-nitrosodiphenylamine	µg/L	24-hr Composite	1/Month[3~~,4~~,12]	[5]
PAHs	µg/L	24-hr Composite	1/Month[3~~,4~~,12]	[5]
PCBs	µg/L	24-hr Composite	1/Week[3~~,4~~,12]	[5]
TCDD equivalents	µg/L	24-hr Composite	1/Month[3~~,4~~]	[5]
1,1,2,2-tetrachloroethane	µg/L	Grab	1/Month[3~~,4~~,12]	[5]
Tetrachloroethylene (Tetrachloroethene)	µg/L	Grab	1/Month[3~~,4~~,12]	[5]
Toxaphene	µg/L	24-hr Composite	1/Week[3~~,4~~,12]	[5]
Trichloroethylene (Trichloroethene)	µg/L	Grab	1/Month[3~~,4~~,12]	[5]
1,1,2-trichloroethane	µg/L	Grab	1/Month[3~~,4~~,12]	[5]
2,4,6-trichlorophenol	µg/L	24-hr Composite	1/Month[3~~,4~~,12]	[5]
Vinyl Chloride	µg/L	Grab	1/Month[3~~,4~~,12]	[5]
Remaining priority pollutants[9]	µg/L	24-hr Composite	1/Month	[5]

1 See Attachment A for definitions of abbreviations and a glossary of common terms used in this Order/Permit.

2 Report the total daily effluent flow and the monthly average effluent flow.

3 The Discharger shall calculate and report the mass emission rate (MER) of the constituent for each sample taken. The MER shall be calculated in accordance with section VII.J.4 of this Order/Permit.

4 For total chlorine residual, until a reliable method for continuous monitoring is available, the Discharger may meet this requirement with at least four grab samples per day, representative of the daily discharge, that is collected immediately prior to entering the PLOO and analyzed for total chlorine residual.~~The minimum frequency of monitoring for this constituent is automatically increased to twice the minimum frequency specified, if any analysis for this constituent yields a result higher than the applicable effluent limitation or performance goal specified in this Order/Permit. The increased minimum frequency of monitoring shall remain in effect until the results of a minimum of four consecutive analyses for this constituent are below all applicable effluent limitations or performance goals specified in this Order/Permit.~~

5 As required under 40 CFR part 136.

6 The Discharger may, at their option, apply this performance goal as a total chromium performance goal.

7 USEPA Method 1631E, with a quantitation level of 0.5 ng/L, shall be used to analyze total mercury.

8 If a Discharger can demonstrate to the satisfaction of the USEPA and the State Water Board that an analytical method is available to reliably distinguish between strongly and weakly complexed cyanide, effluent limitations for cyanide may be met by the combined measurement of free cyanide, simple alkali metals cyanides, and weakly complexed organometallic cyanide complexes. In order for the analytical method to be acceptable, the recovery of free cyanide from metal complexes must be comparable to that achieved by the approved method in 40 CFR part 136, as amended.

9 Also including the 301(h) pesticides listed at 40 CFR section 125.58(p).

10 For compliance determination, chronic toxicity results shall be reported as "Pass" or "Fail." For monitoring purpose only, chronic toxicity results shall also include "Percent Effect."

11 As specified in section VII.M of this Order/Permit and section III.C of this MRP (Attachment E).

12 The Discharger shall calculate and report the MER (metric ton per year, mt/yr) of the constituent for each sample

Parameter	Units	Sample Type	Minimum Sampling Frequency	Required Analytical Test Method

taken in the annual report. The MER shall be calculated in accordance with section VII.J.4 of this Order/Permit.

~~12~~13 The Discharger may meet the performance goal for total recoverable chromium (III) by calculating the difference between total recoverable chromium and total recoverable chromium (VI).

C. Whole Effluent Toxicity (WET) Testing Requirements

The WET refers to the overall aggregate toxic effect to aquatic organisms from all pollutants contained in a facility's wastewater (effluent). The control of WET is one approach this Order/Permit uses to control the discharge of toxic pollutants. WET tests evaluate the 1) aggregate toxic effects of all chemicals in the effluent including additive, synergistic, or antagonistic effects; 2) the effects of unmeasured chemicals in the effluent; and 3) variability in bioavailability of the chemicals in the effluent.

Monitoring to assess the overall toxicity of the effluent is required to answer the following questions:

(1) Does the effluent comply with permit effluent limitations for toxicity thereby ensuring that water quality standards are achieved in the receiving water?

(2) If the effluent does not comply with permit effluent limitations for toxicity, is the observed toxicity causing risk to aquatic life?

(3) If the effluent does not comply with permit effluent limitations, is the observed toxicity caused by one or more pollutants that are measured or unmeasured?

1. Discharge In-stream Waste Concentration (IWC) for Chronic Toxicity

   The chronic IWC is calculated by dividing 100 percent by the dilution ratio. The chronic toxicity IWC is 0.49 percent effluent.

2. Sample Volume and Holding Time

   The total sample volume shall be determined by the specific toxicity test method used. Sufficient sample volume shall be collected to perform the required toxicity test. For the receiving water, sufficient sample volume shall also be collected during accelerated monitoring for subsequent Toxicity Identification Evaluation (TIE) studies, if necessary, at each sampling event. All toxicity tests shall be conducted as soon as possible following sample collection. No more than 36 hours shall elapse between the conclusion of sample collection and test initiation.

3. Chronic Marine Species and Test Methods

   If effluent samples are collected from outfalls discharging to receiving waters with salinity >one parts per thousand (ppt), the Discharger shall conduct the following chronic toxicity tests on effluent samples, at the in-stream waste concentration for the discharge, in accordance with species and test methods in *Short-Term Methods for Estimating the Chronic Toxicity of Effluent and Receiving Waters to West Coast Marine Estuarine Organisms* (EPA/600/R-95/136, 1995). Artificial sea salts or hypersaline brine shall be used to increase sample salinity if needed. In no case shall these species be substituted with another test species unless written authorization from the San Diego Water Board and USEPA, Region IX is received.

   a. A static renewal toxicity test with the topsmelt, *Atherinops affinis* (Larval Survival and Growth Test Method 1006.01).

b. A static non-renewal toxicity test with the purple sea urchin, *Strongylocentrotus purpuratus*/sand dollar, *Dendraster excentricus* (Fertilization Test Method 1008.0); or a static non-renewal toxicity test with the red abalone, *Haliotis rufescens* (Larval Shell Development Test Method).

c. A static non-renewal toxicity test with the giant kelp, *Macrocystis pyrifera* (Germination and Growth Test Method 1009.0).

4. Species Sensitivity Screening

Species sensitivity screening shall be conducted during this Order/Permit's first required sample collection. The Discharger shall collect a single effluent sample to initiate and concurrently conduct three toxicity tests using the fish, an invertebrate, and the alga species previously referenced. This sample shall also be analyzed for the parameters required on a monthly frequency for the discharge, during that given month. As allowed under the test method for the *Atherinops affinis*, a second and third sample shall be collected for use as test solution renewal water as the seven-day toxicity test progresses. If the result of all three species is "Pass," then the species that exhibits the highest "Percent Effect" at the discharge IWC during species sensitivity screening shall be used for routine monitoring during this Order/Permit cycle. If only one species fails, then that species shall be used for routine monitoring during this Order/Permit cycle. Likewise, if two or more species result in "Fail," then the species that exhibits the highest "Percent Effect" at the discharge IWC during the suite of species sensitivity screening shall be used for routine monitoring during this Order/Permit cycle, until such time as a rescreening is required.

Species sensitivity rescreening is required every <u>24 months</u> if there has been discharge during dry weather conditions. If the discharge is intermittent and occurs only during wet weather, rescreening is not required. If rescreening is necessary, the Discharger shall rescreen with the marine vertebrate species, a marine invertebrate species, and the alga species previously referenced, and continue to monitor with the most sensitive species. If the first suite of rescreening tests demonstrates that the same species is the most sensitive then the rescreening does not need to include more than one suite of tests. If a different species is the most sensitive or if there is ambiguity, then the Discharger may proceed with suites of screening tests for a minimum of three, but not to exceed five suites.

The species used to conduct the receiving water monitoring shall be the most sensitive species from the most recent species sensitivity screening.

During the calendar month, toxicity tests used to determine the most sensitive test species shall be reported as effluent compliance monitoring results for the chronic toxicity maximum daily effluent limitation (MDEL).

5. Quality Assurance and Additional Requirements

Quality assurance measures, instructions, and other recommendations and requirements are found in the test methods manual previously referenced. Additional requirements are specified below.

a. The discharge is subject to determination of "Pass" or "Fail" from a chronic toxicity test using the Test of Significant Toxicity (TST) statistical t-test approach described in *National Pollutant Discharge Elimination System Test of Significant Toxicity Implementation Document* (EPA 833- R-10-003, 2010), Appendix A, Figure A-1 and Table A-1 and Appendix B, Table B-1. The null hypothesis (Ho) for the TST statistical approach is: Mean discharge IWC response ≤0.75 × Mean control response. A test result that rejects this null hypothesis is reported as “Pass.” A test result that does not reject this null hypothesis is reported as “Fail.” This is a t-test (formally Student’s t-test), a statistical analysis comparing two sets of replicate observations—in the case of WET, only two test concentrations (i.e., a control and IWC). The purpose of this statistical test is to determine if the means of the two sets of observations are different (i.e., if the IWC or receiving water concentration differs from the control (the test result is “Pass” or “Fail”). The Welch’s t-test employed by the TST statistical approach is an adaptation of Student’s t-test and is used with two samples having unequal variances. The relative “Percent Effect” at the discharge IWC is defined and reported as: ((Mean control response - Mean discharge IWC response) ÷ Mean control response) × 100.

b. If the effluent toxicity test does not meet all test acceptability criteria (TAC) specified in the referenced test method, Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to West Coast Marine and Estuarine Organisms (EPA/600/R-95/136, 1995) (see Table E-6, below), the test should be declared invalid, then the Discharger must resample and re-test within 14 days of test termination.

c. Dilution water and control water, including brine controls, shall be uncontaminated natural water, as specified in the test methods manual. If dilution water and control water is different from test organism culture water, then a second control using culture water shall also be used.

d. Monthly reference toxicant testing is sufficient. All reference toxicant test results should be reviewed and reported using the effects concentration at 25 percent (EC25).

e. The Discharger shall perform toxicity tests on final effluent samples. Chlorine and ammonia shall not be removed from the effluent sample prior to toxicity testing, unless explicitly authorized under this section of this MRP and the rationale is explained in the Fact Sheet (Attachment F).

6. Preparation of an Initial Investigation Toxicity Reduction Evaluation (TRE) Work Plan

The Discharger shall prepare and submit a copy of the Discharger’s Initial Investigation TRE Work Plan to the San Diego Water Board and USEPA, Region IX for approval within 90 days of the effective date of this Order/Permit. If the San Diego Water Board and/or USEPA, Region IX does not disapprove the work plan within 60 days, the work plan shall become effective. The Discharger shall use USEPA manual EPA/833B-99/002 (municipal) as guidance, or most current version. At a minimum, the work plan must contain the provisions in Attachment I, *Generic Toxicity Reduction Evaluation (TRE) Work Plan*. The TRE Work Plan shall describe the steps that the Discharger intends to follow if toxicity is detected, and shall include, at a minimum:

a. A description of the investigation and evaluation techniques that will be used to identify potential causes and sources of toxicity, effluent variability, and treatment system efficiency;

b. A description of the Facility’s methods of maximizing in-house treatment efficiency and good housekeeping practices, and a list of all chemicals used in the operation of the Facility; and,

c. If a TIE is necessary, an indication of the person who would conduct the TIEs (i.e., an in-house expert or an outside contractor).

7. Accelerated Monitoring Schedule for Maximum Daily Single Result: “Fail.”

The Maximum Daily single result shall be used to determine if accelerated testing needs to be conducted.

Once the Discharger becomes aware of this result, the Discharger shall notify the San Diego Water Board and USEPA, Region IX and implement an accelerated monitoring schedule within five calendar days of the receipt of the result. However, if the sample is contracted out to a commercial laboratory, the Discharger shall ensure that the San Diego Water Board and USEPA, Region IX are notified and the first of four accelerated monitoring tests is initiated within seven calendar days of the Discharger becoming aware of the result. The accelerated monitoring schedule shall consist of four toxicity tests (including the discharge IWC), conducted at approximately two week intervals, over an eight week period; in preparation for the TRE process and associated reporting, these results shall also be reported using the EC25. If each of the accelerated toxicity tests results in “Pass,” the Discharger shall return to routine monitoring for the next monitoring period. If one of the accelerated toxicity tests results in “Fail,” the Discharger shall immediately implement the TRE Process conditions set forth below. During accelerated monitoring schedules, only TST results (“Pass” or “Fail”) for chronic toxicity tests shall be reported as effluent compliance monitoring results for the chronic toxicity MDEL.

8. TRE Process

During the TRE Process, monthly effluent monitoring shall resume and TST results (“Pass” or “Fail”) for chronic toxicity tests shall be reported as effluent compliance monitoring results for the chronic toxicity MDEL.

a. Preparation and Implementation of Detailed TRE Work Plan. The Discharger shall immediately initiate a TRE using, according to the type of treatment facility, USEPA manual *Toxicity Reduction Evaluation Guidance for Municipal Wastewater Treatment Plants* (EPA/833/B-99/002, 1999) and, within 15 days of receiving validated results, submit to the San Diego Water Board and USEPA, Region IX a Detailed TRE Work Plan, which shall follow the Initial Investigation TRE Work Plan revised as appropriate for this toxicity event. It shall include the following information, and comply with additional conditions set by the San Diego Water Board and/or USEPA, Region IX:

   i. Further actions by the Discharger to investigate, identify, and correct the causes of toxicity;

   ii. Actions the Discharger will take to mitigate the effects of the discharge and prevent the recurrence of toxicity; and

   iii. A schedule for these actions, progress reports, and the final report.

b. TIE Implementation. The Discharger may initiate a TIE as part of a TRE to identify the causes of toxicity using the same species and test method and, as guidance, USEPA manuals: *Methods for Aquatic Toxicity Identification Evaluations: Phase I Toxicity Characterization Procedures* (EPA/600/6-91/003, 1991); *Methods for Aquatic Toxicity Identification Evaluations, Phase II Toxicity Identification Procedures for Samples Exhibiting Acute and Chronic Toxicity* (EPA/600/R-92/080, 1993); *Methods for Aquatic Toxicity Identification Evaluations, Phase III Toxicity Confirmation Procedures for Samples Exhibiting Acute and Chronic Toxicity* (EPA/600/R-92/081, 1993); and *Marine Toxicity Identification Evaluation (TIE): Phase I Guidance Document* (EPA/600/R-96-054, 1996). The TIE should be conducted on the species demonstrating the most sensitive toxicity response.

c. Many recommended TRE elements parallel required or recommended efforts for source control, pollution prevention, and storm water control programs. TRE efforts should be coordinated with such efforts. As toxic substances are identified or characterized, the Discharger shall continue the TRE by determining the sources and evaluating alternative strategies for reducing or eliminating the substances from the discharge. All reasonable steps shall be taken to reduce toxicity to levels consistent with toxicity evaluation parameters.

d. The Discharger shall continue to conduct routine effluent monitoring for compliance determination purposes while the TRE and/or TIE process is taking place. Additional accelerated monitoring and TRE Work Plans are not required once a TRE is begun.

e. The San Diego Water Board and USEPA, Region IX recognizes that toxicity may be episodic and identification of causes and reduction of sources of toxicity may not be successful in all cases. The TRE may be ended at any stage if monitoring finds there is no longer toxicity.

9. Reporting

The Self-Monitoring Report (SMR) shall include a full laboratory report for each toxicity test. This report shall be prepared using the format and content of the test methods manual chapter called Report Preparation, and shall include:

a. The valid toxicity test results for the TST statistical approach, reported as “Pass” or “Fail” and “Percent Effect” at the chronic toxicity IWC for the discharge. All toxicity test results (whether identified as valid or otherwise) conducted during the calendar month shall be reported on the SMR due date specified in Table E-10.

b. Summary water quality measurements for each toxicity test (e.g., pH, dissolved oxygen, temperature, conductivity, hardness, salinity, chlorine, ammonia).

c. The statistical analysis used in *National Pollutant Discharge Elimination System Test of Significant Toxicity Implementation Document* (EPA 833-R-10-003, 2010) Appendix A, Figure A-1 and Table A-1, and Appendix B, Table B-1.

d. TRE/TIE results. The San Diego Water Board and USEPA, Region IX shall be notified no later than 30 days from completion of each aspect of TRE/TIE analyses. Prior to the completion of the final TRE/TIE report, the Discharger shall provide status updates in the monthly monitoring reports, indicating which TRE/TIE steps are underway and which steps have been completed.

e. Statistical program (e.g., TST calculator, CETIS, etc.) output results, including graphical plots, for each toxicity test.

f. Graphical plots and tables clearly showing the laboratory’s performance for the reference toxicant for the previous 20 tests and the laboratory’s performance for the control mean, control standard deviation, and control coefficient of variation for the previous 12-month period.

g. Any additional quality assurance/quality control (QA/QC) documentation or any additional chronic toxicity-related information, upon written request from the San Diego Water Board and/or USEPA, Region IX.

D. Land Discharge Monitoring Requirements – Not Applicable

E. Recycling Monitoring Requirements – Not Applicable

IV. RECEIVING WATER MONITORING REQUIREMENTS

The receiving water and sediment monitoring requirements set forth below are designed to measure the effects of the Facility discharge on the receiving ocean waters. The overall receiving water monitoring program is intended to answer the following questions:

(1) Does the receiving water meet water quality standards?

(2) Are the receiving water conditions getting better or worse over time?

(3) What is the relative contribution of the Facility discharge to pollution in the receiving water?

Receiving water and sediment monitoring in the vicinity of the Point Loma Ocean Outfall (PLOO) shall be conducted as specified below. This program is intended to document conditions within the waste field in the vicinity of the zone of initial dilution (ZID) boundary, at reference stations, and at areas beyond the ZID where discharge impacts might be reasonably expected. Station location, sampling, sample preservation and analyses, when not specified, shall be by methods approved by the San Diego Water Board and USEPA, Region IX. The monitoring program may be modified by the San Diego Water Board and/or USEPA, Region IX at any time. The Discharger may also submit a list of proposed changes with supporting rational to these monitoring requirements that it considers to be appropriate to the San Diego Water Board and USEPA, Region IX for approval.

During monitoring events, sample stations shall be located using a land-based microwave positioning system or a satellite positioning system such as global positioning system (GPS). If an alternate navigation system is proposed, its accuracy should be compared to that of microwave and satellite based systems, and any compromises in accuracy shall be justified.

A. Shoreline Water Quality Monitoring Requirements

As ocean surface waves come closer to shore they break, forming the foamy, bubbly surface called surf. The region of breaking waves defines the shoreline.

Monitoring of the shoreline is intended to answer the following questions:

(1) Does the effluent cause or contribute to an exceedance of the water quality standards in the receiving water?

(2) Does the effluent reach water contact zones or commercial shellfish beds?

(3) Are densities of bacteria in water contact areas below levels protective of public health?

1. All shoreline stations (listed in Table E-1) shall be monitored as follows:

Table E-5. Shoreline Monitoring[1]

Parameter	Units	Sample Type	Minimum Sampling Frequency
Visual Observations	--	Visual	[2]
Temperature	°C	Grab	1/Week
Total and Fecal Coliforms; Enterococcus	colony forming units (CFU) /100 ml	Grab	1/Week[3]

1 See Attachment A for definitions of abbreviations and a glossary of common terms used in this Order/Permit.

2 Visual observations of the surface water conditions at the designated receiving water stations shall be conducted in such a manner as to enable the observer to describe and report the presence, if any, of floatables of sewage origin. Observations of wind (direction and speed), weather (cloudy, sunny, or rainy), direction of current, tidal conditions

(high or low), water color, discoloration, oil and grease, turbidity, and odor shall be recorded. These observations shall be taken whenever a sample is collected. Visual observations shall also be conducted for repeat sampling.

3. If a single sample exceeds any of the single sample maximum bacterial standards contained in section V.A.1.a.ii of this Order/Permit, repeat sampling at that location shall be conducted to determine the extent and persistence of the exceedance. Repeat sampling shall be conducted within 24 hours of receiving analytical results and continued until the sample result is less than the single sample maximum standard or until a sanitary survey is conducted to determine the source of the high bacterial densities. When repeat sampling is required because of an exceedance of any one single sample density, results from all samples collected during that 30-day period will be used to calculate the 30-day geometric mean.

2. Sample Station Omission Due to Storm Condition (including required repeat sampling). In the event of stormy weather which makes sampling hazardous at certain shoreline stations, collection of samples at such stations may be omitted, provided that such omissions do not occur more than five days in any calendar year or occur at consecutive sampling times, or provided that a written request from the Discharger is approved by the Executive Officer in writing. The visual observations listed in footnote no. 2 to Table E-~~6~~ 5 above shall still be recorded and reported in the monthly SMR to the San Diego Water Board and USEPA, Region IX for these stations at the time the sample collection. If practicable, an effort should be made to return to the sampling station that was omitted and collect the sample during calmer conditions within the same reporting period.

B. Offshore Water Quality Monitoring Requirements

Offshore monitoring is necessary to answer the following questions:

(1) Is natural light significantly reduced at any point outside the ZID as a result of the discharge?

(2) Does the discharge cause a discoloration of the ocean surface?

(3) Does the discharge of oxygen demanding waste cause the dissolved oxygen concentration to be depressed at any time more than 10 percent from that which occurs naturally outside the ZID?

(4) Does the discharge of waste cause the pH to change at any time more than 0.2 units from that which occurs naturally outside the ZID?

(5) Is the wastewater plume encroaching upon receiving water areas used for swimming, surfing, diving, and shellfish harvesting?

(6) What is the fate of the discharge plume?

1. Offshore receiving water monitoring shall be conducted at the offshore monitoring stations (listed in Table E-1) as follows:

Table E-6. Offshore Monitoring Requirements[1]

Parameter	Units	Sample Type	Sampling Frequency[2,3]	
			Offshore	Kelp
Visual Observations	--	Visual	[4]	[4]
Temperature and Depth[5]	~~practical salinity units,~~ °C, meters	Profile	1/Quarter	1/Week
pH[5]	units	Profile	1/Quarter	1/Week
Salinity[5]	part per thousand (ppt)	Profile	1/Quarter	1/Week
Dissolved Oxygen[5]	mg/L	Profile	1/Quarter	1/Week

Light Transmittance[5]	percent	Profile	1/Quarter	1/Week
Chlorophyll a[5]	μg/L	Profile	1/Quarter	1/Week
Total Coliforms	CFU/100 ml	Grab	--	1/Week
Fecal Coliforms	CFU/100 ml	Grab	--	1/Week
Enterococcus	CFU/100 ml	Grab	1/Quarter	1/Week

1 See Attachment A for definitions of abbreviations and a glossary of common terms used in this Order/Permit.

2 Quarterly receiving water monitoring results shall be submitted within the monthly SMR for the month in which the monitoring was conducted.

3 Shall be monitored at all applicable discrete depths specified for bacterial monitoring in Table E-1 of this MRP.

4 Visual observations of the surface water conditions at the designated receiving water stations shall be conducted in such a manner as to enable the observer to describe and report the presence, if any, of floatables of sewage origin. Observations of wind (direction and speed), weather (cloudy, sunny, or rainy), direction of current, tidal conditions (high or low), water color, oil and grease, turbidity, and odor shall be recorded. These observations shall be taken whenever a sample is collected.

5 Temperature, depth, salinity, dissolved oxygen, light transmittance, pH, and chlorophyll a profile data shall be measured throughout the entire water column during the quarterly and weekly sampling events.

2. Plume Tracking

   a. Plume Tracking Monitoring Plan (PTMP). Within 180 days of the effective date of this Order/Permit, the Discharger shall, in consultation with the San Diego Water Board and USEPA, Region IX, prepare and submit a PTMP to implement an ongoing program designed to map dispersion and fate of the wastewater plume discharged from the PLOO. The PTMP shall include, but is not limited to, the following elements.

      i. Installation and operation by the Discharger of a permanent, real-time oceanographic mooring system located near the terminal diffuser wye structure of the PLOO. The mooring system shall be designed to measure, at minimum, direction and velocity of subsurface currents, and ocean stratification.

      ii. Development of a work plan or pilot study (special study) for implementation of the PLOO real-time mooring system, including data acquisition and processing.

      iii. Networking the PLOO system to be compatible with a similar system being deployed by the Discharger near the South Bay Ocean Outfall discharge site, as well as a third system operated by the University of California San Diego, Scripps Institution of Oceanography in the coastal waters off the City of Del Mar.

      iv. Development of a work plan or pilot study (special study) for utilizing advanced oceanographic sampling technologies such as an autonomous underwater vehicle (AUV) or remotely operated towed vehicle (ROTV) in conjunction with the PLOO real-time mooring system to enhance collection of water quality data in real-time and provide higher resolution maps of plume location and movement.

   b. Plume Tracking Implementation. The Discharger shall implement the PTMP within sixty (60) days after submission in accordance with the scheduled contained in the PTMP unless otherwise directed by the San Diego Water Board and USEPA, Region IX.

   c. Plume Tracking Reporting. The Discharger shall submit reports to the San Diego Water Board and USEPA, Region IX on the PLOO real-time mooring system and associated pilot studies (e.g., AUV/ROTV surveys) biennially in accordance with the due dates specified in Table E-10 for the Biennial Receiving Waters Monitoring and Assessment Report. These reports shall include in-depth discussion, evaluation, interpretation, and tabulation of the real-time mooring and other project data. Report interpretations and conclusions shall include the state of the receiving waters into which the PLOO discharges and the estimated location of the PLOO plume throughout the reporting period, Additional project progress reports may also be required per approved work plan schedules.

C. Benthic Monitoring Requirements

Seafloor sediments integrate constituents that are discharged to the ocean. Most particles that come from the PLOO discharge, and any associated contaminants, will eventually settle to the seafloor where they are incorporated into the existing sediments. Sediments can accumulate these particles over the years until the point where sediment quality is degraded and beneficial uses are impaired.

Benthic organisms are strongly affected by sediment contaminant exposure because these organisms often live in continual direct contact with sediment/pore water, and many species ingest significant quantities of sediment as a source of nutrition. Because the benthos are dependent on their surroundings, they serve as a biological indicator that reflects the overall conditions of the aquatic environment.

The assessment of sediment quality with respect to sediment chemistry, sediment toxicity and benthic community condition is necessary to answer the following questions:

(1) Is the dissolved sulfide concentration of waters in sediments significantly increased above that present under natural conditions?

(2) Is the concentration of substances, set forth in Table 1 of the Ocean Plan for protection of marine aquatic life, in marine sediments at levels which would degrade the benthic community?

(3) Is the concentration of organic pollutants in marine sediments at levels that would degrade the benthic community?

(4) Are benthic communities degraded as a result of the discharge?

(5) Is the sediment quality changing over time?

The assessment of sediment quality to evaluate potential effects of the PLOO discharge and compliance with narrative water quality standards specified in the Ocean Plan consist of the measurement and integration of three lines of evidence: 1) physical and chemical properties of seafloor sediments, 2) seafloor sediment toxicity to assess bioavailability and toxicity of sediment contaminants, and 3) ecological status of the biological communities (benthos) that live in or on the seafloor sediments.

1. Sediment Assessment for Physical and Chemical Properties

   a. Sediment Sampling Stations and Monitoring Frequency. The core sediment monitoring program is designed to assess spatial and temporal trends at 22 offshore benthic stations listed in Table E-1, including 12 primary core stations located along the outfall discharge depth contour and 10 secondary core stations located at other depths. At the discretion of the San Diego Water Board and USEPA, Region IX, the requirement for sampling the secondary stations may be relaxed to allow Discharger participation in Southern California Bight Regional Monitoring efforts, or to reallocate resources to accommodate approved Strategic Process Studies. Sediment samples shall be collected twice per year during the winter (e.g., January) and summer (e.g., July) at each of the above referenced benthic stations in order to assess benthic habitat condition in terms of physical and chemical composition (e.g., grain-size distribution, sediment chemistry).

b. Sediment Sample Collection Methods. Sediment samples shall be taken using a 0.1-square meter modified Van Veen grab sampler. Samples for grain-size and chemical analyses shall be collected from within the upper two centimeters of the surface sediment. Bulk sediment chemical analysis shall include at a minimum the set of constituents listed in Table E-~~8~~ 7 below.

c. Sediment Chemistry. Sediment chemistry is the measurement of the concentration of chemicals of concern in sediments. The chemistry line of evidence is used to assess the potential overall exposure risk to benthic organisms from pollutants in surficial sediments. Chemical analysis of sediment shall be conducted using USEPA approved methods, methods developed by the National Oceanic and Atmospheric Administration's (NOAA's) *National Status and Trends for Marine Environmental Quality*, or methods developed in conjunction with the Southern California Bight Regional Monitoring Program. For chemical analysis of sediment, samples shall be reported on a dry weight basis.

Sediment monitoring for physical and chemical properties shall be conducted at the offshore benthic stations listed in Table E-1 as follows:

Table E-7. Sediment Monitoring Requirements[1]

Parameter	Units	Type of Sample	Minimum Frequency
Sediment Grain Size	micrometer (μm)	Grab	2/Year
Total Organic Carbon	Percent	Grab	2/Year
Total Nitrogen	Percent	Grab	2/Year
Acid Volatile Sulfides	Milligram/ kilogram (mg/kg)	Grab	2/Year
~~Dissolved Sulfides~~	~~mg/kg~~	~~Grab~~	~~2/Year~~
Aluminum	mg/kg	Grab	2/Year
Antimony	mg/kg	Grab	2/Year
Arsenic	mg/kg	Grab	2/Year
Cadmium	mg/kg	Grab	2/Year
Chromium	mg/kg	Grab	2/Year
Copper	mg/kg	Grab	2/Year
Iron	mg/kg	Grab	2/Year
Lead	mg/kg	Grab	2/Year
Manganese	mg/kg	Grab	2/Year
Mercury	mg/kg	Grab	2/Year
Nickel	mg/kg	Grab	2/Year
Selenium	mg/kg	Grab	2/Year
Silver	mg/kg	Grab	2/Year
Tin	mg/kg	Grab	2/Year
Zinc	mg/kg	Grab	2/Year
PCBs	nanograms/ kilogram (ng/kg)	Grab	2/Year
2,4-DDD	ng/kg	Grab	2/Year
4,4-DDD	ng/kg	Grab	2/Year
2,4-DDE	ng/kg	Grab	2/Year

Parameter	Units	Type of Sample	Minimum Frequency
4,4-DDE	ng/kg	Grab	2/Year
2,4-DDT	ng/kg	Grab	2/Year
4,4-DDT	ng/kg	Grab	2/Year
Aldrin	ng/kg	Grab	2/Year
Alpha-Chlordane	ng/kg	Grab	2/Year
Dieldrin	ng/kg	Grab	2/Year
Endosulfan	ng/kg	Grab	2/Year
Endrin	ng/kg	Grab	2/Year
Gamma-BHC	ng/kg	Grab	2/Year
Heptachlor	ng/kg	Grab	2/Year
Heptachlor Epoxide	ng/kg	Grab	2/Year
Hexachlorobenzene	ng/kg	Grab	2/Year
Mirex	ng/kg	Grab	2/Year
Trans-Nonachlor	ng/kg	Grab	2/Year
Acenapthene	microgram/ kilogram (µg/kg)	Grab	2/Year
Acenaphthylene	µg/kg	Grab	2/Year
Anthracene	µg/kg	Grab	2/Year
Benzo(a)anthracene	µg/kg	Grab	2/Year
Benzo(o)fluoranthene	µg/kg	Grab	2/Year
Benzo(k)fluoranthene	µg/kg	Grab	2/Year
Benzo(ghi)pyrelene	µg/kg	Grab	2/Year
Benzo(a)pyrene	µg/kg	Grab	2/Year
Benzo(e)pyrene	µg/kg	Grab	2/Year
Biphenyl	µg/kg	Grab	2/Year
Chrysene	µg/kg	Grab	2/Year
Dibenz(ah)anthraces	µg/kg	Grab	2/Year
Fluoranthene	µg/kg	Grab	2/Year
Fluorene	µg/kg	Grab	2/Year
Ideno(123cd)pyrene	µg/kg	Grab	2/Year
Naphthalene	µg/kg	Grab	2/Year
1-Methylnaphthalene	µg/kg	Grab	2/Year
2-Methylnaphthalene	µg/kg	Grab	2/Year
2,6-Dimethylnaphthalene	µg/kg	Grab	2/Year
2,3,5-Trimethylnaphthale	µg/kg	Grab	2/Year
Perylene	µg/kg	Grab	2/Year
Phenanthrene	µg/kg	Grab	2/Year
1-Methylphenanthene	µg/kg	Grab	2/Year
Pyrene	µg/kg	Grab	2/Year

1. See Attachment A for definitions of abbreviations and a glossary of common terms used in this Order/Permit.

2. Sediment Toxicity. Sediment toxicity is a measure of the response of invertebrates exposed to surficial sediments under controlled laboratory conditions. The sediment toxicity line of evidence is used to assess both pollutant related biological effects and exposure. The Discharger shall implement the *Sediment Toxicity Monitoring Plan for the South Bay Ocean Outfall and Point Loma Ocean Outfall Monitoring Regions, San Diego, California, Submitted by City of San Diego Public Utilities Department Environmental Monitoring & Technical Services Division, August 28, 2015* (Sediment Toxicity Plan) in accordance with the schedule contained in the Sediment Toxicity Plan unless otherwise directed in writing by the San Diego Water Board and USEPA, Region IX. Before

beginning sample collection activities, the Discharger shall comply with any conditions set by the San Diego Water Board and USEPA, Region IX.

3. Benthic Community Condition

   a. Benthic Community Sampling Stations and Frequency. Sediment samples for assessment of benthic community structure shall be collected twice per year during winter (e.g., January) and summer (e.g., July) at each of the 22 offshore benthic stations listed in Table E-1. One sample per station shall be collected for analysis of benthic community structure.

   b. Benthic Community Sample Collection Methods. Benthic community sample shall be collected using the guidance specified in the most recent field manual developed for the Southern California Bight Regional Monitoring Program. The benthic samples shall be collected using a 0.1-square meter modified Van Veen grab sampler. These grab samples shall be separate from (but adjacent to as much as possible) samples collected for sediment grain-size and chemistry. The samples shall be sieved using a 1.0-millimeter mesh screen. The benthic organisms retained on the sieve shall be fixed in 10 percent buffered formalin, and transferred to at least 70 percent ethanol within two to seven days of storage. Benthic organisms, obtained during benthic monitoring shall be counted and identified to as low a taxon as possible.

   c. Benthic Community Analysis. Analysis of benthic community structure shall include determination of the number of species, number of individuals per species, and total numerical abundance present. The following parameters or metrics shall be calculated for each 0.1-square meter grab sample and summarized by station, as appropriate:

      i. Number of species;

      ii. Total numerical abundance;

      iii. Benthic Response Index (BRI);

      iv. Swartz's 75 percent dominance index;

      v. Shannon-Weiner's diversity index (H); and

      vi. Pielou evenness index (J).

      In addition to summarizing the above benthic community structure parameters at each station, a more rigorous assessment shall be performed as detailed in this MRP, section IV.E.

   d. Benthic Random Sampling. This MRP and the MRPs for the South Bay Ocean Outfall (SBOO)[1] require U.S. Section of the International Boundary and Water Commission (USIBWC) and the Discharger to sample and analyze annually for sediment chemistry and benthic community conditions at an additional array of 40 randomly selected stations. The same sampling and processing procedures must be

[1] Order No. R9-2013-0006 as amended by Order No. R9-2014-0071, NPDES No. CA0109045, Waste Discharge Requirements for the City of San Diego South Bay Water Reclamation Plant Discharge to the Pacific Ocean via the South Bay Ocean Outfall, Monitoring and Reporting Program (Attachment E)
Order No. R9-2014-0009 as amended by Order No. R9-2014-0094, NPDES Permint No. CA0108928, Waste Discharge Requirements for the United States Section of the International Boundary and Water Commission, South Bay International Wastewater Treatment Plant, Discharge to the Pacific Ocean via the South Bay Ocean Outfall, Monitoring and Reporting Program (Attachment E)

followed as outlined above for core benthic sediment and benthic community condition monitoring. These 40 randomly selected stations shall be reselected each year by USEPA and San Diego Water Board, or their designee to meet the requirements for both this MRP and the MRPs for the SBOO, using the USEPA probability-based Environmental Monitoring and Assessment Program (EMAP) design.

The random benthic sampling requirement may be suspended as part of a resource exchange agreement to allow for participation in the Southern California Bight Regional Monitoring Surveys at the discretion of the San Diego Water Board and USEPA, Region IX.

D. Fish and Invertebrate Monitoring Requirements

Many pollutants discharged into receiving waters have the potential to bioaccumulate and persist in tissues of aquatic organisms, including marine fishes. Chemical pollutants that bioaccumulate tend to magnify in concentration as they pass through the aquatic food chain. Therefore, fish monitoring data is required to assess the human health risks for individuals who may consume fish and to assess trends of contaminants levels in the receiving waters over time.

Aquatic benthic invertebrates are excellent indicators of ecosystem health because they are ubiquitous, abundant, diverse, and typically sedentary. The growth, survival, and reproduction of many species of aquatic invertebrates are all sensitive to changes in environmental health, making analysis of assemblage structure a good ecosystem monitoring tool.

Fish and invertebrate monitoring is necessary to answer the following questions:

(1) Does the concentration of pollutants in fish, shellfish, or other marine organisms used for human consumption bioaccumulate to levels that are harmful to human health?

(2) Does the concentration of pollutants in marine life bioaccumulate to levels that degrade marine communities?

(3) Are the concentrations of pollutants in fish and other marine organisms changing over time?

(4) Is the health of fish changing over time?

(5) Are the populations of selected species of fish and invertebrates changing over time?

1. Fish and Invertebrate Trawls

   a. Fish and Invertebrate Trawl Frequency and Monitoring Stations. Epibenthic trawls shall be conducted to assess the structure of demersal fish and megabenthic invertebrate communities, while the presence of priority pollutants in fish will be analyzed from species captured using both trawling and rig fishing techniques. Single community trawls for fish and invertebrates shall be conducted semi-annually in the winter (e.g., January) and summer (e.g., July) at six trawl stations at the locations listed in Table E-1. These stations represent two areas near Discharge Point No. 001 (stations SD-010 and SD-012), two areas up coast of Discharge Point No. 001 (stations SD-013 and SD-014), and two areas down coast of Discharge Point No. 001 (SD-007 and SD-008). Trawls shall be conducted using a Marinovich 7.62 m (25 feet) head rope otter trawl, using the guidance specified in the most recent field manual developed for the Southern California Bight Regional Monitoring Program. Captured organisms shall be identified at all stations.

In order to minimize negative impacts that may occur due to unsuccessful trawling efforts associated with unusual environmental conditions, the requirement to conduct trawls during any given period may be postponed or waived at the discretion of the Executive Officer of the San Diego Water Board, in concurrence with USEPA, upon receipt of written justification provided by the Discharger. Examples of such unusual events include the presence of large populations of red tuna crabs (*Pleuroncodes planipes*) associated with El Niño and the occurrence of large squid egg masses that prevent hauling in the trawl nets.

b. Fish and Invertebrate Community Structure Analysis. All demersal fishes and megabenthic invertebrates collected by trawls should be identified to species if possible. For fish, community structure analysis shall consist of determining the standard length and total wet weight, total number of individuals per species, the total numerical abundance of all fish, species richness, species diversity (H'), and multivariate pattern analyses (e.g., ordination and classification analyses). The presence of any physical abnormalities or disease symptoms (e.g., fin erosion, external lesions, and tumors) or external parasites shall also be recorded. For invertebrates, community structure shall be summarized as the total number of individuals per species, the total numerical abundance of all invertebrates, species richness, and species diversity (H').

c. Fish Tissue Chemical Analysis. Chemical analyses of fish tissues shall be performed annually (e.g., during October) on target species collected at or near the trawl stations. The six stations are classified into four zones for the purpose of collecting sufficient numbers of fish for tissue analyses. Trawl Zone 1 represents the nearfield zone, defined as the area within a 1-km radius of stations SD-010 and/or SD-012; Trawl Zone 2 is considered the northern farfield zone, defined as the area within a 1-km radius of stations SD-013 and/or SD-014; Trawl Zone 3 represents the LA-5 disposal site zone, and is defined as the area centered within a 1-km radius of station SD-008; and Trawl Zone 4 is considered the southern farfield zone, and is defined as the area centered within a 1-km radius of station SD-007.

Liver tissues shall be analyzed during each survey from fishes collected in each of the above four trawl zones. No more than a maximum of five 10-minute (bottom time) trawls shall be required per zone in order to acquire sufficient numbers of fish for composite samples; these trawls may occur anywhere within a defined zone. If sufficient numbers of trawl zone target species cannot be, or are unlikely to be, captured by trawling, fish for tissue analysis from these areas may be collected using alternative methods such as those described below under Rig Fishing in section IV.D.2.b of this MRP (e.g., hook and line, baited lines).Three replicate composite samples shall be prepared from each trawl zone, with each composite consisting of tissues from at least three individual fish of the same species. These liver tissues shall be analyzed for the constituents listed in the Table E-9 below.

Table E-8. Fish Tissue Monitoring Requirements[1]

Parameter	Units	Type of Sample	Minimum Frequency
Total Lipids	µg/kg	Composite	Annual
Aluminum	mg/kg	Composite	Annual
Antimony	mg/kg	Composite	Annual
Arsenic	mg/kg	Composite	Annual
Cadmium	mg/kg	Composite	Annual
Chromium	mg/kg	Composite	Annual

Parameter	Units	Type of Sample	Minimum Frequency
Copper	mg/kg	Composite	Annual
Iron	mg/kg	Composite	Annual
Lead	mg/kg	Composite	Annual
Manganese	mg/kg	Composite	Annual
Mercury	mg/kg	Composite	Annual
Nickel	mg/kg	Composite	Annual
Selenium	mg/kg	Composite	Annual
Silver	mg/kg	Composite	Annual
Tin	mg/kg	Composite	Annual
Zinc	mg/kg	Composite	Annual
PCBs	µg/kg	Composite	Annual
2,4-DDD	µg/kg	Composite	Annual
4,4-DDD	µg/kg	Composite	Annual
2,4-DDE	µg/kg	Composite	Annual
4,4-DDE	µg/kg	Composite	Annual
2,4-DDT	µg/kg	Composite	Annual
4,4-DDT	µg/kg	Composite	Annual
Aldrin	µg/kg	Composite	Annual
Alpha-Chlordane	µg/kg	Composite	Annual
Dieldrin	µg/kg	Composite	Annual
Endosulfan	µg/kg	Composite	Annual
Endrin	µg/kg	Composite	Annual
Gamma-BHC	µg/kg	Composite	Annual
Heptachlor	µg/kg	Composite	Annual
Heptachlor Epoxide	µg/kg	Composite	Annual
Hexachlorobenzene	µg/kg	Composite	Annual
Mirex	µg/kg	Composite	Annual
Trans-Nonachlor	µg/kg	Composite	Annual
Acenapthene	µg/kg	Composite	Annual
Acenaphthylene	µg/kg	Composite	Annual
Anthracene	µg/kg	Composite	Annual
Benzo(a)anthracene	µg/kg	Composite	Annual
Benzo(o)fluoranthene	µg/kg	Composite	Annual
Benzo(k)fluoranthene	µg/kg	Composite	Annual
Benzo(ghi)pyrelene	µg/kg	Composite	Annual
Benzo(a)pyrene	µg/kg	Composite	Annual
Benzo(e)pyrene	µg/kg	Composite	Annual
Biphenyl	µg/kg	Composite	Annual
Chrysene	µg/kg	Composite	Annual
Dibenz(ah)anthraces	µg/kg	Composite	Annual
Fluoranthene	µg/kg	Composite	Annual
Fluorene	µg/kg	Composite	Annual
Ideno(123cd)pyrene	µg/kg	Composite	Annual
Naphthalene	µg/kg	Composite	Annual
1-Methylnaphthalene	µg/kg	Composite	Annual
2-Methylnaphthalene	µg/kg	Composite	Annual
2,6-Dimethylnaphthalene	µg/kg	Composite	Annual
2,3,5-Trimethylnaphthale	µg/kg	Composite	Annual
Perylene	µg/kg	Composite	Annual
Phenanthrene	µg/kg	Composite	Annual
1-Methylphenanthene	µg/kg	Composite	Annual

Parameter	Units	Type of Sample	Minimum Frequency
Pyrene	µg/kg	Composite	Annual

1. See Attachment A for definitions of abbreviations and a glossary of common terms used in this Order/Permit.

d. Fish Targeted for Analysis. The species of fish targeted for tissue analysis from the trawl sites shall be primarily flatfish including, but not limited to, Pacific sanddab (*Citharichthys sordidus*), longfin sanddab (*Citharichthys xanthostigma*), bigmouth sole (*Hippoglossina stomata*), and hornyhead turbot (*Pleuronichthys verticalis*). If sufficient numbers of these primary flatfish species are not present in a zone, secondary candidate species such as the California scorpionfish (*Scorpaena guttata*) and halfbanded rockfish (*Sebastes semicinctus*) may be collected as necessary.

2. Rig Fishing

a. Rig Fishing Frequency. Muscle tissues shall be analyzed annually (~~i.e.~~ e.g., during October) from fishes collected in each of the two rig fishing zones described below in order to monitor the uptake of pollutants in species and tissues that are consumed by humans.

b. Rig Fishing Method and Location. The fish shall be collected by hook and line or by setting baited lines from within zones surrounding rig fishing stations RF-001 and FR-002 listed in Table E-1. Rig Fishing Zone 1 is the nearfield area centered within a 1-km radius of station RF-001; and Rig Fishing Zone 2 is considered the farfield area centered within a 1-km radius of station RF-002. There are no depth requirements for these two rig fishing zones with regards to the collection of fishes for tissue analysis. The species targeted for muscle tissue analysis in the rig fishing stations shall be representative of those caught by recreational and/or commercial fishery activities in the region. The species targeted for muscle tissue analysis shall be primarily rockfish, which may include, but are not limited to, the vermilion rockfish (*Sebastes miniatus*) and the copper rockfish (*Sebastes caurinus*). If sufficient numbers of these primary species are not present or cannot be caught in a particular zone, secondary target species (e.g., other rockfish, scorpionfish) may be collected and analyzed as necessary. Fish samples shall be identified to species, with number of individuals per species, standard length and wet weight recorded. Physical abnormalities and disease symptoms shall be recorded and itemized (e.g., fin rot, lesions, and tumors).

c. Rig Fishing Collection. Three replicate composite samples of the target species shall be obtained from each zone, with each composite consisting of a minimum of three individual fish. Muscle tissue shall be chemically analyzed for the same set of constituents as trawl-caught fish specified in Table E-~~9~~ 8 above.

E. Receiving Water Monitoring Reports

1. The Discharger shall submit Interim and Biennial Receiving Water Monitoring Reports to the San Diego Water Board and USEPA, Region IX. The Interim Receiving Water Monitoring Reports will cover only one year of receiving water monitoring (e.g., separate reports for calendar years 2016, 2018, and 2020) and shall be submitted every other year. The Biennial Receiving Water Monitoring Reports will provide a more thorough discussion, evaluation (e.g., detailed statistical analyses), and interpretation than the Interim Receiving Water Monitoring Reports, will cover two years of receiving water monitoring (e.g., biennial reports for calendar years 2016-2017, 2018-2019, and 2020-2021), and shall be submitted the opposite years as the Interim Receiving Water Monitoring Reports. These reports are described below under sections IV.E.2 and IV.~~F~~E.3 and cover the following monitoring requirements:
   a. Shoreline, offshore, and kelp monitoring (sections IV.A and IV.B of this MRP);
   b. Sediment chemistry (section IV.C.1 of this MRP);
   c. Sediment toxicity (section IV.C.2 of this MRP);
   d. Benthic community (section IV.C.3 of this MRP);
   e. Fish and invertebrate trawls (section IV.D.1 of this MRP);
   f. Rig fishing (section IV.D.2 of this MRP); and
   g. Plume tracking (section IV.B.2 of this MRP).
2. The Discharger shall submit Interim Receiving Water Monitoring Reports (Interim Reports, executive summary) as specified in Table E-~~10~~9, section VIII.B of this MRP. The Interim Reports will cover the first “even” year in each biennial reporting cycle as described below in section IV.E.3 (e.g., separate reports for calendar years 2016, 2018, and 2020). The Interim Reports may be submitted as an integrated report covering both the receiving water monitoring required in this MRP and the receiving water monitoring for the SBOO (as required under separate waste discharge requirements (WDRs)). The Interim Reports shall include, as a minimum, the following information:
   a. A description of climatic and receiving water characteristics at the time of sampling (weather observations, floating debris, discoloration, wind speed and direction, swell or wave action, time of sampling, tide height, etc.);
   b. A description of sampling stations, including, if such information is available, differences unique to each station (e.g., station location, sediment grain size, distribution of bottom sediments, rocks, shell litter, calcareous worm tubes, etc.);
   c. A description of the sample collection and preservation procedures used in the survey;
   d. A description of the specific method used for laboratory analysis;
   e. A tabulation of the data; and
   f. A narrative summary of general observations, including any abnormal conditions.
3. The Discharger shall submit Biennial Receiving Water Monitoring and Assessment Reports (Biennial Reports, full assessment) as specified in Table E-~~10~~9. These Biennial Reports will each cover a full 2-year monitoring cycle beginning with even-numbered years (e.g., biennial reports for calendar years 2016-2017, 2018-2019, 2020-2021). The Biennial Reports may be submitted as an integrated report covering both the receiving

water monitoring required in this MRP and the receiving water monitoring for the SBOO (as required under separate WDRs). The Biennial Reports shall include, as a minimum, the following information:

a. A description of climatic and receiving water characteristics at the time of sampling (weather observations, floating debris, discoloration, wind speed and direction, swell or wave action, time of sampling, tide height, etc.);

b. A description of sampling stations, including, if such information is available, differences unique to each station (e.g., station location, sediment grain size, distribution of bottom sediments, rocks, shell litter, calcareous worm tubes, etc.);

c. A description of the sample collection and preservation procedures used in the survey;

d. A description of the specific method used for laboratory analysis; and

e. An in-depth discussion, evaluation (e.g., detailed statistical analyses), interpretation and tabulation of the data including interpretations and conclusions as to whether applicable receiving water limitations in this Order/Permit have been attained at each station.

4. During the same year that the Biennial Reports are submitted, the Discharger shall provide a Biennial State of the Ocean Report (an oral report) to the San Diego Water Board summarizing the conclusions of the Biennial Report over the 2-year monitoring period. If an oral report cannot be scheduled for a San Diego Water Board meeting, the San Diego Water Board may approve submission of a written Biennial State of the Ocean Report instead. The Biennial State of the Ocean Report shall include, as a minimum, a description of the monitoring effort completed during the past two years, the status and trends of receiving waters quality conditions, and plans for future monitoring efforts.

V. REGIONAL MONITORING REQUIREMENTS

Regional ocean monitoring provides information about the sources, fates, and effects of anthropogenic contaminants in the coastal marine environment necessary to make assessments over large areas. The large scale assessments provided by regional monitoring describe and evaluate cumulative effects of all anthropogenic inputs and enable better decision making regarding protection of beneficial uses of ocean waters. Regional monitoring data assists in the interpretation of core monitoring studies by providing a more accurate and complete characterization of reference conditions and natural variability. Regional monitoring also leads to methods standardization and improved quality control through inter-calibration exercise. The coalitions implementing regional monitoring enable sharing of technical resources, trained personnel, and associated costs. Focusing these resources on regional issues and developing a broader understanding of pollutants effects in ocean waters enables the development of more rapid and effective response strategies. Based on all of these considerations the San Diego Water Board supports regional approaches to monitoring ocean waters.

The Discharger shall, as directed by the San Diego Water Board, participate with other regulated entities, other interested parties, and the San Diego Water Board in development and implementation of new and improved monitoring and assessment programs for ocean waters in the San Diego Region and discharges to those waters. These programs shall be developed and implemented so as to answer the following questions:

(1) What are the status and trends of conditions in ocean waters in the San Diego Region with regard to beneficial uses? For example:

  i. Are fish and shellfish safe to eat?

  ii. Is water quality safe for swimming?

  iii. Are ecosystems healthy?

(2) What are the primary stressors causing or contributing to conditions of concern?

(3) What are the major sources of the stressors causing or contributing to conditions of concern?

(4) Are the actions taken to address such stressors and sources effective (i.e., environmental outcomes)?

Development and implementation of new and improved monitoring and assessment programs for ocean waters will be guided by the following:

1. The Ocean Plan;
2. San Diego Water Board Resolution No. R9-2012-0069, *Resolution in Support of A Regional Monitoring Framework*;
3. San Diego Water Board staff report entitled *A Framework for Monitoring and Assessment in the San Diego Region*; and
4. Other guidance materials, as appropriate.

A. Kelp Bed Canopy Monitoring Requirements

Kelp consists of a number of species of brown algae. Along the central and southern California coast, giant kelp (*Macrocystis pyrifera*) is the largest species colonizing rocky, and in some cases sandy, subtidal habitats. Giant kelp is an important component of coastal and island communities in southern California, providing food and habitat for numerous animals. Monitoring of the kelp beds is necessary to answer the following questions:

(1) What is the maximum areal extent of the coastal kelp bed canopies each year?

(2) What is the variability of the coastal kelp bed canopy over time?

(3) Are coastal kelp beds disappearing? If yes, what are factors that could contribute to the disappearance?

(4) Are new coastal kelp beds forming?

The Discharger shall participate with other Southern California ocean dischargers in an ongoing regional survey of coastal kelp beds in the Southern California Bight. The intent of these surveys is to provide an indication of the health of these kelp beds, recognizing that the extent of kelp bed canopies may change due to variety of influences.

Kelp beds shall be monitored by means of vertical aerial infrared photography to determine the maximum areal extent of the canopies of coastal kelp beds each year. Surveys shall be conducted as close as possible to when kelp bed canopies are at their greatest extent during the year. The entire San Diego Region coastline, from the international boundary to the San Diego Region/Santa Ana Region boundary shall be photographed on the same day.

The maximum areal extent of kelp bed canopies each year shall be compared to that observed in previous years. Any significant losses that persist for more than one year shall be investigated by divers to document benthic and understory conditions.

Annually on October 1, the Discharger shall submit to the San Diego Water Board and USEPA Region IX a report which summarizes the data, analyses, assessment, and images produced by the surveys. The report is a joint collaboration among ~~a few~~multiple ocean dischargers in the Southern California (e.g., Regional 9 Kelp Survey Consortium member agencies). In addition to the kelp bed canopies, the images shall show onshore reference points, locations of all ocean outfalls and diffusers, artificial reefs, areas of known hard-bottom substrate (i.e., rocky reefs), and depth contours at intervals of 30-feet mean lower low water (MLLW). The report shall also be made available in a user-friendly format on a website that is readily available to the public.

The surveys shall be conducted on a “continuous improvement” basis, as needed when improvements shall be made in monitoring, analysis, assessment, and/or documentation. For example, these could include:

1. More sophisticated analysis of patterns, correlations, and cycles that may be related to the extent of kelp bed canopies; or
2. Projects to improve understanding of influences on kelp beds or of how the extent of the canopies of various kelp beds has changed since the early 20th century.

B. Southern California Bight Monitoring Program Participation Requirements

The Discharger is required to participate in the, Southern California Bight Regional Monitoring Program coordinated by the Southern California Coastal Water Research Project (SCCWRP), or any other coordinator named by the San Diego Water Board, pursuant to Water Code sections 13267 and 13383, and 40 CFR section 122.48. The intent of the Southern California Bight Regional Monitoring Program is to maximize the efforts of all monitoring partners using a more cost-effective monitoring design and to best utilize the pooled scientific resources of the Southern California Bight.

During these coordinated sampling efforts, the Discharger’s receiving water sampling and analytical effort, as defined in section IV of this MRP, may be reallocated to provide a regional assessment of the impact of the discharge of municipal wastewater to the Southern California Bight. In that event, the San Diego Water Board and USEPA, Region IX shall notify the Discharger in writing that the requirement to perform the receiving water sampling and analytical effort defined in section IV of this MRP is suspended for the duration of the reallocation. Anticipated modifications to the monitoring program will be coordinated so as to provide a more comprehensive picture of the ecological and statistical significance of monitoring results and to determine cumulative impacts of various pollution sources. The level of resources in terms of sampling and analytical effort redirected from the receiving water monitoring program required under section IV this MRP shall approximately equal the level of resources provided to implement the regional monitoring and assessment program, unless the San Diego Water Board, USEPA, Region IX, and the Discharger agree otherwise. The specific scope and duration of the receiving water monitoring program reallocation and redirection shall be determined in writing by the San Diego Water Board and USEPA, Region IX in consultation with the Discharger.

VI. SPECIAL STUDIES REQUIREMENTS

Climate Change Action Plan. The Discharger shall prepare and submit a Climate Change Action Plan (CCAP) within three years of the effective date of this Order/Permit. ~~The CCAP shall be subject to the approval of the San Diego Water Board and USEPA, Region IX and shall be modified as directed by the San Diego Water Board and USEPA, Region IX.~~ Changing climate conditions may fundamentally alter the way publicly-owned treatment works are designed and operated. Climate change research indicates the overarching driver of change is increased atmospheric carbon dioxide (CO_2) from human activity. The increased CO_2 emissions trigger changes to climatic patterns, which increase the intensity of sea level rise and coastal storm surges (**Δ Sea Level)**, lead to more erratic rainfall and local weather patterns (**ΔWeather Patterns),** trigger a gradual warming of freshwater and ocean temperatures (**Δ Water Temperature**) and trigger changes to ocean water chemistry (**Δ Water pH**). The CCAP shall identify projected regional impacts on Metro System facilities and operations due to climate change if current trends continue. The CCAP shall also identify steps being taken or planned to address greenhouse gas emissions attributable to wastewater treatment plants, solids handling, and effluent discharge processes. The CCAP shall also identify steps being taken or planned to address flooding and sea level rise risks; volatile rain period impacts (both dry and wet weather); challenges in accommodating high and low wastewater flows; impacts on process design parameters due to higher BOD_5, ammonium, and TSS influent concentrations; impacts on wastewater treatment operations and quality; the potential need to adjust NPDES permit conditions and the Metro System pollution control program; the financing needed to pay for planned actions; schedules to update the CCAP as more information on climate change and its effect become more available; and any other factors as appropriate.

VII. OTHER MONITORING REQUIREMENTS

Outfall and Diffuser Inspection. Discharge Point No. 001 shall be inspected externally a minimum of once a year. Inspections shall include general observations and photographic/video graphic records of the outfall pipes and adjacent ballast material. The inspections may be conducted by remotely operated vehicle, diver, or manned submarine. A summary report of the inspection findings shall be provided annually on July 1. This written report will provide a description of the observed condition of the outfall structures from shallow water to their respective termini. Photographic/video graphic records shall be retained by the Discharger and submitted to the San Diego Water Board and USEPA upon request.

VIII. REPORTING REQUIREMENTS

A. General Monitoring and Reporting Requirements

1. The Discharger shall comply with all Standard Provisions (Attachment D) related to monitoring, reporting, and recordkeeping.
2. The Discharger shall report all instances of noncompliance not reported under sections V.E, V.G, and V.H of the Standard Provisions (Attachment D) at the time monitoring reports are submitted.
3. The Discharger shall arrange all reported data in a tabular format. The data shall be summarized to clearly illustrate whether the Facility is operating in compliance with interim and/or final effluent limitations. The Discharger is not required to duplicate the submittal of data that is entered in a tabular format within California Integrated Water Quality System (CIWQS). When electronic submittal of data is required and CIWQS does not provide for entry into a tabular format within the system, the Discharger shall electronically submit the data in a tabular format as an attachment.
4. The Discharger shall attach a cover letter to the SMR. The information contained in the cover letter shall clearly identify violations of the WDRs; discuss corrective actions taken or planned; and the proposed time schedule for corrective actions. Identified violations must include a description of the requirement that was violated and a description of the violation.

B. Self-Monitoring Reports (SMRs)

1. The Discharger shall electronically submit SMRs using the State Water Board's CIWQS Program website at http://www.waterboards.ca.gov/water_issues/programs/ciwqs/. The CIWQS website will provide additional information for SMR submittal in the event there will be a planned service interruption for electronic submittal. SMRs must be signed and certified as required by section V of the Standards Provisions (Attachment D). The Discharger shall maintain sufficient staffing and resources to ensure it submits SMRs that are complete and timely. This includes provision for training and supervision of individuals on how to prepare and submit SMRs.
2. The Discharger shall report in the SMR the results for all monitoring specified in this MRP under sections III through IV. The Discharger shall submit SMRs including the results of all required monitoring using USEPA-approved test methods or other test methods specified in this Order/Permit. SMRs are to include all new monitoring results obtained since the last SMR was submitted. If the Discharger monitors any pollutant more frequently than required by this Order/Permit, the results of this monitoring shall be included in the calculations and reporting of the data submitted in the SMR.
3. Unless otherwise noted in this MRP, monitoring periods and reporting for all required monitoring shall be completed according to the following schedule:

Table E-9. Monitoring Periods and Reporting Schedule

Sampling Frequency/ Report Type	Monitoring Period Begins	Monitoring Period	SMR Due Date
Continuous	First day of the calendar month following the Order/Permit effective date or on the Order/Permit effective date if that date is first day of the month.	All	First day of second calendar month following month of sampling.
1/Day	First day of the calendar month following the Order/Permit effective date or on the Order/Permit effective date if that date is first day of the month.	(Midnight through 11:59 PM) or any 24-hour period that reasonably represents a calendar day for purposes of sampling.	First day of second calendar month following month of sampling.
1/Week	First Sunday of the calendar month following the Order/Permit effective date or on the Order/Permit effective date if that date is on the first Sunday of the calendar month.	Sunday through Saturday	First day of second calendar month following month of sampling.
1/Month[1,2]	First day of calendar month following the Order/Permit effective date or on the Order/Permit effective date if that date is first day of the month.	First day of calendar month through last day of calendar month	First day of second calendar month following month of sampling.
1/Quarter	Closest of January 1, April 1, July 1, or October 1 following (or on) the Order/Permit effective date.	January 1 through March 31 April 1 through June 30 July 1 through September 30 October 1 through December 31	May 1 August 1 November 1 February 1

Sampling Frequency/ Report Type	Monitoring Period Begins	Monitoring Period	SMR Due Date
2/Year	Closest of January 1 or July 1 following (or on) the Order/Permit effective date	January 1 through June 30 July 1 through December 31	September 1 March 1
Interim Receiving Water Monitoring Report (executive summary)[3]	January 1 following (or on) the Order/Permit effective date.	One calendar year	July 1 of the year following the even years (e.g., separate reports for calendar years 2016 (due 7/1/2017), 2018 (due 7/1/2019), and 2020 (due 7/1/2021))
Biennial Receiving Water Monitoring and Assessment Report (full assessment)[4]	January 1 following (or on) the Order/Permit effective date.	Two calendar years	July 1 of the year following the odd years (e.g., biennial reports for calendar years 2016-2017 (due 7/1/2018), 2018-2019 (due 7/1/2020), and 2020-2021(due 7/1/2022))
Oral/Written Biennial State of the Ocean Report[5]	January 1 following (or on) the Order/Permit effective date.	Two calendar years	By December 31 of the year following the odd years (e.g., biennial reports for calendar years 2016-2017 (due 12/2018), 2018-2019 (due 12/2020), and 2020-2021(due 12/2022))

1. Include the monthly spill report as required by sections VI.C.2.b.iv of this Order
2. Include monitoring results for offshore stations (section IV.B of this MRP) in the monthly SMRs;
3. As specified in sections IV.E.1 and IV.E.2 of this MRP.
4. As specified in sections IV.B.2.c, IV.E.1, and IV.E.3 of this MRP.
5. As specified in section IV.E.4 of this MRP.

4. Section III.B of the Standard Provisions (Attachment D) includes the standard provisions for test procedures. USEPA published regulations for the Sufficiently Sensitive Methods Rule (SSM Rule) which became effective September 18, 2015. For the purposes of the NPDES program, when more than one test procedure is approved under 40 CFR part 136 for the analysis of a pollutant or pollutant parameter, the test procedure must be sufficiently sensitive as defined at 40 CFR sections 122.21(e)(3) and 122.44(i)(1)(iv). Both 40 CFR sections 122.21(e)(3) and 122.44(i)(1)(iv) apply to the selection of a sufficiently sensitive analytical method for the purposes of monitoring and reporting under NPDES permits, including review of permit applications. A USEPA-approved analytical method is sufficiently sensitive where:

   a. The Minimum Level (reported ML, also known as the Reporting Level, or RL) is at or below both the level of the applicable water quality criterion/objective and this Order/Permit limitation for the measured pollutant or pollutant parameter; or

   b. In permit applications, the ML is above the applicable water quality criterion/objective, but the amount of the pollutant or pollutant parameter in a facility's discharge is high enough that the method detects and quantifies the level of the pollutant or pollutant parameter in the discharge; or

c. The method has the lowest ML of the USEPA-approved analytical methods where none of the USEPA-approved analytical methods for a pollutant can achieve the MLs necessary to assess the need for effluent limitations or to monitor compliance with a permit limitation.

The MLs in Ocean Plan Appendix II remain applicable. However, there may be situations when analytical methods are published with MLs that are more sensitive than the MLs for analytical methods listed in the Ocean Plan. For instance, USEPA Method 1631E for mercury is not currently listed in Ocean Plan Table II, but it is published with an ML of 0.5 ng/L that makes it a sufficiently sensitive analytical method. Similarly, USEPA Method 245.7 for mercury is published with an ML of 5 ng/L.

5. Reporting Protocols. The Discharger shall report with each sample result the applicable reported ML (also known as the Reporting Level, or RL) and the current Method Detection Limit (MDL), as described above in section VIII.B.4.

The Discharger shall report the results of analytical determinations for the presence of chemical constituents in a sample using the following reporting protocols:

a. Sample results greater than or equal to the reported ML shall be reported as measured by the laboratory (i.e., the measured chemical concentration in the sample).

b. Sample results less than the reported ML, but greater than or equal to the laboratory's MDL, shall be reported as "Detected, But Not Quantified," or DNQ. The estimated chemical concentration of the sample shall also be reported.

For the purposes of data collection, the laboratory shall write the estimated chemical concentration next to DNQ. The laboratory may, if such information is available, include numerical estimates of the data quality for the reported result. Numerical estimates of data quality may be percent accuracy (± a percentage of the reported value), numerical ranges (low to high), or any other means considered appropriate by the laboratory.

c. Sample results less than the laboratory's MDL shall be reported as "Not Detected," or ND.

d. The Discharger shall instruct laboratories to establish calibration standards so that the ML value (or its equivalent if there is differential treatment of samples relative to calibration standards) is the lowest calibration standard. At no time is the Discharger to use analytical data derived from extrapolation beyond the lowest point of the calibration curve.

e. Compliance Determination. Compliance with effluent limitations for reportable pollutants shall be determined using sample reporting protocols defined above, section VII of this Order/Permit, and Attachment A. For purposes of reporting and administrative enforcement by the San Diego Water Board; State Water Board; and USEPA, Region IX, the Discharger shall be deemed out of compliance with effluent limitations if the concentration of the reportable pollutant in the monitoring sample is greater than the effluent limitation and greater than or equal to the reported ML.

6. Multiple Sample Data. When determining compliance with a measure of central tendency (arithmetic mean, geometric mean, median, etc.) of multiple sample analyses and the data set contains one or more reported determinations of DNQ or ND, the Discharger shall compute the median in place of the arithmetic mean in accordance with the following procedure:

a. The data set shall be ranked from low to high, ranking the reported ND determinations lowest, DNQ determinations next, followed by quantified values (if any). The order of the individual ND or DNQ determinations is unimportant.

b. The median value of the data set shall be determined. If the data set has an odd number of data points, then the median is the middle value. If the data set has an even number of data points, then the median is the average of the two values around the middle unless one or both of the points are ND or DNQ, in which case the median value shall be the lower of the two data points where DNQ is lower than a value and ND is lower than DNQ.

C. Discharge Monitoring Reports (DMRs)

The DMRs are USEPA reporting requirements. The Discharger shall electronically certify and submit DMRs together with SMRs using electronic Self-Monitoring Reports (eSMR) module eSMR 2.5 or any upgraded version. Electronic DMRs submittal shall be in addition to electronic SMR submittal. Information about electronic DMRs submittal is available at the DMR website at:
http://www.waterboards.ca.gov/water_issues/programs/discharge_monitoring.

D. Other Reports

The following reports are required under Special Provisions (section VI.C of this Order), sections I, III, V.A, and VI of this MRP, and the California Code of Regulations (CCR). The reports shall be submitted to the San Diego Water Board using the State Water Board's CIWQS program website. The reports must be signed and certified as required by section V of the Standards Provisions (Attachment D). The CIWQS website will provide additional information for SMR submittal in the event of a planned or unplanned service interruption for electronic submittal.

Table E-10. Reporting Requirements for Special Reports

Report	Location of requirement	Due Date[1]
Annual Biosolids Report	Section VI.C.5.b.viii of this Order	Annually February 19
Annual Local Limits Analysis	Section VI.C.5.d.ii.b) of this Order	Annually July 1
Annual Pretreatment Report	Section VI.C.5.d.v of this Order	March 1
Task Reports for *Pure Water San Diego* Potable Reuse - Individual Tasks	Section VI.C.~~7~~6.b of this Order	February 14, 2017, June 14, 2017, February 14, 2018 (2 tasks), June 14, 2018, February 14, 2019 November 14, 2019, and February 14, 2020
Semiannual Progress Reports for *Pure Water San Diego* Program	Section VI.C.~~7~~6.c of this Order	January 1 through June 30 (due January 14) July 1 through December 31 (due July 14)
Annual Flow Report	Section I.F of this MRP	Annually on July 1
Annual Quality Assurance (QA) Report	Section I.G of this MRP	Annually on April 1
Initial Investigation Toxicity Reduction Evaluation (TRE) Work Plan	Section III of this MRP	Within 90 days of the effective date of this Order/Permit
Plume Tracking Monitoring Plan (PTMP)	Section IV.B.2 of this MRP	Within 180 days of the effective date of this Order/Permit
Kelp Bed Canopy Report	Section V.A of this MRP	Annually on October 1
Outfall and Diffuser Inspection Report	Section VI of this MRP	Annually on July 1
Report of Waste Discharge (for reissuance)	Title 23, CCR	180 days before the Order/Permit expiration date

1 If the due date falls on a weekend or holiday, the due date will be the following workday.

ATTACHMENT F – FACT SHEET

CONTENTS

TABLES

ATTACHMENT F – FACT SHEET

As described in section I, the California Regional Water Quality Control Board, San Diego Region (San Diego Water Board) and U.S. Environmental Protection Agency (USEPA), Region IX incorporates this Fact Sheet as findings of the San Diego Water Board and USEPA, Region IX supporting the issuance of this Order/Permit. This Fact Sheet includes the legal requirements and technical rationale that serve as the basis for the requirements of this Order/Permit.

This Order/Permit has been prepared under a standardized format to accommodate a broad range of discharge requirements for Dischargers in California. Only those sections or subsections of this Order/Permit that are specifically identified as “Not Applicable” have been determined not to apply to this Discharger. Sections or subsections of this Order/Permit not specifically identified as “Not Applicable” are fully applicable to this Discharger.

I. PERMIT INFORMATION

The following table summarizes administrative information related to the Facility.

Table F-1. Facility Information

WDID	9 000000275
Discharger	City of San Diego
Name of Facility	E.W. Blom Point Loma Wastewater Treatment Plant
Facility Address	1902 Gatchell Road
	San Diego, CA 92106
	San Diego County
Facility Contact, Title and Phone	Halla Razak, P.E., Director of Public Utilities (858) 292-6401
Authorized Person to Sign and Submit Reports	Same as above
Mailing Address	9192 Topaz Way, San Diego CA 92123
Billing Address	Same as mailing address
Type of Facility	Publicly-Owned Treatment Works (POTW)
Major or Minor Facility	Major
Threat to Water Quality	1
Complexity	A
Pretreatment Program	Yes
Recycling Requirements	No
Facility Permitted Flow	240 million gallons per day (MGD)
Facility Design Flow	240 MGD
301(h)-variance-based Flow	205 MGD
Watershed	Pacific Ocean
Receiving Water	Pacific Ocean
Receiving Water Type	Ocean

A. The City of San Diego (Discharger) is the owner and operator of the E.W. Blom Point Loma Wastewater Treatment Plant (Facility), Pump Station No. 2, the Metro Biosolids Center (MBC), the Point Loma Ocean Outfall (PLOO), and other associated infrastructure (collectively referred to as Facilities).

B. For the purposes of this Order/Permit, references to the “discharger” or “permittee” in applicable State and federal laws, regulations, plans, or policy are held to be equivalent to references to the Discharger herein.

C. The Facility discharges wastewater to the Pacific Ocean, a water of the U.S. The Facilities and associated discharges to the Pacific Ocean were previously regulated by Order No. R9-2009-0001 and National Pollutant Discharge Elimination System (NPDES) Permit No. CA0107409. Order No. R9-2009-0001 was adopted on June 10, 2009 by the San Diego Water Board and the 301(h)-modified permit (NPDES Permit No. CA0107409) was adopted on June 16, 2010 by USEPA, Region IX. Order No. R9-2009-0001 became effective on August 1, 2010 and expired on July 31, 2015. In accordance with title 40 of the Code of Federal Regulations (40 CFR) section 122.6 and title 23, division 3, chapter 9, article 3, section 2235.4 of the California Code of Regulations (CCR), the terms of Order No. R9-2009-0001 were administratively extended and continued in effect after the Order/Permit expiration date until the adoption of this Order/Permit. Attachment B provides a map of the area around the Facilities. Attachment C provides a flow schematic of the Facilities.

D. The Discharger filed a Report of Waste Discharge (ROWD) and submitted an application of renewal for its Waste Discharge Requirements (WDRs) and 301(h)-modified NPDES permit in January 2015. The 2015 301(h) application is based on an improved discharge, as defined at 40 CFR section 125.58(i).

E. Regulations at 40 CFR section 122.46 limit the duration of NPDES permits to a fixed term not to exceed five years. Accordingly, Tables 3 and 4 of this Order/Permit limits the duration of the discharge authorization. However, pursuant to CCR, title 23, section 2235.4, the terms and conditions of an expired permit are automatically continued pending reissuance of the Order/Permit if the Discharger complies with all federal NPDES requirements for continuation of expired permits.

II. FACILITY DESCRIPTION

A. Description of San Diego Metropolitan Sewerage System (Metro System)

The Facility serves as the terminal treatment facility of the Metro System. The Metro System collects and treats wastewater from the City of San Diego and 12 participating agencies within a 450-square mile service area throughout San Diego County, shown in Table F-2 below. Approximately 70 percent of the total Metro System flows are from the City of San Diego, with the remaining flow from the 12 participating agencies.

Table F-2. Metro System Participating Agencies

Municipalities	Water/Wastewater Districts	Sanitation/Maintenance Districts
City of Chula Vista City of Coronado City of Del Mar City of El Cajon City of Imperial Beach City of La Mesa City of National City City of Poway	Otay Water District Padre Dam Municipal Water District	Lemon Grove Sanitation District San Diego County[1]

[1] Includes the East Otay Mesa, Lakeside, Alpine, Spring Valley, and Wintergardens Service Areas.

In November 1965, the governments of the United States and Mexico agreed to construct, operate, and maintain an emergency connection from the Sewage System of the City of

Tijuana, Baja California to the Metropolitan Sewage System of San Diego, California, as an additional measure of safety to protect. U.S. lands and waters from an upset or shutdown in the Sewage System of the City of Tijuana (IBWC Minute No. 222 between the United States and Mexican sections of the International Boundary and Water Commission)[1]. During the period when it was operational, up to 13 MGD of sewage could be transferred from the Sewage System of the City of Tijuana to the Metropolitan Sewage System of San Diego through the Emergency Connection with treatment and disposal at the Discharger's Facility and discharge through the PLOO. The Emergency Connection was used daily throughout the 1980s and early 1990s and intermittently while the SBOO was still under construction. The Emergency Connection was last used on October 15, 2000; construction of the SBOO eliminated the need for continued use the Emergency Connection. According to the Discharger, this emergency connection still exists but is not currently used. If the Discharger is requested to accept wastewater originating in Tijuana, Mexico, treated or untreated during the term of this Order/Permit, such acceptance would be contingent upon an agreement acceptable to the USEPA, Region IX, San Diego Water Board, and the Discharger. The TSS contribution from that flow would not be counted toward the Discharger's mass emission limit(s).

The Discharger owns and operates Metro System collection, treatment, and effluent disposal facilities. Wastewater collection systems that discharge to the Metro System are owned and operated by the respective participating agencies.

Primary Metro System facilities include:

1. The North City Water Reclamation Plant (NCWRP)

   The NCWRP has a design capacity of 30 MGD and is an advanced wastewater treatment facility capable of producing tertiary-treated recycled water that complies with the requirements of title 22, division 4, chapter 3 of the CCRs (Title 22 Regulations). Discharges of tertiary-treated recycled water from the NCWRP are regulated under separate WDRs. Excess recycled water, secondary-treated effluent, and plant waste streams from NCWRP are returned to the sewer for transport to the Facility for additional treatment. Waste solids removed during treatment at NCWRP are directed to the MBC for treatment and use or disposal.

2. Metro Biosolids Center (MBC)

   The MBC is located on Marine Corps Air Station Miramar. MBC provides dewatering of sludge from the Facility and thickening, anaerobic digestion, and dewatering of sludge from the NCWRP. Dewatered solids are beneficially used as an alternate daily cover at a landfill or as a soil amendment.

3. South Bay Water Reclamation Plant (SBWRP)

   The SBWRP has a tertiary design capacity of 15 MGD and a hydraulic capacity of 18 MGD. SBWRP is an advanced wastewater treatment facility producing recycled water that complies with Title 22 Regulations for customers within the South Bay Region. Excess recycled water and secondary-treated effluent is directed to the South Bay Ocean Outfall. Waste solids are directed to the Facility through the South Metro

[1] Minute No. 222 - *Emergency Connection of the Sewage Sytem of the City of Tijuana, Baja California to the Metropolitan Sewage System of the City Of San Diego, California*, approved by United States on December 20, 1965, approved by Mexico on December 7, 1967, available at http://www.ibwc.gov/Files/Minutes/Min222.pdf (as of August 22, 2016).

Interceptor and Pump Stations Nos. 1 and 2, for treatment and removal. Discharges from the SBWRP are regulated under separate WDRs.

4. South Bay Ocean Outfall (SBOO)

   The SBOO is jointly owned by the U.S. Section of the International Boundary and Water Commission (USIBWC) and the Discharger. The outfall discharges secondary and tertiary treated wastewater from the SBWRP and secondary wastewater from the USIBWC South Bay International Wastewater Treatment Plant. The outfall has an average daily flow capacity of 174 MGD and a peak flow of 333 MGD. The SBOO discharges wastewater approximately 3.5 miles off the coast of the International Border at a depth of approximately 95 feet. Discharges from the SBOO are regulated under separate WDRs.

5. Pump Station No. 1

   Pump Station No. 1 conveys wastewater from the southern portion of the Metro System through the South Metro Interceptor to Pump Station No. 2. Pump Station No. 1 has a pumping capacity of approximately 160 MGD and receives ferrous chloride, sodium hydroxide, and sodium hypochlorite for odor and sulfide control. Additionally, Pump Station No. 1 provides screening via two traveling screens.

6. Pump Station No. 2

   Pump Station No.2 receives wastewater from the north, south, and central regions of the Metro System service area and conveys all influent to the Facility. Pump Station No. 2 also provides initial screening and chemical addition (hydrogen peroxide, sodium hydroxide, and sodium hypochlorite for odor and sulfide control and to assist in coagulation/sedimentation at the Facility). Pump Station No. 2 has a pumping capacity of approximately 432 MGD. Pump Station No. 2 discharges wastewater to the east portal of the Point Loma Tunnel through two 87-inch diameter force mains, respectively 2.9 and 2.7 miles long. One force main follows a land route while the second force main is routed underneath San Diego Bay. The Point Loma Tunnel conveys wastewater to the Facility under the Point Loma peninsula.

7. E.W. Blom Point Loma Wastewater Treatment Plant (Facility)

   The Facility is an advanced primary treatment plant and the terminal treatment facility discharging to the PLOO. The Facility has rated capacities of 240 MGD average annual daily flow and 432 peak wet weather flow. Treatment processes include: mechanical self-cleaning climber screens; chemical addition at Parshall flumes to enhance settling; aerated grit removal, including grit tanks, separators, and washers; sedimentation basins with sludge and scum removal facilities; and effluent disinfection facilities providing chlorination in the effluent channel.

B. Wastewater and Biosolids Treatment and Controls

In addition to receiving raw wastewater from both the northern and southern portions of the Metro System service area, the Facility may also receive treated effluent from the NCWRP. Excess NCWRP secondary effluent is discharged to the Facility via the North Metro Interceptor for retreatment and disposal. Additionally, during times when NCWRP recycled water production exceeds demands, excess NCWRP recycled water may also be conveyed to the Facility for treatment and disposal. The Facility also receives centrate from MBC and waste solids from the SBWRP.

The treatment train at the Facility consists of five influent screens, chemical injection (ferric chloride occurs in the Parshall flumes, and anionic polymer is added in the individual flumes to the sedimentation tanks), six aerated grit chambers, 12 primary sedimentation basins, and sodium hypochlorite injection for chlorination. Increased total suspended solids (TSS) removal is largely attributed to the Discharger's implementation of an integrated system-wide chemical addition approach. The Discharger during the past several years has proceeded with phased implementation of a proprietary technology called Peroxide Regenerated Iron Sulfide Control. On-site solids treatment at the Facility consists of anaerobic sludge digestion. Dewatered solids are beneficially used as an alternate daily cover at a landfill or as a soil amendment. Digested sludge is transported via pipeline to MBC for dewatering and disposal. Screenings, grit, and scum are trucked to a landfill for disposal.

Chlorinated advanced primary treated effluent is discharged through the PLOO to the Pacific Ocean, approximately 4.5 miles offshore. Although this is beyond the limit of the ocean waters of the State, potential plume migration within the ocean waters of the State warrants joint regulation of the effluent. USEPA, Region IX has primary regulatory responsibility for the discharge. However, in 1984, a Memorandum of Understanding was signed between USEPA and the State of California to jointly administer discharges that are granted modifications from secondary treatment standards. Under California's Porter-Cologne Water Quality Control Act, the San Diego Water Board issues WDRs which serve as an NPDES permit.

In addition to domestic sewage and industrial discharges, the Facility accepts flow and pollutants from low-flow urban runoff diversion systems and "first flush" industrial storm water diversion systems that are routed to the sanitary sewer collection system.

C. Discharge Points and Receiving Waters

The PLOO has an average dry weather design flow of 240 MGD and a peak wet weather flow of 432 MGD. The PLOO discharges wastewater from the Facility approximately 4.5 miles off the coast of Point Loma (32° 39' 55" North; 117° 19' 25" West) at a discharge depth of approximately 310 feet at mean lower low water. The PLOO is 23,472 feet long and includes a wye (Y-shaped) diffuser with two 2,496 foot long diffuser legs. The diffuser has 416 discharge ports (208 on each leg). Order No. R9-2009-0001 carried over an initial dilution value for the PLOO of 204 parts seawater per part wastewater (204:1) from previous orders for the Facility. This initial dilution value was established based on the results of a modified version of the RSB model, submitted with the Discharger's 1995 ROWD and the Discharger's 1995, 2001, 2007, and 2015 301(h) applications to USEPA, Region IX. This initial dilution value was predicated based on the 301(h)-variance-based effluent flow of 205 MGD from the Facility. For the 2015 ROWD, the Facility end-of-permit term (calendar year 2022) projected average annual flow is 171 MGD. Because the Facility end-of-permit projected flow of 171 MGD is less than the 301(h)-variance-based flow of 205 MGD evaluated by USEPA, Region IX in the 1995, 2001, and 2007 applications, USEPA, Region IX believes that the 301(h)-variance-based flow of 205 MGD continues to be a reasonable estimate for evaluating initial dilutions in the 2015 application. Thus, this Order/Permit carries over the initial dilution value of 204:1, as discussed in Attachment H. This 301(h)-variance-based flow of 205 MGD and minimum initial dilution value of 204:1 is used by the San Diego Water Board and USEPA, Region IX to establish water quality-based effluent limitations (WQBELs) and performance goals and calculate mass-based effluent limitations for this Order/Permit, as discussed in section IV.B and C of this Fact Sheet.

D. Summary of Existing Requirements and Self-Monitoring Report (SMR) Data

Effluent limitations, and discharge specifications contained in Order No. R9-2009-0001 for discharges from the Facility and representative monitoring data from August 2010 – July 2015 are as follows:

Table F-3. Historic Effluent Limitations and Monitoring Data[1]

Parameter	Units	Effluent Limitation				Monitoring Data (August 2010 – July 2015)			
		Average Annual	Average Monthly	Highest Average Monthly Discharge	Highest Average Weekly Discharge	Highest Average Annual	Highest Average Monthly Discharge	Highest Average Weekly Discharge	Highest Maximum At Anytime
TSS	milligram per liter (mg/L)	--	75			--	51		
	Facility percent removal		[2]	--	--		83.7[3]		
	system-wide percent removal	--	≥80[4]			--	86.4[3]		
	metric ton per year (mt/yr)	15,000[5]	--			9,035	--		
		13,598[6]	--			6,770	--		
Biochemical Oxygen Demand (5-Day at 20 degrees Celsius (°C)) (BOD_5)	system-wide percent removal	≥58[4]	--			64.1[3]	--		
Oil & Grease	mg/L		25	40	75		14.8	16.7	44.3
	pounds per day (lbs/day)		42,743	68,388	128,228		18,458	23,494	52,833
Settleable Solids	milliliter per liter (ml/L)		1.0	1.5	3.0		0.5	1.0	3.5
Turbidity	nephelometric turbidity unit (NTU)		75	100	225		58.2	63.6	94.6
pH	standard units	Within limits of 6.0 - 9.0 at all times.				6.83 – 7.62			

[1] See Attachment A for definitions of abbreviations and a glossary of common terms used in this Order/Permit.

[2] The Discharger shall, as a 30-day average, remove 75 percent of suspended solids from the influent stream to the Facility before discharging wastewaters to the ocean, except that the effluent limitation to be met shall not be lower than 60 mg/L. This effluent limitation was derived from the Ocean Plan, Table 2.

[3] Represents minimum.

[4] The average monthly system-wide percent removal was derived from CWA sections 301(h) and (j)(5). Percent removal shall be calculated on a system-wide basis, as provided in section VII.G of this Order/Permit. Section VII.G of this Order/Permit is carried over from Orders Nos. R9-2002-0025 and R9-2009-0001.

[5] To be achieved on permit effective date through December 31, 2013. Applies only to TSS discharges from POTWs owned and operated by the Discharger and the Discharger's wastewater generated in the Metro System service area; does not apply to wastewater (and the resulting TSS) generated in Mexico which, as a result of upset or shutdown, is treated at and discharged from the Facility.

6 To be achieved on January 1, 2014. Applies only to TSS discharges from POTWs owned and operated by the Discharger and the Discharger's wastewater generated in the Metro System service area; does not apply to wastewater (and the resulting TSS) generated in Mexico which, as a result of upset or shutdown, is treated at and discharged from the Facility.

Table F-4. Historic Effluent Limitations and Monitoring Data (Protection of Marine Aquatic Life)[1]

Parameter	Units	Effluent Limitation			Monitoring Data (August 2010 – July 2015)		
		Six-Month Median	Maximum Daily	Instantaneous Maximum	Highest Six-month Median	Highest Maximum Daily	Highest Instantaneous Maximum
Chronic Toxicity	chronic toxicity unit (TUc)	--	205	--	--	667	--
Total Chlorine Residual	microgram per liter (µg/L)	410	1,600	12,000	Not Detected (ND)	7,130	7,130
	lbs/day	700	2,800	21,000	ND	15,183	15,183
Phenolic Compounds (Non-Chlorinated)	µg/L	6,200	25,000	62,000	26.5	42.4	42.4
	lbs/day	11,000	42,000	110,000	27.7	44.5	44.5
Chlorinated Phenolics	µg/L	210	820	2,100	ND	7.0	7.0
	lbs/day	350	1,400	3,500	ND	8.2	8.2

1 See Attachment A for definitions of abbreviations and a glossary of common terms used in this Order/Permit.

Table F-5. Historic Effluent Limitations and Monitoring Data (protection of Human Health)[1]

Parameter	Units	Effluent Limitation	Monitoring Data (January 2010 – July 2015)
		30-day Average	Highest 30-day Average
Chlordane	µg/L	0.0047	ND
	lbs/day	0.0081	ND
Chlorodibromomethane (dibromochloromethane)	µg/L	1,800	1.0
	lbs/day	3,000	1.3
Chloroform	µg/L	27,000	10.8
	lbs/day	46,000	12.2
1,4-dichlorobenzene	µg/L	3,700	0.6
	lbs/day	6,300	0.8
Dichlorobromomethane	µg/L	1,300	1.3
	lbs/day	2,200	1.61
Dichloromethane (Methylene Chloride)	µg/L	92,000	2.6
	lbs/day	160,000	2.9
Halomethanes	µg/L	27,000	47.3
	lbs/day	46,000	53.5
Heptachlor	µg/L	0.010	ND
	lbs/day	0.018	ND

1 See Attachment A for definitions of abbreviations and a glossary of common terms used in this Order/Permit.

E. Compliance Summary

Since ~~August 2010~~October 2016, the Discharger has reported the following violations of Order No. R9-2009-0001:

1. The November 2015 to January 2016 monthly eSMR results for the following constituents were reported late and included in the February 2016 monthly eSMR: chlordane, polychlorinated biphenyls (PCBs), Polynuclear aromatic hydrocarbons (PAHs), and tetrachlorodibenzodioxin (TCDD) equivalents.

2. Order No. R9-2009-0001, Attachment D, section I.D states, “Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures.” In the SMRs for July 2015, August 2015, September 2015, and October 2015, the Discharger reported that the method blank was contaminated, no matrix spike was performed, and no duplicate was performed for TCDD equivalents. These results are representative of inadequate laboratory controls and inappropriate quality assurance procedures and are thus a violation of Order No. R9-2009-0001, Attachment D, section I.D.

3. In accordance with Order No. R9-2009-0001, Attachment E, section X.B.4, the laboratory used by the Discharger is required to meet the minimum levels (MLs) specified in Appendix II of the Ocean Plan. The laboratory reports documented an ML that is greater than the ML specified in Appendix II of the Ocean Plan for at least 20 constituents in the monthly SMR’s.

4. Influent monitoring for floating particulates is required daily. Due to low sample volume, influent monitoring for floating particulates was not performed on November 11, 2015.

5. Effluent monitoring for tributyltin is required monthly and was not performed in December 2015.

~~1.~~6. ~~Tetrachlorodibenzodioxin (~~TCDD~~)~~ equivalents represent the sum of concentrations of chlorinated dibenzodioxins (2,3,7,8-CDDs) and chlorinated dibenzofurans (2,3,7,8-CDFs) multiplied by their respective toxicity factors. Effluent monitoring for TCDD equivalents is required monthly. Due to a laboratory error, the Discharger did not report effluent monitoring results for dioxin for October 2015.

~~2.~~7. Effluent monitoring for floating particulates is required daily. Due to a low sample volume, the Discharger did not report effluent monitoring results for floating particulates for October 6, 2015.

~~3.~~8. Section I.D of the Standard Provisions (Attachment D of Order No. R9-2009-0001) requires that the Discharger properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the Discharger to achieve compliance with the conditions of this Order/Permit.

   a. On July 25, 2015 there was a 1,200 gallon spill of ferrous chloride by the ferrous pump area into the secondary containment area.

   b. On July 18, 2015 there was a 25 gallon spill of ferrous chloride by the ferrous pump area into the secondary containment area.

~~4.~~9. The effluent limitation for chronic toxicity is a maximum daily of 205 TUc.

   a. The Discharger reported that the effluent chronic toxicity was 370.4 TUc on May 12, 2015.

b. The Discharger reported that the effluent chronic toxicity was 666.7 TUc on June 2, 2015.

~~5.~~10. The effluent limitation for settleable solids is an instantaneous maximum of 3 ml/L.

a. The Discharger reported that the grab sample for settleable solids was 3.25 ml/L on November 23, 2011.

b. The Discharger reported that the grab sample for settleable solids was 3.5 ml/L on February 8, 2012.

~~b.~~c. The Discharger reported that the grab sample for settleable solids was 4.5 ml/L on February 2, 2016.

F. Planned Changes

~~As a condition of this Order/Permit, the~~The Discharger has committed to implementing a comprehensive water reuse program called *Pure Water San Diego* that has the goal of producing potable water for the San Diego Region while offloading flows and loads from the Facility. This program is a long-term (approximately 20 years) joint water and wastewater facilities plan that would provide a safe, reliable, and cost-effective drinking water supply for the City of San Diego and surrounding areas through the application of advanced treatment technology to purify recycled water (i.e., potable reuse). This program envisions a significant investment in potable water reuse and ancillary facilities and is the result of collaboration between the Discharger, Metro Wastewater Joint Powers Authority (JPA)[2], and a diverse array of regional stakeholders. The Discharger, Metro Wastewater JPA, and regional stakeholders have agreed to cooperate to:[3]

1. Implement a comprehensive potable reuse program using state-of-the-art advanced treatment technology to achieve an ultimate goal of 83 MGD of potable reuse by December 31, 2035 - an amount that equates to approximately one-third of the total City of San Diego potable water demand;
2. Sufficiently reduce influent flows and solids loads to the Facility so that ultimate PLOO TSS mass emissions are reduced to levels that would have occurred if the 240-MGD Facility were to achieve secondary treatment TSS concentration standards;
3. Support the Discharger's application for renewed 301(h)-modified TSS and BOD_5 limitations for the Facility; and
4. Support the Discharger's pursuit of administrative or legislative efforts to codify that, as a result of implementing the comprehensive *Pure Water San Diego* program, the PLOO discharge is recognized as equivalent to secondary treatment for purposes of compliance with the Clean Water Act (CWA). This concept is referred to as secondary treatment equivalency.

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[2] The Metro Wastewater JPA includes the City of Chula Vista, City of La Mesa, City of Del Mar, City of El Cajon, City of Lemon Grove, City of Poway, City of Coronado, City of Imperial Beach, City of National City, Padre Dam Municipal Water District, Otay Water District, and San Diego County.

[3] Cooperatiive Agreement in Suppport of *Pure Water San Diego*; City of San Diego, San Diego Coastkeeper, San Diego County Surfrider, CERF, San Diego Audubon Society; October 2014; Filed by the Office of the City Clerk San Diego, California on November 18, 2014; Signed and approved by the City of San Diego Attorney, Jan I. Goldsmith on December 9, 2014, available at https://www.sandiego.gov/sites/default/files/cooperative_agreement_signed.pdf.

III. APPLICABLE PLANS, POLICIES, AND REGULATIONS

The requirements contained in this Order/Permit are based on the requirements and authorities described in this section.

A. Legal Authorities

This Order/Permit is issued pursuant to federal CWA section 402 and implementing regulations adopted by the USEPA and chapter 5.5, division 7 of the California Water Code (Water Code) (commencing with section 13370). This Order/Permit shall serve as a jointly-issued State and federal NPDES permit authorizing the Discharger to discharge into waters of the U.S. at the discharge location described in Table 2 subject to the WDRs in this Order/Permit. This Order/Permit also serves as WDRs pursuant to article 4, chapter 4, division 7 of the Water Code (commencing with section 13260). Although Discharge Point No. 001 is beyond the limit of State-regulated ocean waters, effluent plume migration into State waters warrants joint regulation of the discharge by the San Diego Water Board and USEPA, Region IX.

B. California Environmental Quality Act (CEQA)

Under Water Code section 13389, this action to adopt an NPDES permit is exempt from the provisions of chapter 3 of the CEQA, (commencing with section 21100) of division 13 of the Public Resources Code.

C. State and Federal Laws, Regulations, Policies, and Plans

1. **Water Quality Control Plan.** The San Diego Water Board adopted the *Water Quality Control Plan for the San Diego Basin* (Basin Plan) on September 8, 1994. The Basin Plan was subsequently approved by the State Water Resources Control Board (State Water Board) on December 13, 1994. Subsequent revisions to the Basin Plan have also been adopted by the San Diego Water Board and approved by the State Water Board. The Basin Plan was last amended by the San Diego Water Board on April 15, 2015. The Basin Plan designates beneficial uses, establishes water quality objectives, and contains implementation programs and policies to achieve those objectives for all waters addressed through the plan. In addition, the Basin Plan implements State Water Board Resolution No. 88-63, which established State policy that all waters, with certain exceptions, should be considered suitable or potentially suitable for municipal or domestic supply. Requirements in this Order/Permit implement the Basin Plan. Beneficial uses applicable to the Pacific Ocean specified in the Basin Plan are as follows:

Table F-6. Basin Plan Beneficial Uses

Discharge Point	Receiving Water Name	Beneficial Use(s)
001	Pacific Ocean	Industrial service supply; navigation; contact water recreation; non-contact water recreation; commercial and sport fishing; preservation of biological habitats of special significance; wildlife habitat; rare, threatened, or endangered species; marine habitat; aquaculture; migration of aquatic organisms; spawning, reproduction, and/or early development; and shellfish harvesting.

In order to protect the beneficial uses, the Basin Plan establishes water quality objectives and a program of implementation. Requirements of this Order/Permit implement the Basin Plan.

2. **California Ocean Plan.** The State Water Board adopted the *Water Quality Control Plan, Ocean Waters of California, California Ocean Plan* (Ocean Plan) in 1972 and amended it in 1978, 1983, 1988, 1990, 1997, 2000, 2005, 2009, 2012, and 2015. The State Water Board adopted the latest amendment on April 15, 2015, and it became effective on August 19, 2013. The Ocean Plan is applicable, in its entirety, to point source discharges to the ocean. The Ocean Plan identifies beneficial uses of ocean waters of the State to be protected as summarized below:

Table F-7. Ocean Plan Beneficial Uses

Discharge Point	Receiving Water	Beneficial Uses
Outfall 001	Pacific Ocean	Industrial water supply; water contact and non-contact recreation, including aesthetic enjoyment; navigation; commercial and sport fishing; mariculture; preservation and enhancement of designated Areas of Special Biological Significance (ASBS); rare and endangered species; marine habitat; fish spawning and shellfish harvesting

In order to protect the beneficial uses, the Ocean Plan establishes water quality objectives and a program of implementation. Requirements of this Order/Permit implement the Ocean Plan.

3. **Alaska Rule.** On March 30, 2000, USEPA revised its regulation that specifies when new and revised State and tribal water quality standards become effective for CWA purposes (40 CFR section 131.21, 65 Fed. Reg. 24641 (April 27, 2000)). Under the revised regulation (also known as the Alaska Rule), new and revised standards submitted to USEPA after May 30, 2000, must be approved by USEPA before being used for CWA purposes. The final rule also provides that standards already in effect and submitted to USEPA by May 30, 2000, may be used for CWA purposes, whether or not approved by USEPA.

4. **Antidegradation Policy.** Section 131.12 of 40 CFR requires that the State water quality standards include an antidegradation policy consistent with the federal policy. The State Water Board established California's antidegradation policy in State Water Board Resolution 68-16 (*Statement of Policy with Respect to Maintaining High Quality of Waters in California*). Resolution 68-16 is deemed to incorporate the federal antidegradation policy where the federal policy applies under federal law. Resolution 68-16 requires that existing water quality be maintained unless degradation is justified based on specific findings. The San Diego Water Board's Basin Plan implements, and incorporates by reference, both the State and federal antidegradation policies. The permitted discharge must be consistent with the antidegradation provision of section 131.12 and State Water Board Resolution 68-16.

5. **Anti-Backsliding Requirements.** Sections 402(o) and 303(d)(4) of the CWA and federal regulations at 40 CFR section 122.44(l) restrict backsliding in NPDES permits. These Anti-backsliding provisions require that effluent limitations in a reissued permit must be as stringent as those in the previous permit, with some exceptions in which limitations may be relaxed.

6. **Endangered Species Act Requirements.** This Order/Permit does not authorize any act that results in the taking of a threatened or endangered species or any act that is now prohibited, or becomes prohibited in the future, under either the California Endangered Species Act (Fish and Game Code, sections 2050 to 2097) or the federal Endangered Species Act (16 U.S. Code (U.S.C.) sections 1531 to 1544). This Order/Permit requires compliance with effluent limits, receiving water limits, and other requirements to protect

the beneficial uses of waters of the State, including protecting rare and endangered species. The Discharger is responsible for meeting all requirements of the applicable Endangered Species Act.

D. Impaired Water Bodies on the CWA section 303(d) List

In July 2015, USEPA approved the list of impaired water bodies, prepared by the State Water Board pursuant to CWA section 303(d), which are not expected to meet applicable water quality standards after implementation of technology-based effluent limitations (TBELs) for point sources. The 303(d) list includes sections of the Pacific Ocean shoreline inside the San Diego Region as impaired for bacteria indicators. Several total maximum daily loads (TMDLs) for bacteria indicators have been adopted and approved within San Diego Region; however, these TMDLs did not contain applicable wasteload allocations for this Facility. Nonetheless, this Order/Permit implements receiving water objectives for bacterial indicators. The 303(d) list for waters in the vicinity of the PLOO include:

1. Pacific Ocean Shoreline, Point Loma HA, at Bermuda Ave for total coliform; and
2. Pacific Ocean Shoreline, Scripps HA, at Pacific Beach Point, Pacific Beach for enterococcus, fecal coliform, and total coliform.

TMDLs for bacteria indicators have been adopted and approved within San Diego Region; however, there is no TMDL wasteload allocation applicable to the PLOO discharge. Nonetheless, this Order/Permit implements receiving water quality objectives for bacterial indicators.

E. Other Plans, Polices and Regulations

1. **301(h) Waiver and Primary Treatment Requirements.** The Discharger has submitted an application for renewal of their 301(h)-modified NPDES permit for the Facility. The Discharger requested a renewal of their variance (informally called a "waiver" or "modification") under CWA section 301(h) and the Ocean Pollution Reduction Act of 1994, from federal secondary treatment standards contained in CWA section 301(b)(1)(B). The Discharger has proposed alternative effluent limitations for TSS and BOD_5, described below. The 2015 301(h) application is based on an improved discharge, as defined at 40 CFR section 125.58(i). The Discharger has proposed to continue effluent disinfection (chlorination) to achieve applicable water quality standards for bacteria in State waters. The administrative processing for a CWA section 301(h) variance by USEPA generally consists of the following actions:
   - Filing of a timely application by the discharger;
   - Initial screening of the application by the State and USEPA;
   - USEPA preparation of a Tentative Decision Document (TDD) which involves comparison of the application with criteria set forth in applicable statutes and regulations;
   - Announcement of the tentative decision for the 301(h) variance by the USEPA Regional Administrator;
   - Public notice of a draft 301(h)-modified permit incorporating the USEPA Regional Administrator's tentative decision and the TDD;
   - Public hearings to address public interest;

- State concurrence in the granting of a 301(h) variance through State and USEPA joint issuance of a 301(h)-modified NPDES permit, or denial by the State and/or the USEPA Regional Administrator; and
- Processing of appeals in accordance with 40 CFR part 124.

The Discharger has proposed the following alternative effluent limitations for TSS and BOD_5. The Discharger's percent removal limitations for TSS and BOD_5 are computed on a "system-wide" basis, whereby the Discharger receives credit for removal achieved as part of water reclamation operations in the Metro System service area which ultimately connect to the Facility and discharge through the PLOO.

Table F-8. Summary of TBELs Based on CWA sections 301(h) and (j)(5)[1]

Parameter	Units	Effluent Limitations	
		Average Monthly	Average Annual
TSS	system-wide percent removal	≥80[2]	
TSS	mg/L	60[3]	--
TSS	mt/yr	--	12,000[4]
TSS	mt/yr	--	11,999[5]
BOD_5	system-wide percent removal		≥58[2]

1 See Attachment A for definitions of abbreviations and a glossary of common terms used in this Order/Permit.

2 Percent removal shall be calculated on a system-wide basis, as provided in section VII.G of this Order/Permit. Section VII.G of this Order/Permit is carried over from Orders Nos. R9-2002-0025 and R9-2009-0001.

3 Based on average monthly performance data (1990 through 1994) for the Facility provided by the Discharger for the 1995 301(h) application.

4 To be achieved on the effective date of this Order/Permit through the end of the fourth year of this Order/Permit. Mass emission limits for TSS apply only to discharges from POTWs owned and operated by the Discharger and the Discharger's wastewater generated in the Metro System service area, excluding TSS contributions from Metro System flows treated in the City of Escondido and South Bay WRP flows discharged to the South Bay Ocean Outfall. If the Discharger is requested to accept wastewater originating in Tijuana, Mexico, treated or untreated, such acceptance would be contingent upon an agreement acceptable to the USEPA, Region IX, San Diego Water Board and Discharger. The TSS contribution from that flow would not be counted toward Discharger’s mass emission limit(s).

5 To be achieved on the beginning of the fifth year of this Order/Permit. Mass emission limits for TSS apply only to discharges from POTWs owned and operated by the Discharger and the Discharger's wastewater generated in the Metro System service area, excluding TSS contributions from Metro System flows treated in the City of Escondido and South Bay WRP flows discharged to the South Bay Ocean Outfall. If the Discharger is requested to accept wastewater originating in Tijuana, Mexico, treated or untreated, such acceptance would be contingent upon an agreement acceptable to the USEPA, Region IX, San Diego Water Board and Discharger. The TSS contribution from that flow would not be counted toward Discharger’s mass emission limit(s).

A POTW applying for a 301(h) variance must demonstrate satisfactorily to USEPA that the modified discharge will meet the following CWA section 301(h) requirements:

- The modified discharge will comply with all applicable water quality standards and the State has determined that the modified discharge will comply with State law;
- The modified discharge, alone or in combination with other sources, will not interfere with the attainment or maintenance of water quality that assures the protection of public water supplies; assures the protection and propagation of a balanced indigenous population of fish, shellfish, and wildlife; and allows for recreational activities;

- A monitoring program has been established by the applicant to monitor the impact of the modified discharge, including biological, water quality, and effluent monitoring;
- The modified discharge will not result in additional requirements on other point and nonpoint sources of pollutants and the State has determined that the modified discharge will not result in any such additional requirements;
- An applicant serving a population of 50,000 or more that receives toxic pollutants from industrial sources must demonstrate they have complied with urban area pretreatment requirements at the time the permit is approved;
- An applicant must make a demonstration that pretreatment requirements for industrial sources introducing wastes into the treatment works will be enforced;
- An applicant must demonstrate that a schedule of activities has been established to minimize the introduction of toxic substances from non-industrial sources onto the treatment works, including the development and implementation of programs for public education and non-industrial source control;
- An applicant must demonstrate that the modified discharge will not result in new or substantially increased discharges of the waived pollutants above the discharge specified in the 301(h)-modified permit. Projections of effluent volumes and mass emission rates (MERs) for pollutants to which the modification applies must be provided in 5-year increments for the design life of the facility; and
- The modified discharge must receive at least primary or equivalent treatment and must meet CWA section 304(a)(1) criteria, in accordance with 40 CFR section 125.62(a). Variances are prohibited for discharges into waters that contain significant amounts of previously discharged effluent from the treatment works, or into saline estuarine waters that do not support a balanced indigenous population, do not allow recreation, or which violate water quality standards or criteria beyond the zone of initial dilution (ZID).

Under 40 CFR section 125.59(b), no 301(h)-modified permit may be issued for:

- Discharges that do not comply with 40 CFR parts 122 and 125, subpart G;
- Discharges of sewage sludge;
- Discharges that would not be in compliance with applicable provisions of State, local, or other federal laws and Executive Orders; or
- Discharges that enter the New York Bight Apex.

In addition, the Discharger must meet the following requirements under the Ocean Pollution Reduction Act of 1994, CWA section 301(j)(5):

- 80 percent removal of TSS based on a system-wide monthly average;
- 58 percent removal of BOD_5 based on a system-wide average annual;
- 45 MGD of water reclamation capacity by the year 2010; and
- Reduction of TSS discharged into the ocean during the period of the Order/Permit modification.

During the term of the 1995 permit, the Discharger implemented a reclamation program with a system capacity of 45 MGD of reclaimed water, thereby meeting the requirement for reclaimed water capacity of 45 MGD in CWA section 301(j)(5). On an average annual basis, currently a little over 12 MGD of reclaimed water is delivered to reuse sites from NCWRP and SBWRP. On a system-wide basis, the Discharger will be able to remove not less than 80 percent of TSS (on a monthly average) and not less than 58 percent of BOD_5 (on an average annual) in the discharge to which the 2015 301(h) application applies.

USEPA, Region IX has drafted a 301(h) TDD evaluating the Discharger's proposed improved discharge and effluent limitations for TSS and BOD_5, the projected average annual end-of-permit effluent flow rate, and 2009 through 2015 effluent concentrations for TSS and BOD_5, as provided in the updated 2015 301(h) application. The 2016 TDD concludes that the Discharger's 301(h) application satisfies CWA sections 301(h) and 301(j)(5). Based on this information, it is the USEPA, Region IX Regional Administrator's tentative decision to grant the Discharger's variance request for TSS and BOD_5, in accordance with the terms, conditions, and limitations of the TDD. In accordance with this decision and the 1984 301(h) Memorandum of Understanding between the State of California and USEPA, the San Diego Water Board and USEPA, Region IX have jointly proposed issuance of a draft 301(h)-modified permit incorporating both federal NPDES requirements and State WDRs. The final permit will be issued without prejudice to the rights of any party to address the legal issue of the applicability of CWA section 1311 (j)(5) to the Discharger's future NPDES permits.

The Discharger's Order/Permit renewal of the variance from federal secondary treatment standards, pursuant to CWA sections 301(h) and (j)(5), is contingent upon:

- Determination by the California Coastal Commission that the proposed discharge is consistent with the Coastal Zone Management Act of 1972, as amended (16 U.S.C. section 1451 et seq.);
- Determination by the U.S. Fish and Wildlife Service and the National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service that the proposed discharge is consistent with the federal Endangered Species Act of 1973, as amended (16 U.S.C. section 1531, et seq.);
- Determination by the NOAA National Marine Fisheries Service that the proposed discharge is consistent with the Magnuson-Stevens Fishery Conservation and Management Act, as amended (16 U.S.C. section 1801, et seq.);
- Determination by the San Diego Water Board that the discharge will not result in additional treatment pollution control, or other requirement, on any other point or nonpoint sources (40 CFR section 125.64);
- The San Diego Water Board's certification concurrence that the discharge will comply with water quality standards for the pollutants which the 301(h) variance is requested (40 CFR section 125.61) (i.e., TSS and BOD_5). The joint issuance of a NPDES permit which incorporates both the 301(h) variance and State WDRs will serve as the State's concurrence; and
- The USEPA, Region IX Regional Administrator's final decision regarding the Discharger's CWA section 301(h) variance request.

2. **Storm Water.** Sewage treatment works with a design flow of 1.0 MGD or greater are required to comply with State Water Board Order No. 2014-0057-DWQ (NPDES General Permit No. CAS000001), *Waste Discharge Requirements for Dischargers of Storm Water Associated with Industrial Activities*. The Facility is currently enrolled under the State Water Board Order No. 2014-0057-DWQ.

3. **Pretreatment.** Federal requirements at 40 CFR part 403 establish pretreatment requirements for POTWs which receive pollutants from nondomestic users. This Order/Permit contains pretreatment requirements pursuant to 40 CFR part 403.

4. **Collection System.** Publicly-owned collection systems are subject to coverage under State Water Board Order No. 2006-0003-DWQ, *Statewide General Waste Discharge Requirements for Sanitary Sewer Systems* and any subsequent Order. The Discharger owns and operates a publicly-owned collection system and must retain coverage under Order No. 2006-0003-DWQ and any subsequent Order.

   In addition, the provisions of this Order/Permit prohibit discharges from any point other than the authorized discharge point. Therefore, any discharges from the collection system are prohibited. Moreover, the collection system is part of the POTW and, therefore, must comply with the provisions of this Order/Permit requiring reports of any noncompliance (40 CFR sections 122.44(1)(6) and (7)), proper operation and maintenance (40 CFR section 122.41(e)), and duty to mitigate sewage spills (40 CFR section 122.41(d)).

5. **Biosolids.** On February 19, 1993, the USEPA, Region IX issued a final rule for the use and disposal of sewage sludge (40 CFR part 503). This regulation requires that producers of sewage sludge meet certain handling, disposal, and monitoring requirements. The USEPA, Region IX, not the San Diego Water Board, will oversee compliance with 40 CFR part 503.

IV. RATIONALE FOR EFFLUENT LIMITATIONS AND DISCHARGE SPECIFICATIONS

The CWA requires point source dischargers to control the amount of conventional, non-conventional, and toxic pollutants that are discharged into the waters of the U.S. The control of pollutants discharged is established through effluent limitations and other requirements in NPDES permits. There are two principal bases for effluent limitations in the Code of Federal Regulations: 40 CFR section 122.44(a) requires that permits include applicable technology-based effluent limitations and standards (TBELs); and 40 CFR section 122.44(d) requires that permits include water quality-based effluent limitations (WQBELs) to attain and maintain applicable numeric and narrative water quality criteria to protect the beneficial uses of the receiving water.

A. Discharge Prohibitions

This Order/Permit retains the discharge prohibitions from Order No. R9-2009-0001, as described below. Compliance determination language is included in section VII of this Order/Permit to accurately describe how violations of these prohibitions are determined. Discharges from the Facility to surface waters in violation of prohibitions contained in this Order/Permit are violations of the CWA and therefore are subject to third party lawsuits. Discharges from the Facility to land in violation of prohibitions contained in this Order/Permit are violations of the Water Code and are not subject to third party lawsuits under the CWA because the Water Code does not contain provisions allowing third party lawsuits.

1. Discharge Prohibition III.A has been carried over from Order No. R9-2009-0001. Prohibition III.A clearly defines what types of discharges are prohibited. This prohibition is based on 40 CFR section 122.21(a), duty to apply, and Water Code section 13260, which requires filing a ROWD before discharges can occur. Discharges not described in the ROWD, and subsequently in this Order/Permit, are prohibited.

2. Prohibitions III.B and III.C include discharge prohibitions of the Ocean Plan and the Basin Plan. These discharge prohibitions are consistent with Standard Provisions VI.A.2.a and b within Order No. R9-2009-0001.

3. Order No. R9-2009-0001 prohibited discharges to the Pacific Ocean through the PLOO in excess of a 240 MGD average monthly flow rate. Because this prohibition is now included as an effluent limitation, this requirement is not retained in section III of this Order/Permit.

B. Technology-Based Effluent Limitations (TBELs)

1. Scope and Authority

CWA section 301(b) and implementing USEPA permit regulations at 40 CFR section 122.44(a)(1) require that permits include conditions meeting applicable technology-based requirements at a minimum, and any more stringent effluent limitations necessary to meet applicable water quality standards.

Regulations promulgated in 40 CFR section 125.3 require TBELs to be placed in NPDES permits.

The *Federal Water Pollution Control Act Amendments of 1972* (PL 92-500) established the minimum performance requirements attainable through the application of secondary treatment [defined in 40 CFR section 304(d)(1)].

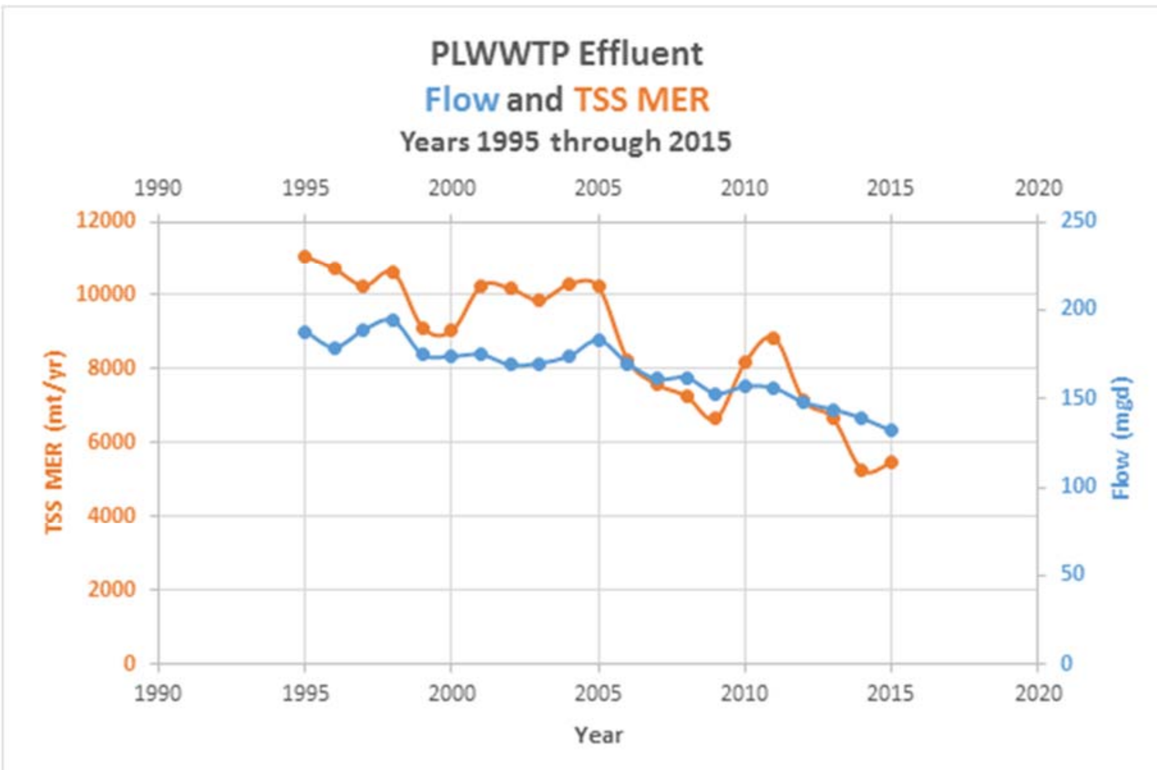
Based on this statutory requirement, USEPA developed secondary treatment regulations, which are specified in 40 CFR part 133. These technology-based regulations apply to all wastewater treatment plants and identify the minimum level of effluent quality attainable by secondary treatment in terms of BOD_5, TSS, and pH.

The Ocean Plan is applicable, in its entirety, to point source discharges to the Pacific Ocean. Therefore, the discharge of wastewater to the Pacific Ocean at Discharge Point No. 001 is subject to the Ocean Plan. The Ocean Plan establishes water quality objectives, general requirements for management of waste discharged to the ocean, effluent quality requirements for waste discharges, discharge prohibitions, and general provisions. Further, Table 2 of the Ocean Plan establishes TBELs for POTWs and industrial discharges for which Effluent Limitation Guidelines have not been established pursuant to CWA sections 301, 302, or 306 (summarized in Table F-9 below).

The Discharger has requested a renewal of its variance under CWA section 301(h), 33 U.S.C. section 1311(h), and the Ocean Pollution Reduction Act of 1994, 33 U.S.C. section 1311(j)(5), from the federal secondary treatment standards contained in CWA section 301(b)(1)(B), U.S.C. section 1311(b)(1)(B), for the pollutants TSS and BOD_5. A modification for pH was not requested. The effluent limitations for TSS and BOD_5, based on CWA sections 301(h) and (j)(5), are previously described in this Fact Sheet, section III.E.1. The TBEL for pH, required by 40 CFR part 133, continues to apply to the discharge which must be maintained within the limits of 6.0 to 9.0 pH units, at all times.

The Facility consistently met the removal requirements for BOD_5 and TSS established in Order No. R9-2009-0001. Based on CWA sections 301(h) and (j)(5), the percent removal requirements of BOD_5 and TSS remain appropriate and are carried over from Order No. R9-2009-0001. TSS and BOD_5 removal is computed on a "system-wide" basis to avoid double-counting of return solids and centrate streams. Table 2 of the Ocean Plan contains a percent removal requirement of 75 percent for TSS. This requirement is not computed on a system-wide basis and applies directly to the Facility influent and effluent waste streams. It is established in this Order/Permit as an effluent limitation based on Table 2 of the Ocean Plan.

The mass emission limitations for TSS in the existing permit are based on the effluent limitations requested by the Discharger in the 2015 301(h) application which were evaluated by USEPA, Region IX in the 2016 TDD. The Discharger requested TSS mass emission limitations of 12,000 mt/yr for years 1 through 4 of this Order/Permit, and 11,999 mt/yr in year 5 of this Order/Permit. This represents a 1,598 mt/yr reduction during years 1 through 4 of this Order/Permit, and 1,599 mt/yr reduction in year 5 of this Order/Permit, from the current mass emission limitation of 13,598 mt/yr. These mass reductions are consistent with the Discharger’s proposed plan to reduce mass emissions to 11,500 mt/yr by 2026, and to 9,942 mt/yr by 2028. An annual reduction down to 9,942 mt/yr is equivalent to levels that would have occurred if the 240-MGD Facility were to achieve TSS concentration standards of 30 mg/L, which is consistent with secondary treatment regulations specified in 40 CFR part 133. The figure below shows the Facility discharge annual average flow rates (MGD) and mass emissions of TSS (metric tons/yr) from 1995 to 2015. During this same time period, the population increased in the Metro System by 16 percent.



The effluent limitation for TSS of 75 mg/L was contained in the 1995, 2003, and 2009 permits. This effluent limitation was based on the Facility performance during the 1990s. Since the 1990s, the Discharger has improved its TSS effluent concentration at the Facility. During 2008-2015, monthly average effluent TSS concentration for the Facility ranged from 23 to 50 mg/l. During 2014, the annual average effluent TSS concentration for the Facility was less than 30 mg/l. Given the improved Facility performance for removing TSS and the TSS effluent limitation from the Ocean Plan, this Order/Permit reduces the TSS effluent limitation from 75 to 60 mg/l.

Table F-9. Monthly and annual average effluent concentrations for TSS (mg/l) at the Facility

Month	2008	2009	2010	2011	2012	2013	2014	2015
January	39	30	35	41	46	35	27	29

Month	2008	2009	2010	2011	2012	2013	2014	2015
February	34	29	36	37	44	39	32	25
March	38	31	36	35	38	37	26	29
April	37	29	37	38	38	36	25	26
May	36	32	34	42	34	38	23	30
June	38	30	39	41	32	38	26	27
July	29	31	36	44	39	50	25	29
August	28	34	34	46	36	27	29	28
September	24	33	37	46	36	24	29	30
October	24	31	39	47	34	25	29	32
November	31	32	37	42	35	26	30	36
December	30	36	45	39	35	27	28	35
Annual Average (average of the 12 monthly averages)	32	32	37	42	37	34	27	30
Maximum Month	39	36	45	47	46	50	32	36
Minimum Month	24	29	34	35	32	24	23	25

Section 122.45(f) of 40 CFR requires effluent limitations be expressed in terms of mass, with some exceptions, and 40 CFR section 122.45(b) requires mass-based effluent limitations for POTWs to be calculated based on the design flow. The average annual design flow rate for the Facility is 240 MGD. The previous orders have contained mass-based effluent limitations for oil and grease calculated using the 301(h)-variance-based annual flow rate of 205 MGD, taken from the 1995 301(h) application. The Discharger has maintained compliance with effluent limitations for mass emissions calculated using 205 MGD. USEPA, Region IX has not evaluated the impact of the PLOO discharge and compliance with CWA section 301(h) decision criteria at an oil and grease MER associated with a PLOO discharge of 240 MGD. Based on the 2015 301(h) application, mass-based effluent limitations continue to be based on the 301(h)-variance-based flow rate of 205 MGD, as they were in the 1995, 2003, and 2009 permits (see section II.C of this Fact Sheet for more info).

The CWA requires that TBELs be established based on several levels of controls:

a. Best practicable treatment control technology (BPT) represents the average of the best existing performance by well-operated facilities within an industrial category or subcategory. BPT standards apply to toxic, conventional, and non-conventional pollutants.

b. Best available technology economically achievable (BAT) represents the best existing performance of treatment technologies that are economically achievable within an industrial point source category. BAT standards apply to toxic and non-conventional pollutants.

c. Best conventional pollutant control technology (BCT) represents the control from existing industrial point sources of conventional pollutants including BOD, TSS, fecal coliform, pH, and oil and grease. The BCT standard is established after considering a two-part reasonableness test. The first test compares the relationship between the costs of attaining a reduction in effluent discharge and the resulting benefits. The second test examines the cost and level of reduction of pollutants from the discharge from POTWs to the cost and level of reduction of such pollutants from a class or category of industrial sources. Effluent limitations must be reasonable under both tests.

d. New source performance standards (NSPS) represent the best available demonstrated control technology standards. The intent of NSPS guidelines is to set limitations that represent state-of-the-art treatment technology for new sources.

2. Applicable TBELs

Technology-based regulations, specified in Table 2 of the Ocean Plan and CWA sections 301(h) and (j)(5), are summarized in the Table F-9 below.

Table F-10. Summary of TBELs, Discharge Point No. 001[1]

Parameter	Units	Effluent Limitations[2]				
		Average Annual	Average Monthly	Average Weekly	Instantaneous Minimum	Instantaneous Maximum
TSS	mg/L	--	60[3]	--	--	--
	Facility percent removal	--	75[3]	--	--	--
	system-wide percent removal	--	≥80[4]	--	--	--
	mt/yr	12,000[5]	--	--	--	--
		11,999[6]	--	--	--	--
BOD_5	system-wide percent removal	≥58[4]	--	--	--	--
Oil and Grease	mg/L	--	25	40	--	75
	lbs/day	--	42,743	68,388	--	128,228
Settleable Solids	ml/L	--	1.0	1.5	--	3.0
Turbidity	NTU	--	75	100	--	225
pH	standard units	--	--	--	6.0	9.0

1. See Attachment A for definitions of abbreviations and a glossary of common terms used in this Order/Permit.
2. The MER limitation, in lbs/day, was calculated based on the following equation: MER (lbs/day) = 8.34 x Q x C, where Q is the 301(h)-variance-based flow of 205 MGD and C is the concentration (in mg/L). The 301(h)-variance-based average annual flow rate of 205 MGD was taken from the 1995 301(h) application and carried over from Orders Nos. 95-106, R9-2002-0025, and R9-2009-0001 (see section II.C of this Fact Sheet for more info).
3. Dischargers shall, as a 30-day average, remove 75% of suspended solids from the influent stream before discharging wastewaters to the ocean,* except that the effluent limitation to be met shall not be lower than 60 mg/l.
4. The average monthly system-wide percent removal was derived from CWA sections 301(h) and (j)(5). Percent removal shall be calculated on a system-wide basis, as provided in section VII.G of this Order/Permit. Section VII.G of this Order/Permit is carried over from Orders Nos. R9-2002-0025 and R9-2009-0001.
5. To be achieved on the effective date of this Order/Permit through the end of the fourth year of this Order/Permit. Mass emission limits for TSS apply only to discharges from POTWs owned and operated by the Discharger and the Discharger's wastewater generated in the Metro System service area, excluding TSS contributions from Metro System flows treated in the City of Escondido and South Bay WRP flows discharged to the South Bay Ocean Outfall. If the Discharger is requested to accept wastewater originating in Tijuana, Mexico, treated or untreated, such acceptance would be contingent upon an agreement acceptable to the USEPA, Region IX, San Diego Water Board and Discharger. The TSS contribution from that flow would not be counted toward Discharger's mass emission limit(s).

6. To be achieved by the beginning of the fifth year of this Order/Permit. Mass emission limits for TSS apply only to discharges from POTWs owned and operated by the Discharger and the Discharger's wastewater generated in the Metro System service area, excluding TSS contributions from Metro System flows treated in the City of Escondido and South Bay WRP flows discharged to the South Bay Ocean Outfall. If the Discharger is requested to accept wastewater originating in Tijuana, Mexico, treated or untreated, such acceptance would be contingent upon an agreement acceptable to the USEPA, Region IX, San Diego Water Board and Discharger. The TSS contribution from that flow would not be counted toward Discharger's mass emission limit(s).

Order No. R9-2009-0001 contains a prohibition of discharges from the Facility in excess of a monthly average flow rate of 240 MGD. As explained in section IV.A.3 of this Fact Sheet, this prohibition is now included as an effluent limitation in this Order/Permit. This flow rate is based on the design flow rate of the Facility.

C. Water Quality-Based Effluent Limitations (WQBELs)

1. Scope and Authority

CWA section 301(b) and 40 CFR section 122.44(d) require that permits include limitations more stringent than applicable federal technology-based requirements where necessary to achieve applicable water quality standards.

Section 122.44(d)(1)(i) of 40 CFR requires that permits include effluent limitations for all pollutants that are or may be discharged at levels that have the reasonable potential to cause or contribute to an exceedance of a water quality standard, including numeric and narrative objectives within a standard. Where reasonable potential has been established for a pollutant, but there is no numeric criterion or objective for the pollutant, WQBELs must be established using: (1) USEPA criteria guidance under CWA section 304(a), supplemented where necessary by other relevant information; (2) an indicator parameter for the pollutant of concern; or (3) a calculated numeric water quality criterion, such as a proposed State criterion or policy interpreting the State's narrative criterion, supplemented with other relevant information, as provided in 40 CFR section 122.44(d)(1)(vi).

The process for determining reasonable potential and calculating WQBELs when necessary is intended to protect the designated uses of the receiving water as specified in the Basin Plan and Ocean Plan, and achieve applicable water quality objectives and criteria that are contained in the Ocean Plan.

2. Applicable WQBELs

The Basin Plan and Ocean Plan designate beneficial uses, establish water quality objectives, and contain implementation programs and policies to achieve those objectives for all waters.

a. Basin Plan. The beneficial uses specified in the Basin Plan applicable to the Pacific Ocean are summarized in section III.C.1 of this Fact Sheet.

The Basin Plan water quality objective for dissolved oxygen applicable to ocean waters is stated as follows: "The dissolved oxygen concentration in ocean waters shall not at any time be depressed more than 10 percent from that which occurs naturally, as the result of the discharge of oxygen demanding waste materials."

The Basin Plan water quality objective for pH applicable to ocean waters is stated as follows: "The pH value shall not be changed at any time more than 0.2 pH units from that which occurs naturally."

b. Ocean Plan. The beneficial uses specified in the Ocean Plan for the Pacific Ocean are summarized in section III.C.2 of this Fact Sheet. The Ocean Plan also includes water quality objectives for the ocean receiving water for bacterial characteristics, physical characteristics, chemical characteristics, biological characteristics, and radioactivity.

Table 1 of the Ocean Plan includes the following water quality objectives for toxic pollutants and whole effluent toxicity:

i. Six-month median, daily maximum, and instantaneous maximum objectives for 21 chemicals and chemical characteristics, including total chlorine residual and chronic toxicity, for the protection of marine aquatic life;

ii. 30-day average objectives for 20 non-carcinogenic chemicals for the protection of human health;

iii. 30-day average objectives for 42 carcinogenic chemicals for the protection of human health; and

iv. Daily maximum objectives for acute and chronic toxicity.

3. Determining the Need for WQBELs

Order No. R9-2009-0001 contained effluent limitations for non-conventional and toxic pollutant parameters in Table B of the 2005 Ocean Plan. For this Order/Permit, the need for effluent limitations based on water quality objectives in Table 1 of the 2015 Ocean Plan was re-evaluated in accordance with 40 CFR section 122.44(d) and guidance for statistically determining the "reasonable potential" for a discharged pollutant to exceed an objective, as outlined in the revised *Technical Support Document for Water Quality-Based Toxics Control* (TSD; EPA/505/2-90-001, 1991) and the Ocean Plan Reasonable Potential Analysis (RPA) Amendment that was adopted by the State Water Board on April 21, 2005. The statistical approach combines knowledge of effluent variability (as estimated by a coefficient of variation) with the uncertainty due to a limited amount of effluent data to estimate a maximum effluent value at a high level of confidence. This estimated maximum effluent value is based on a lognormal distribution of daily effluent values. Projected receiving water values (based on the estimated maximum effluent value or the reported maximum effluent value and minimum probable initial dilution) can then be compared to the appropriate objective to determine the potential for an exceedance of that objective and the need for an effluent limitation. According to the Ocean Plan amendment, the RPA can yield three endpoints: 1) Endpoint 1, an effluent limitation is required and monitoring is required; 2) Endpoint 2, an effluent limitation is not required and the San Diego Water Board and USEPA, Region IX may require monitoring; and 3) Endpoint 3, the RPA is inconclusive, monitoring is required, and an existing effluent limitation may be retained or a permit reopener clause may be included to allow inclusion of an effluent limitation if future monitoring warrants the inclusion. Endpoint 3 is typically the result when there are fewer than 16 data points and all are censored data (i.e., below quantitation or method detection levels for an analytical procedure). If no data was provided for a parameter, and an RPA could not be conducted for that parameter, reasonable potential for that parameter was carried over to this Order/Permit based on the requirements of State and federal Anti-backsliding regulations. Data for all parameters was available to conduct an RPA.

The implementation provisions for Table 1 of the Ocean Plan specify that the minimum initial dilution is the lowest average initial dilution within any single month of the year. Dilution estimates are to be based on observed waste flow characteristics, observed receiving water density structure, and the assumption that no currents of sufficient strength to influence the initial dilution process flow across the discharge structure.

Using the RPcalc 2.0 software tool developed by the State Water Board for conducting RPAs, the San Diego Water Board and USEPA, Region IX has conducted the RPA for the parameters listed in Table 1 of the Ocean Plan. For parameters that do not display reasonable potential, this Order/Permit includes desirable maximum effluent concentrations which were derived using effluent limitation determination procedures described below and are referred to in this Order/Permit as “performance goals.” A narrative receiving water limitation statement to comply with all Ocean Plan objectives requirements is provided for those parameters not displaying reasonable potential. The Discharger is required to monitor for these parameters pursuant to the Monitoring and Reporting Program (MRP, Attachment E) in order to gather data for use in RPA for future permit reissuances. Conventional pollutants were not a part of the RPA.

Effluent data provided in the Discharger’s monitoring reports for the Facility from August 2010 through July 2015 were used in the RPA.

During the development of Order No. R9-2009-0001, initial dilution was assessed using USEPA modeling application Visual Plumes (UM3) and the minimum initial dilution was calculated to be 227:1. Effluent and outfall characteristics have not changed sufficiently to warrant the need for another dilution analysis and the dilution is not anticipated to have changed. The calculated value from the 2009 UM3 analysis is higher than the previous initial dilution (204:1) based on the results of a modified version of the RSB model, submitted with the Discharger's 1995 ROWD and the Discharger's 1995, 2001, 2007, and 2015 301(h) applications to USEPA, Region IX. The Discharger has recommended retaining the previous initial dilution value as more appropriate and representative of PLOO minimum initial dilution. Thus the initial dilution value of 204:1 has been carried over from Order No. R9-2009-0001 to this Order/Permit. A detailed description of the 2009 UM3 analysis is provided in Attachment H.

A summary of the RPA results is provided below:

Table F-11. RPA Results Summary[1]

Parameter	Units	N[2]	MEC[3,4]	Most Stringent Criteria	Background[5]	RPA Endpoint[6]
Arsenic, Total Recoverable	µg/L	251	1.71	8	3	2
Cadmium, Total Recoverable	µg/L	251	1.13	1	0	2
Chromium (VI), Total Recoverable[7]	µg/L	251	9	2	0	2
Copper, Total Recoverable	µg/L	251	46.8	3	2	2
Lead, Total Recoverable	µg/L	251	18.9	2	0	2
Mercury, Total Recoverable	µg/L	253	0.05	0.04	0.0005	2
Nickel, Total Recoverable	µg/L	251	16.1	5	0	2
Selenium, Total Recoverable	µg/L	251	2.05	15	0	2
Silver, Total Recoverable	µg/L	251	1.21	0.7	0.16	2
Zinc, Total Recoverable	µg/L	251	66.1	20	8	2
Cyanide, Total	µg/L	252	4	1	0	2
Total Chlorine Residual	µg/L	1,808	7,130	2	0	1
Ammonia	µg/L	251	41,600	600	0	2
Chronic Toxicity	TUc	270	666.7	1	0	1
Phenolic Compounds	µg/L	251	78.9	30	0	2
Chlorinated Phenolics	µg/L	251	7	1	0	2
Endosulfan	µg/L	241	<0.0046	0.009	0	2

Parameter	Units	N[2]	MEC[3,4]	Most Stringent Criteria	Background[5]	RPA Endpoint[6]
Endrin	µg/L	250	0.0165	0.002	0	2
Hexachlorocyclohexane (HCH)	µg/L	250	0.0085	0.004	0	2
Radioactivity	pico-curies per liter (pCi/L)	-----	-----	-----	-----	-----
Acrolein	µg/L	61	<1.3	220	0	2
Antimony, Total Recoverable	µg/L	251	6.7	1,200	0	2
Bis(2-chloroethoxyl)methane	µg/L	62	<1.01	4.4	0	2
Bis(2-chloroisopropyl)ether	µg/L	62	<1.16	1,200	0	2
Chlorobenzene	µg/L	61	0.725	570	0	2
Chromium (III), Total Recoverable[7]	µg/L	251	9	190,000	0	2
Di-n-butyl phthalate	µg/L	62	<3.96	3,500	0	2
Dichlorobenzenes	µg/L	61	<0.9	5,100	0	2
Diethyl phthalate	µg/L	62	19.1	33,000	0	2
Dimethyl phthalate	µg/L	62	<1.44	820,000	0	2
4,6-Dinitro-2-methylphenol	µg/L	250	<1.52	220	0	2
2,4-Dinitrophenol	µg/L	250	<2.16	4	0	2
Ethylbenzene	µg/L	61	1.53	4,100	0	2
Fluoranthene	µg/L	62	<1.33	15	0	2
Hexachlorocyclopentadiene	µg/L	62	<1.25	58	0	2
Nitrobenzene	µg/L	62	<1.6	4.9	0	2
Thallium, Total Recoverable	µg/L	251	7.85	2	0	2
Toluene	µg/L	61	2.93	85,000	0	2
Tributyltin	µg/L	63	<2	0.0014	0	3
1,1,1-Trichloroethane	µg/L	61	<0.4	540,000	0	2
Acrylonitrile	µg/L	61	<0.7	0.1	0	2
Aldrin	µg/L	248	0.0062	0.000022	0	1
Benzene	µg/L	61	<0.4	5.9	0	2
Benzidine	µg/L	62	<1.52	0.000069	0	3
Beryllium, Total Recoverable	µg/L	251	0.084	0.033	0	2
Bis(2-chloroethyl) ether	µg/L	62	<1.38	0.045	0	2
Bis(2-ethylhexyl) phthalate	µg/L	62	<8.96	3.5	0	2
Carbon tetrachloride	µg/L	61	<0.4	0.9	0	2
Chlordane	µg/L	250	<0.002	0.000023	0	2
Chlorodibromomethane (dibromochloromethane)	µg/L	61	1.18	8.6	0	2
Chloroform	µg/L	61	10.8	130	0	2
Dichlorodiphenyltrichloroethane (DDT)	µg/L	250	<0.002	0.00017	0	2
1,4-Dichlorobenzene	µg/L	60	0.925	18	0	2
3,3-Dichlorobenzidine	µg/L	62	<2.44	0.0081	0	3
1,2-Dichloroethane	µg/L	61	<0.5	28	0	2
1,1-Dichloroethylene	µg/L	61	<0.4	0.9	0	2
Dichlorobromomethane	µg/L	61	1.34	6.2	0	2
Dichloromethane (Methylene Chloride)	µg/L	60	5.25	450	0	2
1,3-dichloropropene (1,3-Dichloropropylene)	µg/L	61	<0.5	8.9	0	2
Dieldrin	µg/L	250	<0.003	0.00004	0	2
2,4-Dinitrotoluene	µg/L	62	<1.36	2.6	0	2

Parameter	Units	N[2]	MEC[3,4]	Most Stringent Criteria	Background[5]	RPA Endpoint[6]
1,2-Diphenylhydrazine	µg/L	62	<1.37	0.16	0	2
Halomethanes	µg/L	61	45	130	0	2
Heptachlor	µg/L	250	<0.0006	0.00005	0	2
Heptachlor Epoxide	µg/L	250	<0.004	0.00002	0	2
Hexachlorobenzene	µg/L	62	<1.48	0.00021	0	3
Hexachlorobutadiene	µg/L	62	<1.64	14	0	2
Hexachloroethane	µg/L	62	<1.32	2.5	0	2
Isophorone	µg/L	62	<1.53	730	0	2
N-nitrosodimethylamine	µg/L	62	<1.27	7.3	0	2
N-nitrosodi-N-propylamine	µg/L	62	<1.16	0.38	0	2
N-nitrosodiphenylamine	µg/L	61	<3.48	2.5	0	2
~~Polynuclear Aromatic Hydrocarbons (~~PAHs~~)~~	µg/L	60	<1.77	0.0088	0	2
~~Polychlorinated Biphenyls (~~PCBs~~)~~	µg/L	250	<0.0309	0.000019	0	3
TCDD equivalents	pictograms/ liter (pg/L)	58	1.68E-07~~5.40E-05~~	3.9E-09	0	~~1~~3
1,1,2,2-Tetrachoroethane	µg/L	61	<0.5	2.3	0	2
Tetrachloroethylene (Tetrachloroethene)	µg/L	61	1.15	2	0	2
Toxaphene	µg/L	250	<0.0033	0.00021	0	2
Trichloroethylene (Trichloroethene)	µg/L	61	<0.7	27	0	2
1,1,2-Trichloroethane	µg/L	61	<0.5	9.4	0	2
2,4,6-Trichlorophenol	µg/L	250	<1.65	0.29	0	2
Vinyl Chloride	µg/L	61	<0.4	36	0	2

1. See Attachment A for definitions of abbreviations and a glossary of common terms used in this Order/Permit.
2. Number of data points available for the RPA.
3. If there is a detected value, the highest reported value is summarized in the table. If there are no detected values, the lowest method detection limit (MDL) is summarized in the table.
4. Note that the reported MEC does not account for dilution. The RPA does account for dilution; therefore it is possible for a parameter with an MEC in exceedance of the most stringent criteria not to present a reasonable potential (i.e., Endpoint 2).
5. Background concentrations contained in Table 3 of the Ocean Plan.
6. Endpoint 1 – Reasonable Potential (RP) determined, limitation required, monitoring required.
   Endpoint 2 – Discharge determined not to have RP, monitoring may be established.
   Endpoint 3 – RPA was inconclusive, carry over previous limitations if applicable, and establish monitoring.
7. Discharger monitored for total chromium, in lieu of chromium (VI) and chromium (III).

Reasonable potential to cause or contribute to an exceedance of water quality objectives contained within the Ocean Plan (i.e., Endpoint 1) was determined for aldrin, chronic toxicity, and total residual chlorine~~, and TCDD equivalents~~. Thus effluent limitations for these parameters have been retained (chronic toxicity and total residual chlorine) or established (aldrin~~ and TCDD equivalents~~).

For parameters for which the RPA was inconclusive (i.e., Endpoint 3), reasonable potential was not determined. Endpoint 3 applied to 3,3-dichlorobenzidine, benzidine, hexachlorobenzene, PCBs, TCDD equivalents, and tributyltin. Order No. R9-2009-0001 did not include effluent limitations for these parameters, therefore effluent limitations have not been carried forward. Performance goals have instead been established for these parameters.

Consistent with 40 CFR section 122.44(l)(2)(i)(B), effluent limitations from Order No. R9-2009-0001 were not retained for parameters for which there was no reasonable potential (i.e., Endpoint 2), including phenolic compounds (non-chlorinated), chlorinated phenolics, chlorodane, chlorodibromomethane, chloroform, 1,4-dichlorobenzene, Dichlorobromomethane, dichloromethane, halomethanes, and heptachlor. Instead, performance goals have been established for these parameters.

The monitoring requirements in MRP (Attachment E) are designed to obtain additional information for these constituents to determine if reasonable potential exists for these parameters in future permit renewals and/or updates.

4. WQBEL Calculations

a. From the Table 1 of the Ocean Plan, effluent limitations and performance goals are calculated according to the following equations:

For all pollutants, except for acute toxicity (if applicable) and radioactivity:

Ce = Co + Dm (Co – Cs) where,

Ce = the effluent limitation (µg/L)

Co = the water quality objective to be met at the completion of initial dilution (µg/L)

Cs = background seawater concentration (µg/L), from Table 3 of the Ocean Plan

Dm = minimum probable initial dilution expressed as parts seawater per part wastewater

For acute toxicity (if applicable):

Ce = Ca + (0.1) Dm (Ca) where,

Ce = the effluent limitation

Ca = the concentration (water quality objective) to be met at the edge of the acute mixing zone

Dm = minimum probable initial dilution expressed as parts seawater per part wastewater (This equation applies only when Dm > 24)

b. As discussed in section IV.C.3 above, the initial dilution (Dm) of 204:1 has been carried over from Order No. R9-2009-0001.

c. Table 3 of the Ocean Plan establishes background concentrations for some pollutants to be used when determining reasonable potential (represented as “Cs”). In accordance with Table 1 implementing procedures of the Ocean Plan, Cs equals zero for all pollutants not established in Table 3 of the Ocean Plan. The background concentrations provided in Table 3 of the Ocean Plan are summarized in the Table F-~~11~~ 12 below:

Table F-12. Pollutants Having Background Concentrations

Pollutant	Background Seawater Concentration
Arsenic	3 µg/L
Copper	2 µg/L
Mercury	0.0005 µg/L
Silver	0.16 µg/L
Zinc	8 µg/L

d. Section 122.45(f)(1) of 40 CFR requires effluent limitations be expressed in terms of mass, with some exceptions, and 40 CFR section 122.45(f)(2) allows pollutants that are limited in terms of mass to additionally be limited in terms of other units of measurement. Section III.C.4.j of the Ocean Plan requires that MER limitations be established in addition to the effluent concentration limitations for all Ocean Plan Table 1 parameters. This Order/Permit includes effluent limitations expressed in terms of mass and concentration. In addition, pursuant to the exceptions to mass limitations provided in 40 CFR section 122.45(f)(1), some effluent limitations are not expressed in terms of mass, such as pH and temperature. Exceptions to mass limitations are also allowable where effluent limitations are based on applicable standards expressed in terms of concentration (e.g., California Toxics Rule criteria and maximum contaminant level) and mass limitations are not necessary to protect the beneficial uses of the receiving water.

MER limitations were calculated using the following equation:

MER (lbs/day) = Permitted Flow (MGD) x Pollutant Concentration (mg/L) x 8.34

e. The calculations for the effluent limitations for total residual chlorine are shown below as an example of how effluent limitations and performance goals have been calculated.

Table F-13. Water Quality Objectives from the Ocean Plan for Total Residual Chlorine

Parameter	Units	Six-month Median	Daily Maximum	Instantaneous Maximum
Total Residual Chlorine	µg/L	2	8	60

Using the equations in sections IV.C.4.a and d above, and the 301(h)-variance-based flow of 205 MGD in lieu of the permitted flow, as explained in section II.C, effluent limitations are calculated for total residual chlorine as follows.

$$Ce = Co + Dm\ (Co - Cs)$$

$$Ce = 2 + 204\ (2 - 0) = 410\ \mu g/L\ \text{(Six-month Median)}$$

$$Ce = 8 + 204\ (8 - 0) = 1{,}640\ \mu g/L\ \text{(Daily Maximum)}$$

$$Ce = 60 + 204\ (60 - 0) = 12{,}300\ \mu g/L\ \text{(Instantaneous Maximum)}$$

lb/day = Flow (MGD) x Pollutant Concentration (mg/L) x 8.34

lb/day = 205 MGD x 0.410 mg/L x 8.34 = 701 lb/day

lb/day = 205 MGD x 1.640 mg/L x 8.34 = 2,736 lb/day

lb/day = 205 MGD x 12.300 mg/L x 8.34 = 21,029 lb/day

Based on the implementing procedures described above, effluent limitations and performance goals have been calculated for all pollutants in Table 1 of the Ocean Plan and incorporated into this Order/Permit.

f. A summary of the WQBELs established in this Order/Permit is provided below:

Table F-14. Summary of WQBELs, Discharge Point No. 001[1]

Parameter	Units	Effluent Limitations[2,3]			
		Average Monthly	Maximum Daily	Instantaneous Maximum	Six-month Median
Total Residual Chlorine	µg/L		1.6E+03	1.2E+04	4.1E+02
	lbs/day		2.7E+03	2.1E+04	7.0E+02
Chronic Toxicity (Test of Significant Toxicity)[4,5]	"Pass"/"Fail"		"Pass"		
Aldrin	µg/L	4.5E-03			
	lbs/day	7.7E-03			
~~TCDD Equivalents~~	~~µg/L~~	~~8.0E-07~~			
	~~lbs/day~~	~~1.4E-06~~			

1 See Attachment A for definitions of abbreviations and a glossary of common terms used in this Order/Permit.

2 The MER limitation, in lbs/day, was calculated based on the following equation: MER (lbs/day) = 8.34 x Q x C, where Q is the 301(h)-variance-based flow of 205 MGD and C is the concentration (in mg/L). The 301(h)-variance-based average annual flow rate of 205 MGD was taken from the 1995 301(h) application and carried over from Orders Nos. 95-106, R9-2002-0025, and R9-2009-0001 (see section II.C of this Fact Sheet for more info).

3 Scientific "E" notation is used to express certain values. In scientific "E" notation, the number following the "E" indicates that position of the decimal point in the value. Negative numbers after the "E" indicate that the value is less than 1, and positive numbers after the "E" indicate that the value is greater than 1. In this notation a value of 6.1E-02 represents 6.1 x 10^{-2} or 0.061, 6.1E+02 represents 6.1 x 10^{2} or 610, and 6.1E+00 represents 6.1 x 10^{0} or 6.1.

4 As specified in section VII.M of this Order/Permit and section III.C of the MRP (Attachment E).

5 The Chronic Toxicity final effluent limitation is protective of both the numeric acute and chronic toxicity 2015 Ocean Plan water quality objectives. The final effluent limitation will be implemented using Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to West Coast Marine and Estuarine Organisms (EPA/600/R-95/136, 1995), current USEPA guidance in the *National Pollutant Discharge Elimination System Test of Significant Toxicity implementation Document* (EPA 833-R-10-003, June 2010) (https://www3.epa.gov/npdes/pubs/wet_final_tst_implementation2010.pdf) and EPA Regions 8, 9, and 10, Toxicity Training Tool (January 2010).

g. Parameters that do not have reasonable potential (as determined in section IV.C.3 of this Fact Sheet) have been assigned as performance goals in this Order/Permit. Performance goals serve to ensure existing treatment levels and effluent quality is sufficient to support State and federal antidegradation policies. Additionally, performance goals provide all interested parties with information regarding the expected levels of pollutants in the discharge that should not be exceeded in order to maintain the water quality objectives established in the Ocean Plan. Performance goals are not limitations or standards for the regulation of the discharge. Effluent concentrations above the performance goals will not be considered as violations of the Order/Permit, but serve as red flags that indicate water quality concerns. Repeated red flags may prompt the San Diego Water Board and USEPA, Region IX to reopen and amend this Order/Permit to replace performance goals for parameters of concern with effluent limitations.

A summary of the performance goals established in this Order/Permit in Table 6 is provided below:

Table F-15. Performance Goals, Discharge Point No. 001[1]

Parameter	Units	Performance Goals[2,3]			
		Six-month Median	Maximum Daily	Instantaneous Maximum	Average Monthly
BASED ON OCEAN PLAN OBJECTIVES FOR PROTECTION OF MARINE AQUATIC LIFE					
Arsenic, Total Recoverable	µg/L	1.0E+03	5.9E+03	1.6E+04	--
	lbs/day	1.8E+03	1.0E+04	2.7E+04	--
Cadmium, Total Recoverable	µg/L	2.1E+02	8.2E+02	2.1E+03	--
	lbs/day	3.5E+02	1.4E+03	3.5E+03	--
Chromium (VI), Total Recoverable[4]	µg/L	4.1E+02	1.6E+03	4.1E+03	--
	lbs/day	7.0E+02	2.8E+03	7.0E+03	--
Copper, Total Recoverable	µg/L	2.1E+02	2.1E+03	5.7E+03	--
	lbs/day	3.5E+02	3.5E+03	9.8E+03	--
Lead, Total Recoverable	µg/L	4.1E+02	1.6E+03	4.1E+03	--
	lbs/day	7.0E+02	2.8E+03	7.0E+03	--
Mercury, Total Recoverable[5]	µg/L	8.1E+00	3.3E+01	8.2E+01	--
	lbs/day	1.4E+01	5.6E+01	1.4E+02	--
Nickel, Total Recoverable	µg/L	1.0E+03	4.1E+03	1.0E+04	--
	lbs/day	1.8E+03	7.0E+03	1.8E+04	--
Selenium, Total Recoverable	µg/L	3.1E+03	1.2E+04	3.1E+04	--
	lbs/day	5.3E+03	2.1E+04	5.3E+04	--
Silver, Total Recoverable	µg/L	1.1E+02	5.4E+02	1.4E+03	--
	lbs/day	1.9E+02	9.3E+02	2.4E+03	--
Zinc, Total Recoverable	µg/L	2.5E+03	1.5E+04	3.9E+04	--
	lbs/day	4.2E+03	2.5E+04	6.7E+04	--
Cyanide, Total[6]	µg/L	2.1E+02	8.2E+02	2.1E+03	--
	lbs/day	3.5E+02	1.4E+03	3.5E+03	--
Ammonia (as N)	µg/L	1.2E+05	4.9E+05	1.2E+06	--
	lbs/day	2.1E+05	8.4E+05	2.1E+06	--
Phenolic Compounds (Non-Chlorinated)	µg/L	6.2E+03	2.5E+04	6.2E+04	--
	lbs/day	1.1E+04	4.2E+04	1.1E+05	--
Chlorinated Phenolics	µg/L	2.1E+02	8.2E+02	2.1E+03	--
	lbs/day	3.5E+02	1.4E+03	3.5E+03	--

Parameter	Units	Performance Goals[2,3]			
		Six-month Median	Maximum Daily	Instantaneous Maximum	Average Monthly
Endosulfan	µg/L	1.8E+00	3.7E+00	5.5E+00	--
	lbs/day	3.2E+00	6.3E+00	9.5E+00	--
Endrin	µg/L	4.1E-01	8.2E-01	1.2E+00	--
	lbs/day	7.0E-01	1.4E+00	2.1E+00	--
HCH	µg/L	8.2E-01	1.6E+00	2.5E+00	--
	lbs/day	1.4E+00	2.8E+00	4.2E+00	--
Radioactivity	pCi/L	Not to exceed limits specified in title 17, division 1, chapter 5, subchapter 4, group 3, article 3, section 30253 of the CCRs, Reference to section 30253 is prospective, including future changes to any incorporated provisions of federal law, as the changes take effect.			
BASED ON OCEAN PLAN OBJECTIVES FOR PROTECTION OF HUMAN HEALTH – NONCARCINOGENS					
Acrolein	µg/L	--	--	--	4.5E+04
	lbs/day	--	--	--	7.7E+04
Antimony, Total Recoverable	µg/L	--	--	--	2.5E+05
	lbs/day	--	--	--	4.2E+05
Bis(2-chloroethoxy) Methane	µg/L	--	--	--	9.0E+02
	lbs/day	--	--	--	1.5E+03
Bis(2-chloroisopropyl) Ether	µg/L	--	--	--	2.5E+05
	lbs/day	--	--	--	4.2E+05
Chlorobenzene	µg/L	--	--	--	1.2E+05
	lbs/day	--	--	--	2.0E+05
Chromium (III), Total ~~Recoverable[4]~~Recoverable[7]	µg/L	--	--	--	3.9E+07
	lbs/day	--	--	--	6.7E+07
Di-n-butyl Phthalate	µg/L	--	--	--	7.2E+05
	lbs/day	--	--	--	1.2E+06
Dichlorobenzenes	µg/L	--	--	--	1.0E+06
	lbs/day	--	--	--	1.8E+06
Diethyl Phthalate	µg/L	--	--	--	6.8E+06
	lbs/day	--	--	--	1.2E+07
Dimethyl Phthalate	µg/L	--	--	--	1.7E+08
	lbs/day	--	--	--	2.9E+08
4,6-dinitro-2-methylphenol	µg/L	--	--	--	4.5E+04
	lbs/day	--	--	--	7.7E+04
2,4-dinitrophenol	µg/L	--	--	--	8.2E+02
	lbs/day	--	--	--	1.4E+03
Ethylbenzene	µg/L	--	--	--	8.4E+05
	lbs/day	--	--	--	1.4E+06
Fluoranthene	µg/L	--	--	--	3.1E+03
	lbs/day	--	--	--	5.3E+03

Parameter	Units	Performance Goals[2,3]			
		Six-month Median	Maximum Daily	Instantaneous Maximum	Average Monthly
Hexachlorocyclopentadiene	µg/L	--	--	--	1.2E+04
	lbs/day	--	--	--	2.0E+04
Nitrobenzene	µg/L	--	--	--	1.0E+03
	lbs/day	--	--	--	1.7E+03
Thallium, Total Recoverable	µg/L	--	--	--	4.1E+02
	lbs/day	--	--	--	7.0E+02
Toluene	µg/L	--	--	--	1.7E+07
	lbs/day	--	--	--	3.0E+07
Tributyltin	µg/L	--	--	--	2.9E-01
	lbs/day	--	--	--	4.9E-01
1,1,1-trichloroethane	µg/L	--	--	--	1.1E+08
	lbs/day	--	--	--	1.9E+08
BASED ON OCEAN PLAN OBJECTIVES FOR PROTECTION OF HUMAN HEALTH - CARCINOGENS					
Acrylonitrile	µg/L	--	--	--	2.1E+01
	lbs/day	--	--	--	3.5E+01
Benzene	µg/L	--	--	--	1.2E+03
	lbs/day	--	--	--	2.1E+03
Benzidine	µg/L	--	--	--	1.4E-02
	lbs/day	--	--	--	2.4E-02
Beryllium, Total Recoverable	µg/L	--	--	--	6.8E+00
	lbs/day	--	--	--	1.2E+01
Bis(2-chloroethyl) Ether	µg/L	--	--	--	9.2E+00
	lbs/day	--	--	--	1.6E+01
Bis(2-ethlyhexyl) Phthalate	µg/L	--	--	--	7.2E+02
	lbs/day	--	--	--	1.2E+03
Carbon Tetrachloride	µg/L	--	--	--	1.8E+02
	lbs/day	--	--	--	3.2E+02
Chlordane	µg/L	--	--	--	4.7E-03
	lbs/day	--	--	--	8.1E-03
Chlorodibromomethane	µg/L	--	--	--	1.8E+03
	lbs/day	--	--	--	3.0E+03
Chloroform	µg/L	--	--	--	2.7E+04
	lbs/day	--	--	--	4.6E+04
DDT	µg/L	--	--	--	3.5E-02
	lbs/day	--	--	--	6.0E-02
1,4-dichlorobenzene	µg/L	--	--	--	3.7E+03
	lbs/day	--	--	--	6.3E+03
3,3'-dichlorobenzidine	µg/L	--	--	--	1.7E+00
	lbs/day	--	--	--	2.8E+00
1,2-dichloroethane	µg/L	--	--	--	5.7E+03
	lbs/day	--	--	--	9.8E+03

Parameter	Units	Performance Goals[2,3]			
		Six-month Median	Maximum Daily	Instantaneous Maximum	Average Monthly
1,1-dichloroethylene	µg/L	--	--	--	1.8E+02
	lbs/day	--	--	--	3.2E+02
Dichlorobromomethane	µg/L	--	--	--	1.3E+03
	lbs/day	--	--	--	2.2E+03
Dichloromethane	µg/L	--	--	--	9.2E+04
	lbs/day	--	--	--	1.6E+05
1,3-dichloropropene	µg/L	--	--	--	1.8E+03
	lbs/day	--	--	--	3.1E+03
Dieldrin	µg/L	--	--	--	8.2E-03
	lbs/day	--	--	--	1.4E-02
2,4-dinitrotoluene	µg/L	--	--	--	5.3E+02
	lbs/day	--	--	--	9.1E+02
1,2-diphenylhydrazine	µg/L	--	--	--	3.3E+01
	lbs/day	--	--	--	5.6E+01
Halomethanes	µg/L	--	--	--	2.7E+04
	lbs/day	--	--	--	4.6E+04
Heptachlor	µg/L	--	--	--	1.0E-02
	lbs/day	--	--	--	1.8E-02
Heptachlor Epoxide	µg/L	--	--	--	4.1E-03
	lbs/day	--	--	--	7.0E-03
Hexachlorobenzene	µg/L	--	--	--	4.3E-02
	lbs/day	--	--	--	7.4E-02
Hexachlorobutadiene	µg/L	--	--	--	2.9E+03
	lbs/day	--	--	--	4.9E+03
Hexachloroethane	µg/L	--	--	--	5.1E+02
	lbs/day	--	--	--	8.8E+02
Isophorone	µg/L	--	--	--	1.5E+05
	lbs/day	--	--	--	2.6E+05
N-nitrosodimethylamine	µg/L	--	--	--	1.5E+03
	lbs/day	--	--	--	2.6E+03
N-nitrosodi-N-propylamine	µg/L	--	--	--	7.8E+01
	lbs/day	--	--	--	1.3E+02
N-nitrosodiphenylamine	µg/L	--	--	--	5.1E+02
	lbs/day	--	--	--	8.8E+02
PAHs	µg/L	--	--	--	1.8E+00
	lbs/day	--	--	--	3.1E+00
PCBs	µg/L	--	--	--	3.9E-03
	lbs/day	--	--	--	6.7E-03
TCDD Equivalents	µg/L	--	--	--	8.0E-07
	lbs/day	--	--	--	1.4E-06
1,1,2,2-tetrachloroethane	µg/L	--	--	--	4.7E+02
	lbs/day	--	--	--	8.1E+02

Parameter	Units	Performance Goals[2,3]			
		Six-month Median	Maximum Daily	Instantaneous Maximum	Average Monthly
Tetrachloroethylene	µg/L	--	--	--	4.1E+02
	lbs/day	--	--	--	7.0E+02
Toxaphene	µg/L	--	--	--	4.3E-02
	lbs/day	--	--	--	7.4E-02
Trichloroethylene	µg/L	--	--	--	5.5E+03
	lbs/day	--	--	--	9.5E+03
1,1,2-trichloroethane	µg/L	--	--	--	1.9E+03
	lbs/day	--	--	--	3.3E+03
2,4,6-trichlorophenol	µg/L	--	--	--	5.9E+01
	lbs/day	--	--	--	1.0E+02
Vinyl Chloride	µg/L	--	--	--	7.4E+03
	lbs/day	--	--	--	1.3E+04

1. See Attachment A for definitions of abbreviations and a glossary of common terms used in this Order/Permit.
2. The MER limitation, in lbs/day, was calculated based on the following equation: MER (lbs/day) = 8.34 x Q x C, where Q is the 301(h)-variance-based flow of 205 MGD and C is the concentration (in mg/L). The 301(h)-variance-based average annual flow rate of 205 MGD was taken from the 1995 301(h) application and carried over from Orders Nos. 95-106, R9-2002-0025, and R9-2009-0001 (see section II.C of this Fact Sheet for more info).
3. Scientific "E" notation is used to express certain values. In scientific "E" notation, the number following the "E" indicates that position of the decimal point in the value. Negative numbers after the "E" indicate that the value is less than 1, and positive numbers after the "E" indicate that the value is greater than 1. In this notation a value of 6.1E-02 represents 6.1×10^{-2} or 0.061, 6.1E+02 represents 6.1×10^{2} or 610, and 6.1E+00 represents 6.1×10^{0} or 6.1.
4. Discharger may, at its option, meet this performance goal as a total chromium performance goal.
5. USEPA Method 1631E, with a quantitation level of 0.5 nanogram per liter (ng/L), shall be used to analyze total mercury.
6. If a Discharger can demonstrate to the satisfaction of the San Diego Water Board (subject to USEPA approval) that an analytical method is available to reliably distinguish between strongly and weakly complexed cyanide, effluent limitations for cyanide may be met by (or performance goals may be evaluated with) the combined measurement of free cyanide, simple alkali metals cyanides, and weakly complexed organometallic cyanide complexes. In order for the analytical method to be acceptable, the recovery of free cyanide from metal complexes must be comparable to that achieved by the approved method in 40 CFR part 136, as amended.
~~6.~~7. Discharger may meet the performance goal for total recoverable chromium (III) by calculating the difference between total recoverable chromium and total recoverable chromium (VI).

5. Whole Effluent Toxicity (WET)

a. The WET testing protects receiving waters from the aggregate toxic effect of a mixture of pollutants in the effluent. Because of the nature of industrial discharges into the POTW sewershed, it is possible that toxic constituents could be present in the Facility effluent, or could have additive, synergistic, or antagonistic effects.

b. For chronic toxicity, Order No. R9-2009-0001 established an effluent limitation of 205 TUc and monthly monitoring. During the Order/Permit term for Order No. R9-2009-0001, ~~one sample~~two samples exceeded 205 TUc, with a result of 666.7 TUc (June 2015) and 370.4 TUc (May 2015). Using the RPA procedures from the Ocean Plan, the effluent does have reasonable potential to cause an exceedance of the narrative water quality objective for chronic toxicity (i.e., Endpoint 1). Therefore, this Order/Permit retains effluent limitations and monitoring for chronic toxicity.

Compliance with this chronic toxicity effluent limitation (i.e., determination of "pass" or "fail") shall be evaluated using the Test of Significant Toxicity (TST) statistical approach at the discharge "in-stream" waste concentration (IWC), as described in section VII.M of this Order/Permit and section III.C of the MRP (Attachment E). The TST statistical approach is described in the *National Pollutant Discharge Elimination System Test of Significant Toxicity Implementation Document* (EPA 833-R-10-003, 2010), Appendix A, Figure A-1 and Table A-1. The TST null hypothesis shall be "mean discharge IWC response ≤ 0.75 × mean control response." A test that rejects this null hypothesis shall be reported as "pass." A test that does not reject this null hypothesis shall be reported as "fail." Discharger shall also report the "Percent Effect" as part of chronic toxicity result.

Section III.F of the 2015 Ocean Plan provides for more stringent requirements if necessary to protect the designated beneficial uses of ocean waters. Diamond et al. (2013) examined the side-by-side comparison of No-Observed-Effect-Concentration (NOEC) and TST results using California chronic toxicity test data (including data from POTWs) for the West Coast marine methods and test species required under this Order/Permit. *See* Table 1 (method types 1 through 5) on page 1103 in Diamond D, Denton D, Roberts, J, Zheng L. 2013. *Evaluation of the Test of Significant Toxicity for Determining the Toxicity of Effluents and Ambient Water Samples*. *Environ Toxicol Chem* 32:1101-1108. This comparison shows that while the TST and NOEC statistical approaches perform similarly most of the time, the TST performs better in identifying toxic and nontoxic samples, a desirable characteristic for chronic toxicity testing conducted under this Order/Permit. This examination also signals that the test methods' false positive rate (β no higher than 0.05 at a mean effect of 10%) and false negative rate (α no higher than 0.05 (0.25 for topsmelt) at a mean effect of 25%) are indeed low. This highlights that using the TST in this Order/Permit - in conjunction with other Ocean Plan requirements (West Coast WET method/test species for monitoring and limiting chronic toxicity, the IWC representing the critical condition for water quality protection, the initial dilution procedure, and a single test for compliance)—provides increased assurance that statistical error rates are more directly addressed and accounted for in decisions regarding chronic toxicity in the discharge. As a result and in accordance with Ocean Plan section III.F, the San Diego Water Board is exercising its discretion to use the TST statistical approach for this discharge. USEPA, Region IX agrees with the San Diego Water Board's determination.

c. For acute toxicity, Order No. R9-2009-0001 established performance goals and semiannual monitoring. An acute toxicity test is conducted over a short time period and measures mortality. A chronic toxicity test is conducted over a short or a longer exposure period of time and may measure mortality, reproduction, and growth. A chemical at a low concentration could have chronic effects but no acute effects until the chemical was at a higher concentration. Thus, chronic toxicity is a more stringent requirement than acute toxicity. To ensure the aggregated impacts of pollutants present within the Discharger's effluent does not result in the presence of toxicity within the receiving water, this Order/Permit removes performance goals and monitoring requirements for acute toxicity and retains effluent limitations for chronic toxicity. Removal of the numeric acute toxicity performance goals does not constitute backsliding because chronic toxicity is a more stringent requirement than acute toxicity. Effluent limitations for chronic toxicity are necessary, feasible, and appropriate because effluent data exhibited reasonable potential to cause or contribute to an exceedance of the toxicity water quality objectives.

This Order/Permit contains chronic toxicity effluent limitations because effluent data exhibited reasonable potential to cause or contribute to an exceedance of the water quality objective. Compliance with the chronic toxicity requirement contained in this Order/Permit shall be determined in accordance to section VII.M of this Order/Permit. Nevertheless, this Order/Permit contains a reopener to require the San Diego Water Board and USEPA, Region IX to modify this Order/Permit, if necessary, to make it consistent with any new policy, law, or regulation.

The Ocean Plan's approach to chronic toxicity WQBELs is based on a "toxic unit" derived from one multi-concentration toxicity test. In 2010, USEPA endorsed the TST statistical approach in *National Pollutant Discharge Elimination System Test of Significant Toxicity Implementation Document* (EPA 833-R-10-003, 2010) used in this NPDES permit. Compliance with this chronic toxicity maximum daily effluent limitation (MDEL) (i.e., determination of "pass" or "fail") shall be evaluated using the TST statistical approach at the discharge IWC, as described in section VII.M of this Order/Permit and in section III.C of the MRP (Attachment E). The TST statistical approach is described in *National Pollutant Discharge Elimination System Test of Significant Toxicity Implementation Document* (EPA 833-R-10-003, 2010), Appendix A, Figure A-1 and Table A-1.

In January 2010, USEPA published a guidance document entitled; *EPA Regions 8, 9 and 10 Toxicity Training Tool*, which among other things discusses permit limitation expression for chronic toxicity. The document acknowledges that NPDES regulations at 40 CFR section 122.45(d) require that all permit limits be expressed, unless impracticable, as an average weekly effluent limitation (AWEL) and average monthly effluent limitation (AMEL) for POTWs. Following section 5.2.3 of the Technical Support Document (TSD), the use of an AWEL and AMEL is not appropriate for WET. In lieu of an AWEL and AMEL for POTWs, USEPA recommends establishing a maximum daily effluent limitation (MDEL) for toxic pollutants and pollutants in water quality permitting, including WET. This is appropriate for two reasons. The basis for the average weekly and average monthly requirement for POTWs derives from secondary treatment regulations and is not related to the requirement to assure achievement of water quality standard. Moreover, an average weekly and average monthly requirement comprising up to seven and thirty-one daily samples, respectively, could average out daily peak toxic concentrations for WET and therefore, the discharge's potential for causing acute and chronic effects would be missed. It is impracticable to use an AWEL and AMEL, because short-term spikes of toxicity levels that would be permissible under the 7-day and 31-day average scheme, respectively, would not be adequately protective of all beneficial uses. The MDEL is the highest allowable value for the discharge measured during a calendar day or 24-hour period representing a calendar day. This approach is comparable to that of the Ocean Plan, which calls for a daily maximum chronic toxicity limit.

Later in June 2010, USEPA published another guidance document titled, *National Pollutant Discharge Elimination System Test of Significant Toxicity Implementation Document* (EPA 833-R-10-003, June 2010), in which the following was recommended: "Permitting authorities should consider adding the TST approach to their implementation procedures for analyzing valid WET data for their current NPDES WET Program." The TST approach is another statistical option for analyzing valid WET test data. Use of the TST approach does not result in any changes to USEPA's WET test methods. Section 9.4.1.2 of USEPA's *Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms* (EPA/821/R-02/013, 2002), recognizes that, "the statistical methods in this manual are not the only possible methods of statistical analysis." The TST approach can be applied to acute (survival) and chronic (sublethal) endpoints and is appropriate to use for both freshwater and marine EPA WET test methods.

The USEPA's WET testing program and acute and chronic WET methods rely on the measurement result for a specific test endpoint, not upon achievement of specified concentration-response patterns to determine toxicity. USEPA's WET methods do not require achievement of specified effluent or ambient concentration-response patterns prior to determining that toxicity is present.[4] Nevertheless, USEPA's acute and chronic WET methods require that effluent and ambient concentration-response patterns generated for multi-concentration acute and chronic toxicity tests be reviewed—as a component of test review following statistical analysis—to ensure that the calculated measurement result for the toxicity test is interpreted appropriately. (EPA-821-R-02-012, section 12.2.6.2; EPA-821-R-02-013, section 10.2.6.2). In 2000, EPA provided guidance for such reviews to ensure that test endpoints for determining toxicity based on the statistical approaches utilized at the time the guidance was written (no-observed-effect-concentration (NOEC), percent waste giving 50 percent survival of test organisms (lethal concentration 50, LC 50), effects concentration at 25 percent (EC25) were calculated appropriately (EPA 821-B-00-004).

USEPA designed its 2000 guidance as a standardized step-by step review process that investigates the causes for ten commonly observed concentration-response patterns and provides for the proper interpretation of the test endpoints derived from these patterns for NOECs, LC 50, and EC25, thereby reducing the number of misclassified test results. The guidance provides one of three determinations based on the review steps: that calculated effect concentrations are reliable and should be reported, that calculated effect concentrations are anomalous and should be explained, or that the test was inconclusive and should be repeated with a newly collected sample. The standardized review of the effluent and receiving water concentration-response patterns provided by USEPA's 2000 guidance decreased discrepancies in data interpretation for NOEC, LC 50, and EC25 test results, thereby lowering the chance that a truly nontoxic sample would be misclassified and reported as toxic.

Appropriate interpretation of the measurement result from USEPA's TST statistical approach ("Pass"/"Fail") for effluent and receiving water samples is, by design, independent from the concentration-response patterns of the toxicity tests for those samples. Therefore, when using the TST statistical approach, application of USEPA's 2000 guidance on effluent and receiving waters concentration-response patterns will not improve the appropriate interpretation of TST results as long as all Test Acceptability Criteria and other test review procedures—including those related to quality assurance for effluent and receiving water toxicity tests, reference toxicity tests, and control performance (mean, standard deviation, and coefficient of variation)—described by the WET test methods manual and TST guidance, are

[4] See, Supplementary Information in support of the Final Rule establishing WET test methods at 67 Fed. Reg. 69952, 69963, Nov. 19, 2002.

followed. The 2000 guidance may be used to identify reliable, anomalous, or inconclusive concentration-response patterns and associated statistical results to the extent that the guidance recommends review of test procedures and laboratory performance already recommended in the WET test methods manual. The guidance does not apply to single-concentration (IWC) and control statistical t-tests and does not apply to the statistical assumptions on which the TST is based. The San Diego Water Board and USEPA, Region IX will not consider a concentration-response pattern as sufficient basis to determine that a TST t- test result for a toxicity test is anything other than valid, absent other evidence. In a toxicity laboratory, unexpected concentration-response patterns should not occur with any regular frequency and consistent reports of anomalous or inconclusive concentration-response patterns or test results that are not valid will require an investigation of laboratory practices.

Any Data Quality Objectives or Standard Operating Procedure used by the toxicity testing laboratory to identify and report valid, invalid, anomalous, or inconclusive effluent or receiving water toxicity test measurement results from the TST statistical approach which include a consideration of concentration-response patterns and/or Percent Minimum Significant Differences (PMSDs) must be submitted for review by the San Diego Water Board, in consultation with USEPA, Region IX and the State Water Board's Quality Assurance Officer and Environmental Laboratory Accreditation Program (ELAP) (40 CFR section 122.44(h)). As described in the bioassay laboratory audit directives to the San Jose Creek Water Quality Laboratory from the State Water Board dated August 7, 2014, and from the USEPA dated December 24, 2013, the PMSD criteria only apply to compliance for NOEC and the sublethal endpoints of the NOEC, and therefore are not used to interpret TST results.

D. Final Effluent Limitation Considerations

1. Anti-Backsliding Requirements

NPDES permits must conform with Anti-backsliding requirements discussed in section III.C.5 of this Fact Sheet. The effluent limitations in this Order/Permit are at least as stringent as the effluent limitations in the previous Order (Order No. R9-2009-0001), with the exception of effluent limitations for the following parameters: phenolic compounds (non-chlorinated), chlorinated phenolics, chlordane, chlorodibromomethane, chloroform, 1,4-dichlorobenzene, dichlorobromomethane, dichloromethane, halomethanes, and heptachlor. The effluent limitations for these parameters were removed and replaced with performance goals based on the results of the RPA performed on data collected during the Order/Permit cycle for Order No. R9-2009-0001. The removal of these effluent limitations from this Order/Permit is consistent with the federal Anti-backsliding requirements for the reasons set forth below.

As discussed in section IV.C.3 of this Fact Sheet, effluent limitations from Order No. R9 2009-0001 are not retained for parameters for which RPA results indicated Endpoint 2; instead performance goals have been assigned for these parameters. Based on the RPA performed on new monitoring data, parameters for which Endpoint 2 was indicated are determined not to have reasonable potential, thus it is inappropriate to establish effluent limitations for these parameters. The removal of the effluent limitations for parameters for which RPA results indicated Endpoint 2 is appropriate under the exceptions described in 40 CFR section 122.44(I)(2)(i)(B)(1), which specify that permits may include a less stringent effluent limitation than the previous permit, if information is available which was not available at the time of permit issuance (other than revised regulations, guidance, or test methods) and which would have justified the application of a less stringent effluent limitation at the time of permit issuance. The performance goals that replace the removed effluent limitations and continued monitoring for these parameters serve to ensure existing treatment levels and effluent quality is maintained. The monitoring requirements in the Monitoring and Reporting Program (Attachment E) for parameters with performance goals are intended to obtain additional information for these parameters to determine if reasonable potential exists for these parameters in future permit renewals and/or updates.

As discussed in section IV.C.5.c of this Fact Sheet, the acute toxicity performance goal and monitoring from Order No. R9-2009-0001 has been removed. An acute toxicity test is conducted over a short time period and measures mortality. A chronic toxicity test is conducted over a short or a longer period of time and may measure mortality, reproduction, and growth. A chemical at a low concentration could have chronic effects but no acute effects until the chemical was at a higher concentration. Thus, chronic toxicity is a more stringent requirement than acute toxicity. To ensure the aggregated impacts of pollutants present within the Discharger's effluent does not result in the presence of toxicity within the receiving water, this Order/Permit removes performance goals and monitoring requirements for acute toxicity and retains effluent limitations for chronic toxicity. Removal of the numeric acute toxicity performance goals does not constitute backsliding because chronic toxicity is a more stringent requirement than acute toxicity. Effluent limitations for chronic toxicity are necessary, feasible, and appropriate because effluent data exhibited reasonable potential to cause or contribute to an exceedance of the toxicity water quality objectives.

Based on all of these considerations, this Order/Permit complies with all applicable State and federal Anti-backsliding regulations.

2. Antidegradation Policies

The WDRs for the Discharger must conform with antidegradation requirements discussed in section III.C.4 of this Fact Sheet.

This Order/Permit has been modified from Order No. R9-2009-0001, to replace WQBELs for some parameters with performance goals based on the conclusions of an RPA. The procedures for conducting the RPA are explained in section IV.C.3 of this Fact Sheet. Performance goals were included in this Order/Permit for parameters determined not to have reasonable potential to cause or contribute to an exceedance of water quality objectives, and thus, for which WQBELs were not included. Performance goals will indicate the level of discharge at which possible water quality impacts may be significant. The removal of WQBELs by themselves is not expected to cause a change in the physical nature of the effluent discharged and is not expected to impact beneficial uses nor cause a reduction of the water quality of the receiving water. Coupled with the inclusion of performance goals and retention of the monitoring program for parameters without WQBELs, the existing water quality is expected to be maintained. For these reasons, an antidegradation analysis is not required to consider the possible impacts resulting from the removal of WQBELs following an RPA.

Provision VI.C.2.e of Order No. R9-2009-0001 required the Discharger to conduct a full antidegradation analysis justifying that the continued increase in effluent loading of phenolic compounds (non-chlorinated) to a Tier II waterbody was not subject to an antidegradation analysis. The Discharger conducted an analysis of the phenolic compounds (non-chlorinated) projected effluent load above the mass emission benchmark level and the resulting impact to receiving water quality of the total effluent load. Provision VI.C.2.e establishes a level of significance test where water quality impacts are deemed "not significant" if projected receiving water quality beyond the ZID is less than 50 percent of the Ocean Plan receiving water standard. As demonstrated in Discharger's 2011 Significance Study, the existing discharge complies with this "significance" test by two orders of magnitude or more for non-chlorinated phenolic compounds. In addition to complying with the Ocean Plan receiving water standards, the discharge ensures compliance with federal water quality criteria for the protection of human health (consumption of organisms). The study concludes that the existing discharge complies with Tier 1 antidegradation regulations, and no Tier 2 socioeconomic analysis is required for non-chlorinated phenolic compounds. The Assessment documents that both the current and projected future Plant effluent concentrations of phenolic compounds (non-chlorinated) are projected to remain far below the Tier 1 threshold of 50 percent below the Ocean Plan receiving water standard.

As discussed in section IV.C.5.c of this Fact Sheet, the acute toxicity performance goal and monitoring from Order No. R9-2009-0001 has been removed. An acute toxicity test is conducted over a short time period and measures mortality. A chronic toxicity test is conducted over a short or a longer period of time and may measure mortality, reproduction, and growth. A chemical at a low concentration could have chronic effects but no acute effects until the chemical was at a higher concentration. Thus, chronic toxicity is a more stringent requirement than acute toxicity. For these reasons, the removal of performance goal and monitoring for acute toxicity and the retention of effluent limitations and monitoring for chronic toxicity is not expected to cause a change in the physical nature of the effluent discharged and is not expected to impact beneficial uses nor cause a reduction of the water quality of the receiving water. Thus, an antidegradation analysis is not required to consider the possible impacts resulting from the removal of performance goal and monitoring for acute toxicity.

This Order/Permit complies with the antidegradation provision of 40 CFR section 131.12 and State Water Board Resolution No. 68-16.

3. Annual Toxics Mass Emission Performance Goals

Order Nos. 95-106, R9-2002-0025, and R9-2009-0001 contained toxics mass emission performance goals for effluent discharged through the PLOO. These performance goals were established to address the uncertainty due to projected increases in toxic pollutant loadings from the Facility to the marine environment during the 5-year 301(h) variance, and to establish a framework for evaluating the need for an antidegradation analysis to determine compliance with water quality standards at the time of permit reissuance. The performance goals contained in Order No. R9-2009-0001 have been carried over to this Order/Permit.

The annual mass emission performance goals for the 1995 permit were determined using 1990 through April 1995 n-day average monthly performance (95th percentile) of the Facility and the 301(h)-variance-based effluent flow of 205 MGD for the 1995 301(h) application and the following equations:

MER (lbs/day) = Permitted Flow (MGD) x Pollutant Concentration (mg/L) x 8.34.

For the 2002 permit, mass emission performance goals for copper and selenium were recalculated using the 1994 n-day average monthly performance (95th percentile) and 205 MGD and the mass emission benchmark for cyanide was corrected. Average monthly performance was calculated as outlined in Appendix E of *Technical Support Document for Water Quality-based Toxics Control* (EPA/5005/2-90-001, 1991; TSD).

These mass emission performance goals are not WQBELs and are not enforceable, as such. The mass emission performance goals may be re-evaluated and modified during this Order/Permit term, or this Order/Permit may be modified to incorporate WQBELs, in accordance with the requirements set forth at 40 CFR sections 122.62 and 124.5. The following effluent mass emission performance goals for toxic and carcinogenic materials apply to the undiluted effluent from the Facility discharged to the PLOO at Monitoring Location EFF-001 as described in the MRP (Attachment E):

Table F-16. Summary of Annual Toxics Mass Emission Performance Goals[1] (based on 205 MGD)

Effluent Constituent	Units	Annual Mass Emission
Arsenic, Total Recoverable	mt/yr	0.88
Cadmium, Total Recoverable	mt/yr	1.4
Chromium (VI), Total Recoverable[2]	mt/yr	14.2
Copper, Total Recoverable	mt/yr	26
Lead, Total Recoverable	mt/yr	14.2
Mercury, Total Recoverable[3]	mt/yr	0.19
Nickel, Total Recoverable	mt/yr	11.3
Selenium, Total Recoverable	mt/yr	0.44
Silver, Total Recoverable	mt/yr	2.8
Zinc, Total Recoverable	mt/yr	18.3
Cyanide, Total[4]	mt/yr	1.57
Ammonia (as N)	mt/yr	8,018
Phenolic Compounds (Non-Chlorinated)	mt/yr	2.57
Chlorinated Phenolics	mt/yr	1.73
Endosulfan	mt/yr	0.006
Endrin	mt/yr	0.008
HCH	mt/yr	0.025
Acrolein	mt/yr	17.6
Antimony, Total Recoverable	mt/yr	56.6
Bis(2-chloroethoxy) Methane	mt/yr	1.5
Bis(2-chloroisopropyl) Ether	mt/yr	1.61
Chlorobenzene	mt/yr	1.7
Di-n-butyl Phthalate	mt/yr	1.33
Dichlorobenzenes	mt/yr	2.8
Diethyl Phthalate	mt/yr	6.23
4,6-dinitro-2-methylphenol	mt/yr	6.8
2,4-dinitrophenol	mt/yr	11.9
Ethylbenzene	mt/yr	2.04
Fluoranthene	mt/yr	0.62
Nitrobenzene	mt/yr	2.07
Thallium	mt/yr	36.8
Toluene	mt/yr	3.31
Tributyltin	mt/yr	0.001

Effluent Constituent	Units	Annual Mass Emission
1,1,1-trichloroethane	mt/yr	2.51
Acrylonitrile	mt/yr	5.95
Aldrin	mt/yr	0.006
Benzene	mt/yr	1.25
Benzidine	mt/yr	12.5
Beryllium, Total Recoverable	mt/yr	1.42
Bis(2-chloroethyl) Ether	mt/yr	1.61
Bis(2-ethylhexyl) Phthalate	mt/yr	2.89
Carbon Tetrachloride	mt/yr	0.79
Heptachlor Epoxide	mt/yr	0.024
Hexachlorobenzene	mt/yr	0.54
Hexachlorobutadiene	mt/yr	0.54
Hexachloroethane	mt/yr	1.13
Isophorone	mt/yr	0.71
N-nitrosodimethylamine	mt/yr	0.76
N-nitrosodiphenylamine	mt/yr	1.47
PAHs	mt/yr	15.45
PCBs	mt/yr	0.275
1,1,2,2-tetrachloroethane	mt/yr	1.95
Tetrachloroethylene	mt/yr	4
Toxaphene	mt/yr	0.068
Trichloroethylene	mt/yr	1.56
1,1,2-trichloroethane	mt/yr	1.42
2,4,6-trichlorophenol	mt/yr	0.960
Vinyl Chloride	mt/yr	0.40

1. See Attachment A for definitions of abbreviations and a glossary of common terms used in this Order/Permit.
2. Discharger may, at its option, meet this annual mass emission performance as a total chromium annual mass emission performance.
3. USEPA Method 1631E, with a quantitation level of 0.5 ng/L, shall be used to analyze total mercury.
4. If a Discharger can demonstrate to the satisfaction of the San Diego Water Board (subject to USEPA approval) that an analytical method is available to reliably distinguish between strongly and weakly complexed cyanide, effluent limitations for cyanide may be met by (or performance goals may be evaluated with) the combined measurement of free cyanide, simple alkali metals cyanides, and weakly complexed organometallic cyanide complexes. In order for the analytical method to be acceptable, the recovery of free cyanide from metal complexes must be comparable to that achieved by the approved method in 40 CFR part 136, as amended.

4. Stringency of Requirements for Individual Pollutants

This Order/Permit contains both TBELs and WQBELs for individual pollutants. The TBELs consist of restrictions on BOD_5, TSS, oil and grease, settleable solids, turbidity, and pH, which are discussed in section IV.B of this Fact Sheet. This Order's technology-based pollutant restrictions implement the minimum, applicable federal technology-based requirements. These limitations are not more stringent than required by the CWA.

WQBELs have been derived to implement water quality objectives that protect beneficial uses. Both the beneficial uses and the water quality objectives have been approved pursuant to federal law and are the applicable federal water quality standards. The procedures for calculating the individual WQBELs are based on the Ocean Plan, which was approved by USEPA on February 14, 2006 and has since been further amended. All beneficial uses and water quality objectives contained in the Basin Plan were approved under State law and submitted to and approved by USEPA prior to May 30, 2000. Any water quality objectives and beneficial uses submitted to USEPA prior to May 30, 2000, but not approved by USEPA before that date, are nonetheless "applicable water quality standards for purposes of the CWA" pursuant to 40 CFR section 131.21(c)(1). For pH, both technology-based effluent limitations and WQBELs are applicable. The more stringent of these effluent limitations are implemented by this Order/Permit. Collectively, this Order's restrictions on individual pollutants are no more stringent than required to implement the requirements of the CWA.

E. Interim Effluent Limitations – Not Applicable

F. Land Discharge Specifications – Not Applicable

G. Recycling Specifications – Not Applicable

V. RATIONALE FOR RECEIVING WATER LIMITATIONS

Receiving water limitations of this Order/Permit are derived from the water quality objectives for ocean waters established by the Basin Plan and the Ocean Plan.

Prior to 2009, the San Diego Water Board interpreted the Bacterial Characteristics Water-contact Standards of the Ocean Plan to apply only in the zone bounded by the shoreline and a distance 1,000 feet from the shoreline or the 30-foot depth contour, whichever is further from the shoreline, and within kelp beds. The Ocean Plan provides that these Bacteriological Standards also apply in designated areas outside this zone used for water contact sports, as determined by the Regional Water Boards (i.e., all waters designated with the contact water recreation (REC-1) beneficial use). These designated areas must be specifically defined in the Basin Plan. Because the San Diego Water Board has designated the ocean waters with the REC-1 beneficial use in the Basin Plan, the Ocean Plan Bacterial Standards apply throughout State of California territorial marine waters in the San Diego Region, which extend from surface to bottom, out to three nautical miles from the shoreline. This interpretation has been confirmed by USEPA. The bacteria characteristics for waters beyond State of California territorial marine waters are derived from the 2012 Recreational Water Quality Criteria (https://www.epa.gov/wqc/2012-recreational-water-quality-criteria).

VI. RATIONALE FOR PROVISIONS

A. Standard Provisions

Standard Provisions, which apply to all NPDES permits in accordance with 40 CFR section 122.41, and additional conditions applicable to specified categories of permits in accordance with 40 CFR section 122.42, are provided in the Standard Provisions (Attachment D).

Sections 122.41(a)(1) and (b) through (n) of 40 CFR establish conditions that apply to all State-issued NPDES permits. These conditions must be incorporated into the permits either expressly or by reference. If incorporated by reference, a specific citation to the regulations must be included in the Order/Permit. Section 123.25(a)(12) allows the State to omit or modify conditions to impose more stringent requirements. In accordance with 40 CFR section 123.25, this Order/Permit omits federal conditions that address enforcement authority specified in 40 CFR sections 122.41(j)(5) and (k)(2) because the enforcement authority under the Water Code is more stringent. In lieu of these conditions, this Order/Permit incorporates by reference Water Code section 13387(e).

B. Special Provisions

1. Reopener Provisions

This Order/Permit may be reopened and modified, revoked and reissued, or terminated in accordance with the provisions of 40 CFR parts 122, 123, 124, and 125. The San Diego Water Board and USEPA, Region IX may reopen this Order/Permit to modify permit conditions and requirements. Causes for modifications include, but are not limited to, increased/ modified receiving water requirements and participation in the Southern California Coastal Water Research Project (SCCWRP) model monitoring program; the promulgation of new regulations; modification in sludge use or disposal practices; or adoption of new regulations by the State Water Board or the San Diego Water Board or USEPA, Region IX, including revisions to the Basin Plan.

2. Special Studies and Additional Monitoring Requirements

a. Spill Prevention and Response Plans

The CWA largely prohibits any discharge of pollutants from point sources to waters of the U.S. except as authorized under an NPDES permit. In general, any point source discharge of sewage effluent to waters of the U.S. must comply with technology-based, secondary treatment standards, at a minimum, and any more stringent requirements necessary to meet applicable water quality standards and other requirements. The unpermitted discharge of wastewater to waters of the U.S. is illegal under the CWA. Further, the Basin Plan prohibits discharges of waste to land, except as authorized by WDRs or the terms described in Water Code section 13264. The Basin Plan also prohibits the unauthorized discharge of treated or untreated sewage to waters of the State or to a storm water conveyance system. Further, Discharge Prohibition III.A of this Order/Permit prohibits the discharges of wastes in a manner or to a location which have not been specifically authorized by this Order/Permit and for which valid WDRs are not in force.

Sanitary collection and treatment systems experience periodic failures resulting in discharges that may affect waters of the State. There are many factors which may affect the likelihood of a spill. To ensure appropriate funding, management, and planning to reduce the likelihood of a spill, and increase the spill preparedness, this Order/Permit requires the Discharger to maintain and implement Spill Prevention and Response Plans.

b. Spill Reporting Requirements

To determine compliance with Discharge Prohibition III.A and provide appropriate notification to the general public for the protection of public health, spill reporting requirements have been established in section VI.C.2.b of this Order/Permit.

3. Best Management Practices and Pollution Prevention

The Pollutant Minimization Program is based on the requirements of the section III.C.9 of the Ocean Plan.

4. Construction, Operation, and Maintenance Specifications

This provision is based on the requirements of 40 CFR 122.41(e).

5. Special Provisions for Publicly-Owned Treatment Works (POTWs)

a. Treatment Plant Capacity

Title 23, division 3, chapter 9, article 9, section 2232 of the CCR requires POTWs ensure adequate treatment plant capacity. This Order/Permit retains the requirement for a treatment plant capacity study which serves as an indicator to the San Diego Water Board and USEPA, Region IX of the Facility's hydraulic capacity and potential growth in the service area.

b. Sludge (Biosolids) Requirements

The use and disposal of biosolids within the U.S. is regulated under State and federal laws and regulations, including permitting requirements and technical standards included in 40 CFR part 503. The Discharger is required to comply with the standards and time schedules contained in 40 CFR part 503 for biosolids used or disposed of within the U.S.

Title 27, division 2, subdivision 1, section 20005 of the CCR establishes approved methods for the disposal of collected screenings, residual sludge, biosolids, and other solids removed from liquid wastes. Requirements to ensure the Discharger disposes of solids in compliance with State and federal regulations have been included in this Order/Permit.

c. Requirements for Receipt of Anaerobically Digestible Material

Some POTWs choose to accept organic material such as food waste, fats, oils, and grease into their anaerobic digesters for co-digestion to increase production of methane and other biogases for energy production and to prevent such materials from being discharged into the collection system, which could cause sanitary sewer overflows. The California Department of Resources Recycling and Recovery has proposed an exemption from requiring Process Facility/Transfer Station permits where this activity is regulated under WDRs or NPDES permits. The proposed exemption is restricted to anaerobically digestible material that has been prescreened, slurried, and processed/conveyed in a closed system to be co-digested with regular POTW sludge. The proposed exemption requires that a POTW develop Standard Operating Procedures (SOPs) for the proper handling, processing, tracking, and management of the anaerobically digestible material before it is received by the POTW.

The SOPs are required for POTWs that accept hauled food waste, fats, oil, and grease for injection into anaerobic digesters. The development and implementation of SOPs for management of these materials is intended to allow the California Department of Resources Recycling and Recovery to exempt this activity from separate and redundant permitting programs. If the POTW does not accept food waste, fats, oil, or grease for resource recovery purposes, it is not required to develop and implement SOPs.

d. Pretreatment

CWA section 307 and 40 CFR part 403 establish pretreatment requirements for POTWs which receive pollutants from non-domestic users. This Order/Permit contains pretreatment program requirements pursuant to 40 CFR part 403 that are applicable to the Discharger. Also, this Order/Permit incorporates conditions for implementing urban area pretreatment program requirements under CWA section 301(h) and 40 CFR part 125. Also, this Order/Permit retains the requirement to conduct an annual analysis of the local limits as required under 40 CFR section 125.65(c)(1)(iii).

e. Collection System

The State Water Board issued Order 2006-0003-DWQ, *Statewide General Waste Discharge Requirements for Sanitary Sewer System* (Statewide General SSO Order) on May 2, 2006. The State Water Board amended the MRP for the Statewide General SSO Order through Order WQ 2013-0058-EXEC on August 6, 2013. The Statewide General SSO Order requires public agencies that own or operate sanitary sewer systems with sewer lines one mile of pipe or greater to enroll for coverage and comply with the Statewide General SSO Order. The Statewide General SSO Order requires agencies to develop sanitary sewer management plans (SSMPs) and report all sanitary sewer overflows, among other requirements and prohibitions.

The Statewide General SSO Order contains requirements for operation and maintenance of collection systems and for reporting and mitigating sanitary sewer overflows that are more extensive, and therefore, more stringent than the requirements under federal standard provisions. The Discharger and public agencies that are discharging wastewater into the facility's collection system were required to obtain enrollment for regulation under the Statewide General SSO Order by December 1, 2006.

The San Diego Water Board issued Order No. R9-2007-0005*, Waste Discharge Requirements for Sewage Collection Agencies in the San Diego Region (Regional General SSO Order).* Order No. R9-2007-0005 is more stringent and prescriptive than the Statewide General SSO Order. Agencies that are enrolled under the Statewide General SSO Order are also required to also comply with the Regional General SSO Order.

6. Other Special Provisions ~~– Not Applicable~~

~~**7. Compliance Schedules**~~

***Pure Water San Diego* Potable Reuse Tasks and Goals.** As discussed in section II.F of this Fact Sheet, the Discharger ~~has~~ is committed to implementing a comprehensive water reuse program called *Pure Water San Diego* ~~as a condition of this 301(h) waiver of secondary treatment requirements~~. This program is a long-term joint water and wastewater facilities plan that will provide a safe, reliable, and cost-effective drinking water supply for San Diego while continuing to provide affordable wastewater treatment as well as decreases in effluent flows and pollutant loads that would otherwise be discharged from the Facility into the Pacific Ocean~~offloading flows and loads from the Facility~~. This program is the result of collaboration between the Discharger, Metro Wastewater JPA, and a diverse array of regional stakeholders.

~~To ensure that the~~The Discharger ~~will~~ has committed to complete the *Pure Water San Diego* project by December 31, 2035~~,~~. To demonstrate its commitment to move forward with implementation of *Pure Water San Diego*, the Discharger has committed to completing the tasks set forth in section VI.C.~~7~~ 6 of this Order/Permit by specified completion dates~~contains a detailed compliance schedule to be completed~~ during the term of this Order/Permit; i.e., achieving an interim goal of 30-MGD potable reuse by

December 2022.~~ term and~~ The Discharger has committed[5] to implementing the *Pure Water San Diego* program, and thus the 2035 goal that post-dates the term of this Order/Permit is included, with the expectation that details associated with the 2035 goal and necessary additional or interim~~the final~~ implementation goals will be provided and described in~~to be broken down and incorporated as required tasks within~~ subsequent Orders/Permits~~ term~~. Facilities planning, including the potential to accelerate the implementation schedule, has been aggressively pursued by the Discharger since the submittal of the ROWD for renewal of the Facility NPDES modified permit. Implementation of *Pure Water San Diego* faces a unique challenge, well beyond what a normal expansion of the water and wastewater infrastructure would experience. The detailed ~~compliance~~task completion schedule set forth in Table 8 of section VI.C.6 of this Order/Permit~~included~~ was provided by the Discharger on January 30, 2017. The Discharger has noted that the projected task completion~~Discharger may request modification of these~~ dates may be modified based on issues related to regulatory approval, environmental review, or legal challenges. Certain specified tasks are dependent upon future approval by the Mayor and City Council of San Diego.~~In recognition of this the enforceable milestones and schedule originally presented by the Discharger remains applicable for use in this Order/Permit, while realizing that the Discharger is using its best efforts to achieve its goals ahead of schedule.~~

As shown in the figure on page F-20, discharge flows and mass emission loads from the Facility have continually declined over the past 20 years, thereby minimizing the chance of negative impact on the ocean environment. ~~A compliance schedule is required because the~~The Discharger ~~must implement specific tasks in order~~plans to reduce TSS loading to that which would be allowable if the Facility were meeting secondary treatment standards for TSS as set forth in Table F-17 below. That is, if the Facility were treating wastewater at its facility design flow of 240 MGD and meeting the secondary treatment standards for TSS (average monthly effluent limitation of 30 mg/L), the annual mass effluent rate would be 9,942 mt/yr for TSS (using the equation MER (lbs/day) = Permitted Flow (MGD) x Pollutant Concentration (mg/L) x 8.34). Table F-~~16~~ 17 below summarizes the required step-wise reductions in PLOO TSS mass emissions.

Table F-17. Future TSS MER Limits

Year	TSS MER Limitation in mt/yr
2014	13,598
2015 through 2025	12,000
2026 through 2027	11,500
2028 forward	9,942

~~8.~~7. Compliance Section – Not Applicable

VII. RATIONALE FOR MONITORING AND REPORTING REQUIREMENTS

CWA section 308 and 40 CFR sections 122.41(h), (j)-(*l*), 122.44(i), and 122.48 require that all NPDES permits specify monitoring and reporting requirements. Water Code sections 13267 and 13383 also authorize the San Diego Water Board to establish monitoring, inspection, entry, reporting, and recordkeeping requirements. The MRP (Attachment E) establishes monitoring, reporting, and recordkeeping requirements that implement State and federal requirements. The

[5] Pursuant to the 2014 Cooperative Agreement between the Discharger and the San Diego Coastkeeper, San Diego County Surfrider, the Coastal Environmental Rights Foundation, and the San Diego Audubon Society.

following provides the rationale for the monitoring and reporting requirements contained in the MRP (Attachment E).

A. Core Monitoring Requirements

1. Influent Monitoring

   Influent monitoring is required to determine the effectiveness of the pretreatment and non-industrial source control programs, to assess the performance of treatment facilities, and to evaluate compliance with effluent limitations. Influent monitoring requirements have been carried over from Order No. R9-2009-0001.

   Refer to section III.A of the MRP (Attachment E).

2. Return Stream Monitoring

   Return stream monitoring is required to evaluate compliance with effluent limitations (i.e., system-wide percent removal for BOD_5 and TSS). Return stream monitoring requirements have been carried over from Order No. R9-2009-0001.

   Refer to section III.A of the MRP (Attachment E).

3. Effluent Monitoring

   Effluent monitoring is required to determine compliance with the conditions of this Order/Permit, to identify operational problems, to improve plant performance, and to conduct reasonable potential analyses for subsequent orders. Effluent monitoring also provides information on wastewater characteristics for use in interpreting water quality and biological data. Effluent monitoring requirements have been carried over from Order No. R9-2009-0001.

   Refer to section III.B of the MRP (Attachment E).

4. Whole Effluent Toxicity (WET) Testing Requirements

   This Order/Permit contains chronic toxicity effluent limitations as described in sections IV.C.3 and IV.C.5 of this Fact Sheet.

   This Order/Permit requires the Discharger to conduct additional toxicity testing for exceedances of the toxicity effluent limitations. If the additional tests demonstrate toxicity, the Discharger is required to submit a Toxicity Reduction Evaluation (TRE) Work Plan in accordance with the submitted TRE Work Plan and USEPA guidance which shall include: further steps taken by the Discharger to investigate, identify, and correct the causes of toxicity; actions the Discharger will take to mitigate the effects of the discharge and prevent the recurrence of toxicity; and a schedule for these actions.

   Section III.C.10 of the Ocean Plan requires a TRE if a discharge consistently exceeds an effluent limitation based on a toxicity objective in Table 1 of the Ocean Plan.

   Consistent with the requirements of the Ocean Plan, section III.C.5 of the MRP (Attachment E) requires the Discharger to develop an Initial Investigation TRE Work Plan and submit the Initial Investigation TRE Work Plan within 90 days of the effective date of this Order/Permit. The Work Plan must describe steps the Discharger intends to follow if the effluent limitation for chronic toxicity is exceeded.

   If the effluent limitation for chronic toxicity is exceeded in any one test, the Discharger must conduct a TRE if the toxicity is exceeded in any of the next four succeeding tests performed at 14-day intervals and notify the San Diego Water Board and USEPA, Region IX. The requirement for a minimum of four succeeding tests performed at 14-day intervals is based on the probability of encountering at least one toxicity exceedance assuming a true, but unknown level of occurrence. After the chronic toxicity exceedance, the Discharger must continue to conduct the routine monthly monitoring for chronic toxicity as required in Monitoring and Reporting Program (Attachment E). The TRE shall be conducted in accordance with the approved TRE Work Plan and available USEPA guidance documents.[6] The Discharger must also implement a Toxicity Identification Evaluation (TIE), as necessary, based upon the magnitude and persistence of toxicity effluent limitation exceedances. Once the source of toxicity is identified, the Discharger must take all reasonable steps to reduce the toxicity to meet the chronic toxicity effluent limitation identified in section IV.A of this Order/Permit.

Within 30 days of completion of the TRE, the Discharger must submit the results of the TRE, including a summary of the findings, data generated, a list of corrective actions taken or planned to achieve consistent compliance with all the toxicity limitations of this Order/Permit and prevent recurrence of exceedances of those limitations, and a time schedule for implementation of any planned corrective actions. The Discharger must implement any planned corrective actions in the TRE Final Report in accordance with the specified time schedule, unless otherwise directed in writing by the San Diego Water Board and/or USEPA, Region IX. The corrective actions and time schedule must be modified at the direction of the San Diego Water Board and/or USEPA, Region IX.

Refer to section III.C of the MRP (Attachment E).

5. Land Discharge Monitoring Requirements – Not Applicable

6. Recycling Monitoring Requirements – Not Applicable

B. Receiving Water Monitoring

The receiving water and sediment monitoring requirements set forth below are designed to measure the effects of the Facility discharge on the receiving water. These monitoring requirements will remain in effect on an interim basis, pending development of a new and updated monitoring and assessment program.

Refer to section IV of the MRP (Attachment E).

1. Shoreline Water Quality Monitoring Requirements

Shoreline water quality monitoring is required to determine if the effluent is causing or contributing to exceedances in the water quality standards in the shoreline, the area where the ocean surface waves come closer to shore and break. The monitoring frequency has been modified from 5/monthly to weekly in this Order/Permit to be consistent with the receiving water monitoring conducted for SBOO. The Discharger conducts the monitoring for PLOO and SBOO ~~at the same time~~ and standardizing the two monitoring programs makes it easier and more efficient for the Discharger to manage the two monitoring programs.

Refer to section IV.A of the MRP (Attachment E).

[6] See (a) TRE Guidance for Municipal Wastewater Treatment Plants (EPA 833-B-99-002, 1999); (b) Generalized Methodology for Conducting Industrial Toxicity Reduction Evaluations (EPA/600/2-88/070); Toxicity Identification Evaluation, Phase I (EPA/600/6-91/005F); (c) Methods for Aquatic Toxicity Identification Evaluations, Phase II (EPA/600/R-92/080); (d) Methods for Aquatic Toxicity Identification Evaluations, Phase III (EPA/600/R-92/081); and (e) Marine Toxicity Identification Evaluation (TIE): Phase I Guidance Document (EPA/600/R-96-054,1996).

2. Offshore Water Quality Monitoring Requirements

Offshore monitoring stations are shown on Map B-3 in Attachment B. Offshore water quality monitoring is required to determine if the effluent is causing or contributing to exceedances in the water quality standards outside of the ZID and to determine the fate of the effluent plume. Offshore monitoring requirements have been carried over from Order No. R9-2009-0001, with some exceptions. The monitoring frequency for kelp stations has been modified from 5/monthly to weekly in this Order/Permit to be consistent with the changes made to the shoreline monitoring frequency and with the receiving water monitoring conducted for SBOO.

In 2008, the Discharger began partial chlorination of the effluent, which made using bacteria as a plume tracer ineffective. As a replacement plume tracer, receiving water monitoring for ammonia was added to Order No. R9-2009-0001. However, monitoring for ammonia has produced no useful data since all ammonia results have been very low or ND near the outfall. Given this, receiving water monitoring for ammonia has been removed in this Order/Permit.

Refer to section IV.B.1 of the MRP (Attachment E).

3. Benthic Community Protection Monitoring Requirements

Sediments integrate constituents that are discharged to the ocean. Most particles that come from the PLOO discharge, and any associated contaminants, will eventually settle to the seafloor where they are incorporated into the existing sediments. Sediments can accumulate these particles over the years until the point where sediment quality has degraded and beneficial uses are impaired.

The MRP requires periodic assessment of sediment quality to evaluate potential effects of the PLOO discharge and compliance with narrative water quality standards specified in the Ocean Plan. The required assessment consists of the measurement and integration of three lines of evidence: 1) physical and chemical properties of seafloor sediments, 2) seafloor sediment toxicity to assess bioavailability and toxicity of sediment contaminants and 3) ecological status of the biological communities (benthos) that live in or on the seafloor sediments.

The benthic community is strongly affected by sediment composition (e.g., sand, silt, and clay distributions), sediment quality (e.g., chemistry, toxicity), and water quality. Because benthic macroinvertebrates (e.g., infauna) are dependent on their surroundings, they often serve as important biological indicators that reflect the overall conditions of the marine environment.

Order No. R9-2009-0001 requires two infaunal samples and one sediment sample per station per survey. However, the second infaunal sample (replicate) is of little value since it does not have a corresponding sediment sample. Therefore, this Order/Permit reduces the infaunal sampling to a single sample per station per survey. This reduction is consistent with the receiving water monitoring conducted for SBOO.

As a component of the joint receiving water monitoring program for PLOO and for SBOO, this Order/Permit adds a requirement for the annual survey of 40 randomly selected benthic stations each year, as requested by the Discharger in its ROWD. These 40 randomly selected stations will be sampled and analyzed annually to meet the requirements in both this Order/Permit and WDRs for SBOO[7,8].

Refer to section IV.C of the MRP (Attachment E).

4. Fish and Invertebrate Monitoring Requirements

Many pollutants discharged into receiving waters have the potential to bioaccumulate and persist in the tissues of aquatic organisms, including marine fishes. Chemical pollutants that bioaccumulate tend to magnify in concentration as they pass through the aquatic food chain. Fish monitoring data is required to assess the human health risks for individuals who may consume fish and to assess trends of contaminants levels in the receiving water over time.

Marine aquatic invertebrates are excellent indicators of ecosystem health because they are ubiquitous, abundant, diverse, and typically sedentary. The growth, survival, and reproduction of aquatic invertebrates are all sensitive to declines in environmental health, making analysis of assemblage structure a good ecosystem monitoring tool.

Refer to section IV.D of the MRP (Attachment E).

5. Plume Tracking

As commissioned by the Discharger and funded by a grant from the NOAA, staff at the University of California San Diego, Scripps Institution of Oceanography conducted a study to determine the characteristic fates of the wastewater plume from the PLOO. The results of the study were summarized in the *Final Report Point Loma Ocean Outfall Plume Behavior Study*, dated September 14, 2012 (Plume Study). Recommendations from the Plume Study have been included in this Order/Permit.

Refer to section IV.B.2 of the MRP (Attachment E).

6. Receiving Water Monitoring Reports.

In a letter dated November 5, 2015, the Discharger requested modifications to the reporting requirements for the receiving water monitoring for PLOO and SBOO. Order No. R9-2009-0001 for PLOO and Order No. R9-2013-0006 as amended by Order No. R9-2014-0071 for SBOO required the Discharger to submit annual full assessment reports, one annual report for PLOO and one annual report for SBOO. The Discharger also prepares separate annual full assessment report~~s~~ for USIBWC[8] for their discharge through the SBOO. The Discharger requested these three annual reports be replaced with Interim Receiving Water Monitoring Reports (Interim Reports, executive summary) and Biennial Receiving Water Monitoring Reports (Biennial Reports, full assessment) submitted on alternating years. The Interim Reports will cover a single monitoring year (e.g., 2018, 2020), while the Biennial Reports will cover two years (e.g., 2016-2017, 2018-2019, 2020-2021). ~~The Interim Receiving Water Monitoring Reports will cover only one year of receiving water monitoring (e.g., separate reports for calendar years 2016, 2018, and 2020) and shall be submitted every other year.~~ The Biennial Receiving Water

[7] Order No. R9-2013-0006 as amended by Order No. R9-2014-0071, NPDES Permit No. CA0109045, Waste Discharge Requirements for the City of San Diego South Bay Water Reclamation Plant Discharge to the Pacific Ocean via the South Bay Ocean Outfall, Monitoring and Reporting Program (Attachment E)

[8] Order No. R9-2014-0009 as amended by Order No. R9-2014-0094, NPDES Permit No. CA0108928, Waste Discharge Requirements for the United States Section of the International Boundary and Water Commission, South Bay International Wastewater Treatment Plant Discharge to the Pacific Ocean via the South Bay Ocean Outfall, Monitoring and Reporting Program (Attachment E)

Monitoring Reports will provide a more thorough discussion, evaluation (e.g., detailed statistical analyses), and interpretation than the Interim Receiving Water Monitoring Reports, will cover two years of receiving water monitoring (e.g., biennial reports for calendar years 2016-2017, 2018-2019, and 2020-2021), and shall be submitted the opposite years as the Interim Receiving Water Monitoring Reports. These reports may be submitted as an integrated report covering the receiving water monitoring requirements for both the MRP for the PLOO (Attachment E) and the MRPs for the SBOO (Orders Nos. R9-2013-0006 and R9-2014-0009).

In the November 5, 2015 letter, the Discharger offered to provide a Biennial State of the Ocean Report (an oral report) to the San Diego Water Board following each submittal of the Biennial Reports. The oral report would focus on the effort completed during the past two years, the status of the receiving waters, and plans for future monitoring efforts. If the oral report is not feasible (e.g., board meetings are cancelled or have too many items), a written Biennial State of the Ocean Report may be provided in lieu of the oral report.

The requirements for Interim Reports, Biennial Reports, and Biennial State of the Ocean Reports ~~on the Biennial Reports~~ have been included in this Order/Permit.

Refer to section IV.E of the MRP (Attachment E).

7. Groundwater – Not Applicable

C. Regional Monitoring Requirements

Regional ocean water monitoring provides information about the sources, fates, and effects of anthropogenic contaminants in the coastal marine environment necessary to make assessments over large areas. The large scale assessments provided by regional monitoring describe and evaluate cumulative effects of all anthropogenic inputs and enable better decision making regarding protection of beneficial uses of ocean waters. Regional monitoring data assists in the interpretation of core monitoring studies by providing a more accurate and complete characterization of reference conditions and natural variability. Regional monitoring also leads to methods standardization and improved quality control through inter-calibration exercise. The coalitions implementing regional monitoring enable sharing of technical resources, trained personnel, and associated costs. Focusing these resources on regional issues and developing a broader understanding of pollutants effects in ocean waters enables the development of more rapid and effective response strategies. Based on all of these considerations the San Diego Water Board supports regional approaches to monitoring ocean waters.

The Discharger shall, as directed by the San Diego Water Board, participate with other regulated entities, other interested parties, and the San Diego Water Board in development and implementation of new and improved monitoring and assessment programs for ocean waters in the San Diego Region and discharges to those waters.

Refer to section V of the MRP (Attachment E).

1. Kelp Bed Canopy Monitoring Requirements

   Kelp consists of a number of species of brown algae. Along the central and southern California coast, giant kelp (Macrocystis pyrifera) is the largest species colonizing rocky, and in some cases sandy, subtidal habitats. Giant kelp is an important component of coastal and island communities in southern California, providing food and habitat for numerous animals.

   Refer to section V.A of the MRP (Attachment E).

2. Southern California Bight Regional Monitoring Program Participation Requirements

The Discharger is required to participate in the ~~SCCWRP,~~ Southern California Bight Regional Monitoring Program coordinated by SCCWRP, or any other coordinator named by the San Diego Water Board, pursuant to Water Code sections 13267 and 13383, and 40 CFR section 122.48. The intent of the Southern California Bight Regional Monitoring Program is to maximize the efforts of all monitoring partners using a more cost-effective monitoring design and to best utilize the pooled scientific resources of the Southern California Bight.

During these coordinated sampling efforts, the Discharger's receiving water sampling and analytical effort, as defined in section IV of the MRP (Attachment E), may be reallocated to provide a regional assessment of the impact of the discharge of municipal wastewater to the Southern California Bight. In that event, the San Diego Water Board and USEPA, Region IX shall notify the Discharger in writing that the requirement to perform the receiving water sampling and analytical effort defined in section IV of the MRP (Attachment E) is suspended for the duration of the reallocation. Anticipated modifications to the monitoring program will be coordinated so as to provide a more comprehensive picture of the ecological and statistical significance of monitoring results and to determine cumulative impacts of various pollution sources. The level of resources in terms of sampling and analytical effort redirected from the receiving water monitoring program required under section IV of the MRP (Attachment E) shall equal the level of resources provided to implement the regional monitoring and assessment program, unless the San Diego Water Board, USEPA, Region IX, and the Discharger agree otherwise. The specific scope and duration of the receiving water monitoring program reallocation and redirection shall be determined and set by the San Diego Water Board and USEPA, Region IX in consultation with the Discharger.

Refer to section V.B of the MRP (Attachment E).

D. Special Studies Requirements

Climate Change Action Plan. Changing climate conditions may fundamentally alter the way publicly-owned treatment works are designed and operated. Climate change research indicates the overarching driver of change is increased atmospheric carbon dioxide (CO2) from human activity. The increased CO2 emissions trigger changes to climatic patterns, which increase the intensity of ~~see~~ sea level rise and coastal storm surges (Δ Sea Level), lead to more erratic rainfall and local weather patterns (ΔWeather Patterns), trigger a gradual warming of freshwater and ocean temperatures (Δ Water Temperature) and trigger changes to ocean water chemistry (Δ Water pH). This Order/Permit requires the Discharger to prepare and submit a Climate Change Action Plan (CCAP) within three years of the effective date of this Order/Permit. ~~The CCAP shall be subject to the approval of the San Diego Water Board and USEPA, Region IX and shall be modified as directed by the San Diego Water Board and USEPA, Region IX.~~

E. Other Monitoring Requirements

Outfall and Diffuser Inspection

The annual inspection is required to ensure a periodic assessment of the integrity of the outfall pipes and ballasting system.

VIII. PUBLIC PARTICIPATION

The San Diego Water Board and USEPA, Region IX have jointly considered the issuance of WDRs in this Order/Permit that will serve as an NPDES permit for the Discharger. As a step in the adoption process of this Order/Permit for the Facility, the San Diego Water Board and USEPA, Region IX developed a Tentative Order/Permit and encouraged public participation in the joint proceedings to consider adoption of the Tentative Order/Permit in accordance with the requirements of 40 CFR section 124.10 and Water Code section 13167.5.

A. Notification of Joint Public Hearing and Public Comment Period

By electronic mail dated October 28, 2016, the USEPA, Region IX and San Diego Water Board notified the Discharger and interested agencies and persons of its intent to jointly consider adoption of this Tentative Order/Permit and of its intent to conduct a joint public hearing during a regularly scheduled San Diego Water Board meeting on December 14, 2016. The San Diego Water Board and USEPA, Region IX also provided notice that this Tentative Order/Permit was posted on the San Diego Water Board website and provided a period of at least 30 days for public review and comment. On October 28, 2016, notice of the joint public hearing and public comment period was also published in the San Diego Union Tribune, a daily newspapers within the area affected by the Facility. The San Diego Water Board will not be acting on the NPDES permit at the December 14, 2016 hearing, but will formally act on this Tentative Order/Permit at a subsequent Board meeting.

The public also had access to the joint meeting agenda including all supporting documents and any changes in meeting dates and locations through the San Diego Water Board's website at: http://www.waterboards.ca.gov/sandiego/

B. Written Comments and Responses

Interested persons were invited to submit written comments concerning the Tentative Order/Permit as provided through the notification process. Written comments or e-mailed comments were required to be received in the following addresses:

Executive Officer
San Diego Water Board
2375 Northside Drive, Suite 100,
San Diego, CA 92108.

Peter Kozelka
USEPA, Region IX
NPDES Permits Office (WTR 2-3)
75 Hawthorne Street
San Francisco, CA 94105

To be fully responded to by staff and considered by the San Diego Water Board and USEPA, Region IX, the written or e-mailed comments were due at the San Diego Water Board office and USEPA, Region IX office by 5:00 p.m. on Wednesday, December 21, 2016. The San Diego Water Board and USEPA, Region IX provided written responses to all timely received public comments on this Tentative Order/Permit and posted the response to comments document on the Board's website in advance of the public hearing date.

C. Public Hearing

The San Diego Water Board and USEPA, Region IX held a joint public hearing on this Tentative Order/Permit during its joint meeting on the following date and time and at the following location:

Date:	December 14, 2016
Time:	9:00 AM
Location:	San Diego Water Board Meeting Room, 2375 Northside Drive, San Diego California

Interested persons were invited to attend. At the joint public hearing, the San Diego Water Board and USEPA, Region IX heard and considered all comments and testimony pertinent to the discharge and the Tentative Order. For accuracy of the record, important testimony was requested in writing.

The San Diego Water Board will not be acting on the NPDES permit at the December 14, 2016 hearing, but will formally act on this Tentative Order/Permit at a subsequent Board meeting. Upon issuance of the final Order/Permit and 301(h)-modified NPDES permit decision and response to comments, the San Diego Water Board and USEPA, Region IX will notify the Discharger and persons who submitted written comments, or requested notice of the final decision.

D. Petition for State Water Board Review

Any aggrieved person may petition the State Water Board to review the decision of the San Diego Water Board regarding the final WDRs of this Order/Permit in accordance with Water Code section 13320 and the CCR, title 23, sections 2050 and following. The State Water Board must receive the petition by 5:00 p.m., 30 days after the adoption date of this Order/Permit, except that if the thirtieth day following the adoption date of this Order/Permit falls on a Saturday, Sunday, or State holiday, the petition must be received by the State Water Board by 5:00 p.m. on the next business day. Copies of the law and regulations applicable to filing petitions may be found on the State Water Board website at: http://www.waterboards.ca.gov/public_notices/petitions/water_quality or will be provided upon request.

For instructions on how to file a petition for review, see the State Water Board website at: http://www.waterboards.ca.gov/public_notices/petitions/water_quality/wqpetition_instr.shtml

E. Appeal of Federal Permit

When a final 301(h)-modified NPDES permit is issued by USEPA, Region IX, it will become effective 33 days following the date it is mailed to the Discharger, unless a request for review is filed. If a request for review is filed, only those permit conditions which are uncontested will go into effect pending deposition of the request for review. Requests for review must be filed within 33 days following the date the final permit is mailed and must meet the requirements of 40 CFR section 124.19. All requests for review should be addressed to the Environmental Appeals Board (EAB) as follows. Requests sent through the U.S. Postal Service (except by Express Mail) must be addressed to the EAB's mailing address, which is:

USEPA
Clerk of the Board
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All filings delivered by hand or courier, including Federal Express, UPS, and U.S. Postal Express Mail, should be directed to the following address:

Environmental Appeals Board
USEPA
Colorado Building
1341 G Street, N.W., Suite 600
Washington, D.C. 20460

Those persons filing a request for review must have filed comments on the tentative decision and draft permit, or participated in the public hearing, except as provided in 40 CFR section 124.19. Otherwise, any such request for review may be filed only to the extent of changes from the draft permit to the final permit decision.

F. Public Access to Records

Records pertinent to the San Diego Water Board's and USEPA, Region IX's proceedings to adopt this Order/Permit including but not limited to the ROWD, public notices, draft and finalized versions of the Tentative Order, public comments received, Board responses to comments received, and other supporting documents are maintained by the San Diego Water Board and USEPA, Region IX. These records are available for public access Monday through Friday between the hours of 8:00 a.m. to 5:00 p.m. at the San Diego Water Board office and USEPA, Region IX office.

The San Diego Water Board website contains information and instructions on how to request access and obtain copies of these records at: http://www.waterboards.ca.gov/sandiego/about_us/contact_us/records.shtml.

Before making a request to view public records in the San Diego Water Board office you may wish to determine if the information is already available on the San Diego Water Board's website at http://www.waterboards.ca.gov/sandiego.

Copying of documents may also be arranged by calling the USEPA, Region IX office at 415-972-3524.

G. Register of Interested Persons

Any person interested in being placed on the mailing list for information regarding this Order/Permit should contact the San Diego Water Board and/or USEPA at the address below, reference this Facility or Order, and provide a name, address, email address (if available), and phone number.

San Diego Regional Water Quality Control Board
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H. Additional Information

Requests for additional information or questions regarding this Order/Permit should be directed to Joann Lim at 619-521-3362 or to the San Diego Water Board via e-mail at rb9_questions@waterboards.ca.gov; and Peter Kozelka of USEPA, Region IX at 415-972-3448.

ATTACHMENT G – OCEAN PLAN AND BASIN PLAN PROHIBITIONS

A. Ocean Plan Discharge Prohibitions

1. The Discharge of any radiological chemical, or biological warfare agent or high-level radioactive waste into the ocean is prohibited.
2. Waste shall not be discharged to designated Areas of Special Biological Significance (ASBS) except as provided in chapter III.E of the Ocean Plan.
3. Pipeline discharge of sludge to the ocean is prohibited by federal law; the discharge of municipal and industrial waste sludge directly to the ocean, or into a waste stream that discharges to the ocean, is prohibited. The discharge of sludge digester supernatant directly to the ocean, or to a waste stream that discharges to the ocean without further treatment, is prohibited.
4. The by-passing of untreated wastes containing concentrations of pollutants in excess of those of Table 2 or Table 1 of the Ocean Plan is prohibited.

B. Basin Plan Discharge Prohibitions

1. The discharge of waste to waters of the State in a manner causing, or threatening to cause a condition of pollution, contamination or nuisance as defined in Water Code section 13050, is prohibited.
2. The discharge of waste to land, except as authorized by WDRs or the terms described in Water Code section 13264 is prohibited.
3. The discharge of pollutants or dredged or fill material to waters of the U.S. except as authorized by an NPDES permit or a dredged or fill material permit (subject to the exemption described in Water Code section 13376) is prohibited.
4. Discharges of recycled water to lakes or reservoirs used for municipal water supply or to inland surface water tributaries thereto are prohibited, unless this San Diego Water Board issues an NPDES permit authorizing such a discharge; the proposed discharge has been approved by the State of California Department of Public Health and the operating agency of the impacted reservoir; and the discharger has an approved fail-safe long-term disposal alternative.
5. The discharge of waste to inland surface waters, except in cases where the quality of the discharge complies with applicable receiving water quality objectives, is prohibited. Allowances for dilution may be made at the discretion of the San Diego Water Board. Consideration would include streamflow data, the degree of treatment provided and safety measures to ensure reliability of facility performance. As an example, discharge of secondary effluent would probably be permitted if streamflow provided 100:1 dilution capability.
6. The discharge of waste in a manner causing flow, ponding, or surfacing on lands not owned or under the control of the discharger is prohibited, unless the discharge is authorized by the San Diego Water Board.
7. The dumping, deposition, or discharge of waste directly into waters of the State, or adjacent to such waters in any manner which may permit its being transported into the waters, is prohibited unless authorized by the San Diego Water Board.

8. Any discharge to a storm water conveyance system that is not composed entirely of storm water is prohibited unless authorized by the San Diego Water Board. [The federal regulations, title 40 of the Code of Federal Regulations (40 CFR) section 122.26(b)(13), define storm water as storm water runoff, snow melt runoff, and surface runoff and drainage. Section 122.26(b)(2) of 40 CFR defines an illicit discharge as any discharge to a storm water conveyance system that is not composed entirely of storm water except discharges pursuant to an NPDES permit and discharges resulting from firefighting activities.] [section 122.26 amended at 56 FR 56553, November 5, 1991; 57 FR 11412, April 2, 1992].

9. The unauthorized discharge of treated or untreated sewage to waters of the State or to a storm water conveyance system is prohibited.

10. The discharge of industrial wastes to conventional septic tank/ subsurface disposal systems, except as authorized by the terms described in Water Code section 13264, is prohibited.

11. The discharge of radioactive wastes amenable to alternative methods of disposal into the waters of the State is prohibited.

12. The discharge of any radiological, chemical, or biological warfare agent into waters of the State is prohibited.

13. The discharge of waste into a natural or excavated site below historic water levels is prohibited unless the discharge is authorized by the San Diego Water Board.

14. The discharge of sand, silt, clay, or other earthen materials from any activity, including land grading and construction, in quantities which cause deleterious bottom deposits, turbidity or discoloration in waters of the State or which unreasonably affect, or threaten to affect, beneficial uses of such waters is prohibited.

ATTACHMENT H – DILUTION MODEL INFORMATION

Initial dilution for the Point Loma Ocean Outfall (PLOO) was assessed using an U.S. Environmental Protection Agency (USEPA) modeling application, Visual Plumes (UM3). UM3 is an acronym for the three-dimensional Updated Merge model for simulating single and multi-port submerged discharges.

The USEPA Visual Plumes website is located at: https://www.epa.gov/exposure-assessment-models/visual-plumes.

The diffuser is a simple wye diffuser. The PLOO is 23,472 feet long and includes a wye (Y-shaped) diffuser with two 2,496 feet long diffuser legs. The diffuser has 416 discharge ports (208 on each leg).

A. Dilution

Initial dilution is defined in the Ocean Plan as follows:

> "The process which results in the rapid and irreversible turbulent mixing of wastewater with ocean water around the point of discharge. For a submerged buoyant discharge, characteristic of most municipal and industrial wastes that are released from the submarine outfalls, the momentum of the discharge and its initial buoyancy act together to produce turbulent mixing. Initial dilution in this case is completed when the diluting wastewater ceases to rise in the water column and first begins to spread horizontally."

Initial dilution, as defined by the Ocean Plan, is interpreted to be when the effluent plume either surfaces or reaches its initial trapping level (level at which the density of the effluent equals that of the ambient background and the effluent no longer has upward momentum based solely on buoyancy).

Dilution is a function of various characteristics of the diffuser, effluent, and ambient background. Dilution of an effluent plume into a receiving water is dependent on the flow of effluent, the momentum of the effluent flow into the receiving water (highly dependent on the effluent flow, shape, size, and number of diffuser ports), the buoyancy of the effluent within the receiving water (highly dependent between the delta between effluent and the ambient background of salinity and temperature), the placement of diffuser ports (space between diffuser ports and directional settings of each port), and the available volume and boundaries of the receiving water.

To effectively model dilution, Visual Plumes breaks data entry into the modeling system into three main components:

1. Diffuser and Effluent Characteristics;
2. An Ambient Profile; and
3. Special Settings

A summary of each of these components and the assumptions for each of these components while conducting the modeling effort is provided below.

B. Diffuser and Effluent Characteristics

Diffuser and effluent characteristics are necessary to determine the momentum of the effluent as it enters the receiving water, and the density of the effluent (which will affect it's buoyancy in the receiving water).

The input fields for the model are listed below with applicable explanations for the input into each field:

1. Port Diameter

   In the Report of Waste Discharge (ROWD) the City of San Diego (Discharger) provided a summary of the diffuser set up, including the number of ports and their respective diameters. Visual Plumes data entry limitations include only allowing a single input for "Port Diameter". Thus, a single port diameter must be determined. This was done by taking an average port size (as centimeter cubed, cm^3) of all the ports as summarized below:

   A port diameter of 10.66 centimeter was entered.

2. Port Elevation

   The port elevation (or height of the port from the sea bed) was not specified in the ROWD. Diffuser drawings were provided by the facility upon request. On October 27, 2008 the Discharger provided a report on dilution indicating that the elevation of the ports was seven feet. Based on this information, a port elevation of seven feet was entered.

3. Vertical Angle

   The vertical angle is defined in the Visual Plumes manual (4th Edition) as the discharge angle relative to the horizontal with zero being horizontal, 90 being vertical upward, and -90 being vertically downward. The ROWD indicates that the ports are located on the diffuser facing opposing directions, 180 degrees away from each other. A data entry limitation of Visual Plumes is that only one vertical angle may be entered. The Visual Plumes manual suggests that a fairly simple and accurate approach to modeling such a situation is to treat the diffuser as if all ports are on one side with half the spacing. In the October 27, 2008 report the Discharger contends that modeling all the ports on one side and reducing the spacing in half over simplifies the modeling for the PLOO and results in the combined outfall plume from all outfall ports being squeezed into a significantly reduced volume. The Discharger further states that because the Ocean Plan requires initial dilution be assessed on the basis of zero ocean currents and the PLOO's high horizontal discharge velocities, no cross-merging of the plumes from either side of the diffuser will occur prior to initial dilution. Using UM3 modeling the Discharger demonstrates that the plume does not cross the diffuser centerline (which would indicate merging). A single vertical angle of 0 was used in the model.

   Because the plumes from each side of the diffuser do not merge, a single representative side of the diffuser can be modeled and assumed for each individual plume on each side of the diffuser. To accurately calculate proper effluent velocity, the total flow through the diffuser must be reduced in half to accurately represent flow through a single side of the diffuser. An effluent flow of 120 million gallons per day (MGD) was used.

4. Horizontal Angle

   The horizontal angle is defined in the Visual Plumes manual as the angle of the diffuser relative to the x-coordinate. Assuming that the default units (degrees) are used, zero is in the direction of the x-coordinate (flow towards the east) and 90 in the direction of the y-coordinate (flow towards the north). The ROWD indicates that the two legs of the wye diffuser extend approximately 150 degrees in separate directions (roughly one towards 255 degrees and one towards 75 degrees). A data entry limitation of Visual Plumes is that only one vertical angle may be entered. A middle direction was chosen, 180 degrees was entered into the data field. This field is important when considering currents and stream flow, both of which are not considered when modeling for ocean discharges to which the Ocean Plan is applicable. Thus, this data entry field was not expected to have an effect on the final initial dilution.

5. Number of Ports

   Based on the number of ports specified in the ROWD (and summarized in the Port Diameter portion of this Attachment), 208 was entered into the data field to account for each side of the diffuser.

6. Port Spacing

   The ROWD indicated that the ports were approximately 7.33 meters apart. This value did not include an additional discharge port located on the diffuser just upstream of the wye structure. Thus using the total distance of the length of the diffuser on which the ports are located, the port spacing was recalculated and determined to be 7.3 meters.

7. Acute Mix Zone/Chronic Mix Zone

   This value is not relevant to the final initial dilution calculations.

8. Port Depth

   The ROWD indicates that the length of diffuser on which diffuser ports are located, is between 93.3 meters to 95.5 meters deep under the ocean surface. An average between these two values was taken, and 94.35 meters was entered into the data field.

9. Effluent Flow

   The 301(h)-variance-based flow for the Discharger is 205 MGD. The Discharger currently discharges a monthly average flow significantly below this value which would result in a greater (and less conservative) dilution value. Because the Discharger will continue to be capable of discharging up to 205 MGD, and this is the most conservative value to use while calculating dilution, 205 MGD was considered to be the applicable discharge volume through the outfall. Due to the modeling limitations explained in section B.3 of this summary, half the flow was used to represent the appropriate effluent flow from each side of the diffuser.

10. Effluent Conductivity

   Conductivity data was available from January 2002 through December 2007. Higher levels of salinity in the effluent result in a less buoyant effluent. The highest monthly average conductivity was used, 3.125 millimhos per centimeter (mmhos/cm) was entered into the data field.

11. Effluent Temperature

   Temperature data was available from January 2002 through December 2007. The smaller the difference between the effluent and receiving water, the less dilution is likely to occur. Receiving water temperatures are significantly lower than the effluent temperature at Discharge Point No. 001. Thus, a lower effluent temperature is likely to result in lower dilution. The lowest monthly average temperature of 21.1 degrees Celsius (°C) was entered into the data field.

12. Effluent Concentration

This data field is for calculating "effective dilution" and does not have an effect on the final initial dilution calculated. However a value must be entered into this field for the model to run, so "20 parts per million (ppm)" was chosen.

C. Ambient Profile

An ambient profile is a conservative profile of the receiving water. This profile includes components of density (temperature and salinity), current (which is always set to zero when running models for the Ocean Plan), and a far-field diffusion coefficient. The ambient profile takes into consideration the natural stratification of the receiving waters, allowing for the entry of various data points at varying depths. The model is capable (and this feature was utilized during the modeling effort for PLOO) of extrapolating data for the depths that were not entered based on the data that is entered.

Receiving water monitoring of temperature and salinity was established during the current permit term at the following monitoring locations which are representative of the receiving water at the point of discharge:

- F-029
- F-030
- F-031

Monitoring was conducted quarterly (January, April, July, and October).

Part C.3.d of the Ocean Plan states:

"For the purpose of this Plan, minimum initial dilution is the lowest average initial dilution within any single month of the year."

Using data from 2003 through 2007, the most conservative monthly profile was determined to be January. In the October 27, 2008 report from the Discharger, the Discharger provided additional depth data for January 2003, 2004, 2005, 2006, and 2007. The following dilutions for January were calculated by the Discharger using Visual Plumes and all available data:

Year	Dilution
January 2003	228.3
January 2004	249.8
January 2005	244.1
January 2006	241.1
January 2007	225.5

Based on the Discharger's results, the ambient profile for January 2007 was the most conservative. The following ambient profile for January 2007 was used to calculate the final initial dilution by the San Diego Water Board using Visual Plumes:

Depth (m)	Temperature (°C)	Density (sigma theta)
1	14.86	24.88
7	14.85	24.89
13	14.80	24.89
19	14.74	24.91
25	14.57	24.94
31	14.27	25.00
37	13.67	25.11
43	13.25	25.22
49	12.95	25.29
55	12.59	25.39
61	12.29	25.45
67	11.88	25.51
73	11.77	25.55
75	11.75	25.55
81	11.60	25.61
87	11.46	25.70
93	11.29	25.77
97	11 03	25.86

Data was extrapolated for depths at which no data was available.

Far-field Diffusion Coefficient

The Visual Plumes manual recommends the use of 0.0003 m0.67/s2. This value was used in the data field as a constant (not extrapolated as the ambient temperature and density were).

D. Special Settings

1. UM3 Tidal Pollutant Buildup Parameters

   This field is used to calculate "effective dilution," which was irrelevant to the PLOO modeling effort.

2. Diffuser Port Contraction Coefficient

   The shape of the diffuser ports was not specified in the ROWD. Upon request the Discharger indicated that the diffuser ports are sharp-edged cylinders. Thus, a diffuser port contraction coefficient of 0.61 was used as recommended in the Visual Plumes manual.

3. Standard Light Adsorption Coefficient

   The value of 0.16 is recommended in the Visual Plumes manual as a conservative value. This is not relevant to final initial dilution, and is for the Mancini bacteria model applications of the model.

4. Far-field Increment (meter)

   This value controls the number of lines output by the Brooks far-field algorithm. A small value produces more lines and graphic output than large values. A value between 100 to 1000 m is recommended by the Visual Plumes manual. This field has little effect on the final calculated initial dilution, a value of 100 meters was used in the data field.

5. UM3 Aspiration Coefficient

   This is the rate at which ambient fluid is entrained (diluted) into the plume. The default value of 0.1 is an average that is rarely changed. A larger value causes more rapid plume spreading and affects other characteristics, like plume rise. The default value of 0.1 was used in the data field.

6. Far-field Diffusivity Option

   As recommended by the Visual Plumes manual, a 4/3 Power Diffusivity was chosen for this field because the discharge is occurring in open water.

E. Final Results

Four model runs were conducted using the data input specified above, one for each ambient profile (January, April, July, and October). This provided seasonal dilution values (expressed as trapping levels) when considering worst case scenarios (most conservative- high flow, high effluent salinity, low effluent temperature, etc.) A summary of the modeling result is included below and has been copied directly from the Visual Plumes text output.

The local maximum height of rise for January 2007 was calculated to be 227.1:1 parts seawater per parts wastewater (227.2:1) (as compared to 225.5 provided by the Discharger). The dilution provided in Order No. R9-2002-0025 is 204:1. The Discharger has recommended retaining, the previously applied initial dilution value of 204:1 as more appropriate and representative of PLOO minimum initial dilution. Because the Discharger has not requested additional dilution, a dilution of 204:1 is applied to the discharge from PLOO without consideration of additional dilution. Should the San Diego Water Board determine, pursuant to title 40 of the Code of Federal Regulations (40 CFR) section 174.55, that a more stringent initial dilution value is appropriate to assure compliance with water quality standards, this Order/Permit will be revised to reflect that initial dilution value.

UM3. *11/14/2008* 12:14:13 PM
Case 1; ambient file C:\Plumes\January additional data.001.db; Diffuser table record 2: ---------------------------------
Ambient Table:

Depth	Amb-cur	Amb-dir	Amb-den	Amb-tem	Amb-pol	Decay	Far-spd	Far-dir	Disprsn	Density
m	*m/s*	deg	psu	C	kglkg	s-1	*m/s*	deg	*mO.67/s2*	sigma-T
0.0	0.0	0.0	32.65	14.86	10.0	2.0	2.0	40.0	0.0003	24.22
1.0	0.0	0.0	32.66	14.86	10.0	2.0	2.0	40.0	0.0003	24.22
7.0	0.0	0.0	32.67	14.85	10.0	2.0	2.0	40.0	0.0003	24.23
13.0	0.0	0.0	32.67	14.8	10.0	2.0	2.0	40.0	0.0003	24.24
19.0	0.0	0.0	32.69	14.74	10.0	2.0	2.0	40.0	0.0003	24.28
25.0	0.0	0.0	32.73	14.57	10.0	2.0	2.0	40.0	0.0003	24.34
31.0	0.0	0.0	32.81	14.27	10.0	2.0	2.0	40.0	0.0003	24.46
37.0	0.0	0.0	32.95	13.67	10.0	2.0	2.0	40.0	0.0003	24.7
43.0	0.0	0.0	33.09	13.25	10.0	2.0	2.0	40.0	0.0003	24.89
49.0	0.0	0.0	33.18	12.95	10.0	2.0	2.0	40.0	0.0003	25.02
55.0	0.0	0.0	33.31	12.59	10.0	2.0	2.0	40.0	0.0003	25.19
61.0	0.0	0.0	33.39	12.29	10.0	2.0	2.0	40.0	0.0003	25.31
67.0	0.0	0.0	33.47	11.88	10.0	2.0	2.0	40.0	0.0003	25.45
73.0	0.0	0.0	33.52	11.77	10.0	2.0	2.0	40.0	0.0003	25.51
75.0	0.0	0.0	33.52	11.75	10.0	2.0	2.0	40.0	0.0003	25.51
81.0	0.0	0.0	33.6	11.6	10.0	2.0	2.0	40.0	0.0003	25.6
87.0	0.0	0.0	33.71	11.46	10.0	2.0	2.0	40.0	0.0003	25.71
93.0	0.0	0.0	33.8	11.29	10.0·	2.0	2.0	40.0	0.0003	25.82
97.0	0.0	0.0	33.92	11.03	10.0	2.0	2.0	40.0	0.0003	25.95

Diffuser table:

P-dia	P-elev	V-angle	H-angle	Ports	Spacing	AcuteMZ	ChrncMZ	P-depth	Ttl-flo	Eff-con	Temp	Polutnt
(cm)	(ft)	(deg)	(deg)	()	(m)	(m)	(m)	(m)	(MGD)	(mmho/cm)	(C)	(ppm)
10.66	7.0	0.0	180.0	208.0	7.3	400.0	400.0	94.35	120.0	3.125	22.6	20.0

<u>Simulation:</u>

Froude number: 31.49; effluent density (sigma-T) -0.827; effluent velocity 4.643(m/s);

Step	Depth (m)	Amb-cur *(m/s)*	P-dia (cm)	Pollutant (ppm)	4/3Eddy (ppm)	Dilutn ()	x-posn (m)	y-posn (m)
0	94.35	0.0	8.326	20.0	20.0	1.0	-0.0	0.0; stream limit
20	94.35	0.0	12.2	3.626E+6	3.626E+6	1.473	-0.0977	0.0; reached
40	94.35	.0	18.07	6.205E+6	6.205E+6	2.176	-0.244	0.0;
60	94.35	0.0	26.8	8.072E+6	8.072E+6	3.221·	-0.461	0.0;
80	94.34	0.0	39.77	9.350E+6	9.350E+6	4.774	-0.784	0.0;
100	94.32	0.0	59.0	1.001E+7	1.001E+7	7.082	-1.264	0.0;
120	94.25	0.0	87.3	1.017E+7	1.017E+7	10.51	-1.974	0.0;
140	94.02	0.0	127.5	1.018E+7	1.018E+7	15.59	-2.996	0.0;
160	93.58	0.0	167.4	1.013E+7	1.013E+7	21.24	-4.044	0.0;
180	92.91	0.0	203.4	1.012E+7	1.012E+7	27.53	-5.037	0.0;
200	91.81	0.0	243.0	1.014E+7	1.014E+7	36.27	-6.113	0.0;
220	89.8	0.0	299.3	1.019E+7	1.019E+7	51.64	-7.415	0.0;
240	86.73	0.0	379.1	1.019E+7	1.019E+7	76.73	-8.754	0.0;
260	82.64	0.0	492.1	1.012E+7	1.012E+7	114.0	-10.03	0.0;
280	77.09	0.0	680.2	-:9.058E+14	-9.058E+14	169.4	-11.41	0.0;
281	76.76	0.0	693.5	4.435E+15	4.435E+15	172.8	-11.49	0.0; trap level;
284	75.73	0.0	737.6	-7.016E+17	-7.016E+17	183.4	-11.73	0.0; merging;
300	69.22	0.0	1402.1	-1.040E+33	-1.040E+33	225.1	-13.6	0.0;
301	69.1	0.0	1445.7	3.961 E+33	3.961 E+33	225.5	-13.65	0.0; begin
320	68.05	0.0	2153.4	-3.741E+37	-3.741E+37	227.1	-14.17	0.0; overlap;
340	67.73	0.0	2782.0	-1.321 E+24	-1.321 E+24	227.1	-14.44	0.0;
360	67.59	0.0	3293.5	5.591 E+6	5.591 E+6	227.2	-14.6	0.0;
380	67.53	0.0	3670.1	1.000E+7	1.000E+7	227.2	-14.73	0.0;
400	67.5	0.0	3898.7	1.000E+7	1.000E+7	227.2	-14.83	0.0;
418	67.49	0.0	3971.5	1.000E+7	1.000E+7	227.2	-14.92	0.0; local;
420	67.49	0.0	3971.8	1.000E+7	1.000E+7	227.2	-14.93	0.0; maximum
440	67.51	0.0	3888.3	1.000E+7	1.000E+7	227.2	-15.02	0.0; rise or fall
460	67.54	0.0	3653.7	1.000E+7	1.000E+7	227.2	-15.13	0.0;
480	67.62	0.0	3279.6	1.000E+7	1.000E+7	227.2	-15.26	0.0;
500	67.78	0.0	2784.2	1.000E+7	1.000E+7	227.2	-15.43	0.0;
520	68.14	0.0	2192.9	1.000E+7	1.000E+7	227.3	-15.7	0.0;
540	69.32	0.0	1553.6	1.001E+7	1.001E+7	228.8	-16.25	0.0;
545	70.04	0.0	1407.3	1.007E+7	1.007E+7	231.3	-16.5	0.0; end overlap;
560	78.67	0.0	1207.8	-9.409E+20	-9.409E+20	273.4	-18~55	0.0; trap level;
567	82.43	0.0	1785.2	3.555E+28	3.555E+28	291.9	-19.45	0.0; begin;
580	83.22	0.0	2673.0	-5.295E+31	-5.295E+31	292.9	-19.75	0.0; overlap
600	83.55	0.0	3850.3	-1.317E+16	-1.317E+16	292.9	-19.93	0.0;
605	83.58	0.0	4118.3	-8.117E+12	-8.117E+12	292.9	-19.96	0.0; bottom hit;
620	83.66	0.0	4851.8	3.657E+6	3.657E+6	293.0	-20.03	0.0;
640	83.71	0.0	5647.2	1.000E+7	1.000E+7	293.0	-20.1	0.0;
660	83.73	0.0	6209.4	1.000E+7	1.000E+7	293.0	-20.15	0.0;
680	83.74	0.0	6519.6	1.000E+7	1.000E+7	293.0	-20.2	0.0;
692	83.74	0.0	6580.5	1.000E+7	1.000E+7	293.0	-20.23	0.0; local max rise or fall

4/3 Power Law. Farfield dispersion based on wastefield width of 582.63 m

conc dilutn (ppm)	width (m)	distnce (m)	time (hrs)	(kg/kg)	(s-1)
1.00E+ 7	294.3	583.8	100.0	0.0111	10.0
1.00E+7	294.0	585.3	200.0	0.025	10.0
1.00E+7	293.9	586.8	300.0	0.0389	10.0
1.00E+7	293.8	588.4	400.0	0.0527	10.0

count: 4; 12:14:16 PM. amb fills: 2

ATTACHMENT I – GENERIC TOXICITY REDUCTION EVALUATION (TRE) WORK PLAN

Information and Data Acquisition

A. Operations and performance review
   1. NPDES permit requirements
      a. Effluent limitations
      b. Special conditions
      c. Monitoring data and compliance history
   2. POTW design criteria
      a. Hydraulic loading capacities
      b. Pollutant loading capacities
      c. Biodegradation kinetics calculations/assumptions
   3. Influent and effluent conventional pollutant data
      a. Biochemical oxygen demand (5-Day @ 20°C) (BOD_5)
      b. Chemical oxygen demand (COD)
      c. Suspended solids (SS)
      d. Ammonia
      e. Residual chlorine
      f. pH
   4. Process control data
      a. Primary sedimentation - hydraulic loading capacity and BOD5 and SS removal
      b. Activated sludge - Food-to-microorganism (F/M) ratio, mean cell residence time (MCRT), mixed liquor suspended solids (MLSS), sludge yield, and BOD_5 and COD removal
      c. Secondary clarification - hydraulic and solids loading capacity, sludge volume index and sludge blanket depth
   5. Operations information
      a. Operating logs
      b. Standard operating procedures
      c. Operations and maintenance practices
   6. Process sidestream characterization data
      a. Sludge processing sidestreams
      b. Tertiary filter backwash
      c. Cooling water

7. Combined sewer overflow (CSO) bypass data
    a. Frequency
    b. Volume
8. Chemical coagulant usage for wastewater treatment and sludge processing
    a. Polymer
    b. Ferric chloride
    c. Alum

B. Publicly-owned treatment works (POTW) influent and effluent characterization data
1. Toxicity
2. Priority pollutants
3. Hazardous pollutants
4. SARA 313 pollutants
5. Other chemical-specific monitoring results

C. Sewage residuals (raw, digested, thickened and dewatered sludge and incinerator ash) characterization data
1. EP toxicity
2. Toxicity Characteristic Leaching Procedure (TCLP)
3. Chemical analysis

D. Industrial waste survey (IWS)

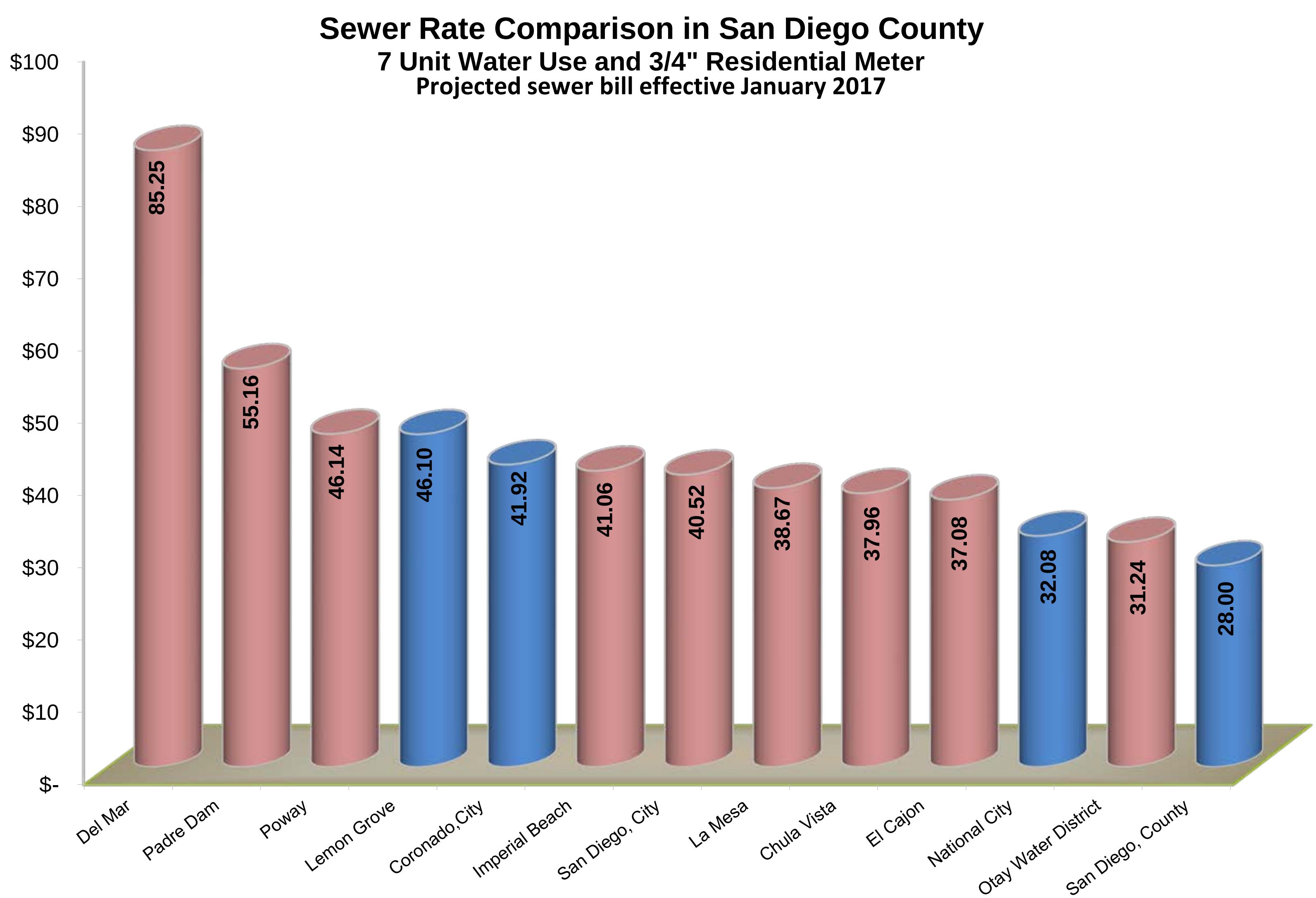
1. Information on Industrial Users (IUs) with categorical standards or local limits and other significant non-categorical IUs
2. Number of IUs
3. Discharge flow
4. Standard Industrial Classification (SIC) code
5. Wastewater flow
    a. Types and concentrations of pollutants in the discharge
    b. Products manufactured
6. Description of pretreatment facilities and operating practices
7. Annual pretreatment report
8. Schematic of sewer collection system
9. POTW monitoring data
    a. Discharge characterization data
    b. Spill prevention and control procedures
    c. Hazardous waste generation
10. IU self-monitoring data
    a. Description of operations
    b. Flow measurements
    c. Discharge characterization data
    d. Notice of sludge loading
    e. Compliance schedule (if out of compliance)
11. Technically based local limits compliance reports
12. Waste hauler monitoring data manifests
13. Evidence of POTW treatment interferences (i.e., biological process inhibition)

Attachment 11

MetroTAC Update/Report

Active Items	Description	Member(s)
Sample Rejection Protocol Working Group	7/16: The sample rejection protocol from the B&C 2013 report has been under discussion between PUD staff and Metro TAC. A working group was formed to deal with this highly technical issue and prepare draft recommendations on any changes to current sampling procedures. The existing protocol is to be used through FY17. If changes are approved to the protocol they will be implemented in FY18. *1/17: Work group continues to meet monthly.*	Dennis Davies Dan Brogadir Al Lau Dexter Wilson SD staff
PLWTP Permit Ad Hoc Work Group	1/17: Greg Humora and Scott Tulloch continue to meet with stakeholders. . Milestones are included in each month Metro TAC and Commission agenda packet.	Greg Humora Scott Tulloch SD staff & consultants Enviro members
Flow Commitment Working Group	6/16: Upon the request of Metro Com Chair Jim Peasley Chairman Humora created a working group to review the Flow Commitment section of the Regional Agreement and make recommendations on the fiscal responsibilities of members who might withdraw their flow from the Metro System. The Work Group held their first meeting June 24, 2016. Yazmin Arellano chairs the work group. *1/17: Work group continues to meet monthly.*	Yazmin Arellano Roberto Yano Eric Minicilli Al Lau SD staff Karyn Keese
Social Media Working Group	6/16: Upon the request of Metro Com Chair Jim Peasley Chairman Humora created a working group to research and provide input on the creation of policies and procedures for Metro JPA social media. Mike Obermiller will chair this work group. He sent out an email to all Metro TAC members requesting copies of their agency's policies. 9/16: A draft policy has been approved by Metro TAC and will be presented to the Commission in October by Alexander Heide. *1/17: Draft policy and consultants contracts to be reviewed by Finance Committee in March 2017.*	Mike Obermiller Alexander Heide
Secondary Equivalency	5/14: Definition of secondary equivalency for Point Loma agreed to be enviros 12/14: Cooperative agreement signed between San Diego and enviros to work together to pass legislation for secondary equivalency (until 8/1/19) San Diego indicated that passage of Federal legislation is not possible under the current political environment. San Diego is exploring options for State legislation 9/15: Letter received from EPA endorsing modified permit for Point Loma 6/16: Pursuit of Federal Legislation will be held off until after the November 2016 election. City of San Diego to consult with DC lobbyists on 2/4/17	Greg Humora Scott Tulloch
Pure Water Program Cost Allocation Ad Hoc Work Group	A working group was formed to discuss Pure Water program cost allocation. 9/16: Concepts to be refined by Metro TAC and San Diego staff for presentation to Commission 1/17.	Greg Humora Scott Tulloch Roberto Yano Karyn Keese SD staff & consultants
Pure Water Program Cost Allocation Metro TAC Work Group	5/14: Draft facility plan and cost allocation table provided to Metro TAC working group 3/15: Draft cost allocation presentation provided to Metro TAC	Greg Humora Scott Tulloch Rick Hopkins Roberto Yano Al Lau Bob Kennedy Karyn Keese
Exhibit E Audit	6/16: FY 2013 audit accepted by Metro Commission; 9/16: FYE 2014 audit accepted by Metro Commission. FYE 2015 audit report to be issued by end of 2016 and then all audits will be caught up. *1/17: FYE 2015 to be issued in February 2017. FYE 2016 fieldwork is underway with anticipated draft 7/17.*	Karyn Keese Karen Jassoy

Active Items	Description	Member(s)
Amend Regional Wastewater Disposal Agreement	The addition of Pure Water facilities and costs will likely require the amendment of the 1998 Regional Wastewater Disposal Agreement. The Padre Dam billing errors have led to a need to either amend the Agreement and/or develop administrative protocols to help resolve potential future billing errors. After Pure Water cost allocation had been agreed to this effort will begin.	Greg Humora Roberto Yano Dan Brogadir Paula de Sousa Mills Karyn Keese
Management of Non-Disposables in Wastewater	9/13: Eric Minicilli handed out a position paper prepared by the NEWEA. 6/15 Chairman Humora provided attached from SCAP. 2/16: Chairman Humora distributed Robbins Geller Rudman & Dowd memorandum.	Eric Minicilli
2015/16 Transportation Rate Update	5/14: Metro TAC approved 2014 transportation rate w/caveat that PUD staff hires a consultant to review/revise methodology for 2015.	Al Lau Dan Brogadir Karyn Keese
IRWMP	8/15 RAC minutes included in August Metro TAC agenda. Padre Dam received a $6 million grant for their project. 9/16: June 2, 2016 and August 3, 2016 minutes presented to Metro TAC. *12/16: Roberto Yano and Yazmin Arellano appointed to IRWMP.*	Roberto Yano Yazmin Arellano
"No Drugs Down the Drain"	The state has initiated a program to reduce pharmaceuticals entering the wastewater flows. There have been a number of pharmaceutical collection events within the region sponsored by law enforcement.	Greg Humora
Strength Based Billing Evaluation	San Diego will hire a consultant every three years to audit the Metro metered system to insure against billing errors.	Al Lau Dan Brogadir Karyn Keese
Grease Recycling	To reduce fats, oils, and grease (FOG) in the sewer systems, more and more restaurants are being required to collect and dispose of cooking grease. Companies exist that will collect the grease and turn it into energy.	Eric Minicilli
Point Loma Modified NPDES Permit	1/15: Permit was submitted. EPA has begun their review. 11/16 first possible date at the Regional Board for consideration. *12/16: First hearing of Permit Application held at San Diego Regional Board.*	Greg Humora Scott Tulloch Karyn Keese
Changes in water legislation	Metro TAC and the Board should monitor and report on proposed and new legislation or changes in existing legislation that impact wastewater conveyance, treatment, and disposal, including recycled water issues	Paula de Sousa Mills
Border Region	Impacts of sewer treatment and disposal along the international border should be monitored and reported to the Board. These issues would directly affect the South Bay plants on both sides of the border.	*New Board Members to be Appointed*


Sewer Rate Comparison in San Diego County
7 Unit Water Use and 3/4" Residential Meter
Projected sewer bill effective January 2017
$100
$90
$80
$70
$60
$50
$40
$30
$20
$10
$-
85.25
55.16
46.14
46.10
41.92
41.06
40.52
38.67
37.96
37.08
32.08
31.24
28.00
Del Mar
Padre Dam
Poway
Lemon Grove
Coronado,City
Imperial Beach
San Diego, City
La Mesa
Chula Vista
El Cajon
National City
Otay Water District
San Diego, County

Metro TAC
Participating Agencies
Selection Panel Rotation

Agency	Representative	Selection Panel	Date Assigned
Padre Dam	Neal Brown	IRWMP – Props 50 & 84 Funds	2006
El Cajon	Dennis Davies	Old Rose Canyon Trunk Sewer Relocation	9/12/2007
La Mesa	Greg Humora	As-Needed Piping and Mechanical	11/2007
National City	Joe Smith	MBC Additional Storage Silos	02/2008
Otay Water District	Rod Posada	As-Needed Biological Services 2009-2011	02/2008
Poway	Tom Howard	Feasibility Study for Bond Offerings	02/2008
County of San Diego	Dan Brogadir	Strategic Business Plan Updates	02/2008
Coronado	Scott Huth	Strategic Business Plan Updates	09/2008
Coronado	Scott Huth	As-needed Financial, HR, Training	09/2008
PBS&J	Karyn Keese	As-needed Financial, Alternate HR, Training	09/2008
Otay Water District	Rod Posada	Interviews for Bulkhead Project at the PLWTP	01/2009
Del Mar	David Scherer	Biosolids Project	2009
Padre Dam	Neal Brown	Regional Advisory Committee	09/2009
County of San Diego	Dan Brogadir	Large Dia. Pipeline Inspection/Assessment	10/2009
Chula Vista	Roberto Yano	Sewer Flow Monitoring Renewal Contract	12/2009
La Mesa	Greg Humora	Sewer Flow Monitoring Renewal Contract	12/2009
Poway	Tom Howard	Fire Alarm Panels Contract	12/2009
El Cajon	Dennis Davies	MBC Water System Improvements D/B	01/2010
Lemon Grove	Patrick Lund	RFP for Inventory Training	07/2010
National City	Joe Smith	Design/Build water replacement project	11/2010
Coronado	Scott Huth	Wastewater Plan update	01/2010
Otay Water District	Bob Kennedy	RFP Design of MBC Odor Control Upgrade/Wastewater Plan Update	02/2011
Del Mar	Eric Minicilli	Declined PS 2 Project	05/2011
Padre Dam	Al Lau	PS 2 Project	05/2011
County of San Diego	Dan Brogadir	RFP for As-Needed Biological Services Co.	05/2011
Chula Vista	Roberto Yano	North City Cogeneration Facility Expansion	07/2011
La Mesa	Greg Humora	confined space RFP selection panel	10/2011
Poway	Tom Howard	COSS's for both Water and WW	10/2011
El Cajon	Dennis Davies	Independent Accountant Financial Review & Analysis – All Funds	01/2012

Lemon Grove	Mike James	MBC Dewatering Centrifuges Replacement (Passed)	01/2012
National City	Joe Smith	MBC Dewatering Centrifuges Replacement (Passed)	01/2012
Coronado	Godby, Kim	MBC Dewatering Centrifuges Replacement (Passed)	01/2012
Otay Water District	Bob Kennedy	MBC Dewatering Centrifuges Replacement (Accepted)/Strategic Planning Rep	01/2012
Del Mar	Eric Minicilli	New As Need Engineering Contract	02/2012
Padre Dam	Al Lau	PA Rep. for RFQ for As Needed Design Build Services (Passed)	05/2012
County of San Diego	Dan Brogadir	PA Rep. for RFQ for As Needed Design Build Services (Cancelled project)	05/2012
Chula Vista	Roberto Yano	As-Needed Condition Assessment Contract (Accepted)	06/2012
La Mesa	Greg Humora	New programmatic wastewater facilities condition (Awaiting Response)	11/2012
Poway	Tom Howard	Optimization Review Study	01/2013
El Cajon	Dennis Davies	PUD 2015 Annual Strategic Plan	1/15/14
Lemon Grove	Mike James	As-Needed Engineering Services (Passed)	7/25/14
National City	Kuna Muthusamy	As-Needed Engineering Services	7/25/14
Coronado	Ed Walton	Strategic Planning	01/2014
Otay Water District	Bob Kennedy	Strategic Planning (Volunteered, participated last year)	01/2014
Del Mar	Eric Minicilli	Pure Water Program Manager Services	9/1/14
Padre Dam	Al Lau	Pure Water Program Manager Services	9/1/14
County of San Diego	Dan Brogadir	As-Needed Condition Assessment Contract	3/24/2015
Chula Vista	Roberto Yano	Out on Leave	6/10/15
La Mesa	Greg Humora	North City to San Vicente Advanced Water Purification Conveyance System	6/10/15
Poway	Mike Obermiller	Real Property Appraisal, Acquisition, and Relocation Assistance for the Public Utilities Department	11/30/15
El Cajon	Dennis Davies	PURE WATER RFP for Engineering Design Services	12/22/15
Lemon Grove	Mike James	PURE WATER RFP Engineering services to design the North City Water reclamation Plant and Influence conveyance project	03/16/15
National City	Kuna Muthusamy	Passes	04/04/2016
Coronado	Ed Walton	As-Needed Environmental Services - 2 Contracts	04/04/2016
Otay Water District	Bob Kennedy	As Needed Engineering Services Contract 1 & 2	04/11/2016
Del Mar	Eric Minicilli	Pure Water North City Public Art Project	08/05/2016
Padre Dam	Al Lau	Biosolids/Cogeneration Facility solicitation for Pure Water	08/24/2016
County of San Diego	Dan Brogadir	Pure Water North City Public Art Project	08/10/2016
Chula Vista	Roberto Yano	Design Metropolitan Biosolids Center (MBC) Improvements Pure Water Program	9/10/2016
La Mesa	Greg Humora	Design of Metropolitan Biosolids Center (MBC) Improvements	9/22/16
Poway	Mike Obermiller	Electrodialysis Reversal (EDR) System Maintenance	12/7/16
El Cajon	Dennis Davies		

Lemon Grove	Mike James		
National City	Kuna Muthusamy		
Coronado	Ed Walton		
Otay Water District	Bob Kennedy		
Del Mar	Eric Minicilli		
Padre Dam	Al Lau		
County of San Diego	Dan Brogadir		
Chula Vista	Roberto Yano		
La Mesa	Greg Humora		
Poway	Mike Obermiller		
El Cajon	Dennis Davies		
Lemon Grove	Mike James		
National City	Kuna Muthusamy		
Coronado	Ed Walton		

Attachment 12

Pt. Loma Permit Renewal Update

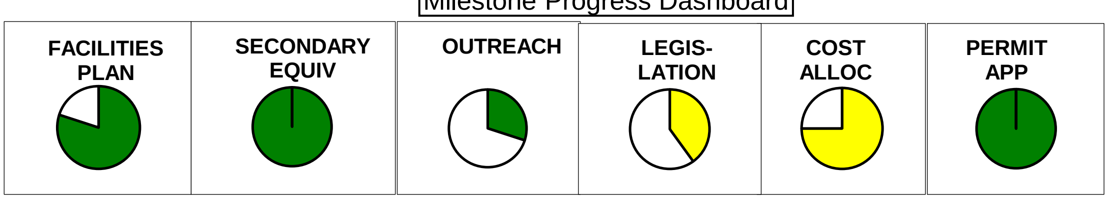
Metro Wastewater JPA

Point Loma Permit/Potable Reuse
KEY MILESTONE DATES

03/02/2017

DATE	TASK	FOLLOW UP ACTION/STATUS
2014	Begin outreach to regulators, legislators, key stakeholders and public	San Diego signed contract with Katz Assoc. 5/14
~~01/23/2014~~	San Diego meet with JPA on cost allocation. 1) Agree on methodology 2) Insert construction costs from facilities plan	San Diego to look at comparing PR facilities construction through secondary to secondary at Point Loma.
February	First draft of legislative language	Draft prepared
~~03/05/2014~~	San Diego (Ann, Brent, Bob, Allan) meet with EPA staff	Pure Water program was well received by EPA
~~10/08/2014~~	City of San Diego Environmental Committee	Consideration of Pt Loma Permit
~~10/16/2014~~	Metro Commission - VOTE on Supporting Permit	
~~11/18/2014~~	City of San Diego City Council Meeting	Consideration of Pt Loma Permit and Side Agreement. Passed 9-0
2015		
~~January~~	Submit NPDES Permit to the Environmental Protection Agency	Submitted! Regional Board expected to act on permit 9/16 or 11/16
	Prepare proposed language for admin fix to Clean Water Act	
	Be ready to provide lang for legislative fix to Clean Water Act	
~~05/20/2015~~	Present Phase 1 of cost allocation to Metro TAC	
~~06/04/2015~~	Metro JPA Strategic Planning Meeting at Pt Loma	
~~07/01/2015~~	Water Reliability Coalition Potable Reuse Media Training	
~~09/15/2015~~	City of San Diego City Council Request to set Prop 218 Public Hearing for water rate increase	218 Notice for water rates approved to be mailed out
~~09/17/2015~~	Letter received from EPA endorsing Pt Loma modified permit	
~~11/17/2015~~	City of San Diego Public Hearing for water rate increases	Water rate increases approved
2016		
~~09/21/2016~~	Pure Water Program EIR to Metro TAC	
~~09/21/2016~~	Pure Water Program Update to Metro TAC	
~~10/06/2016~~	Pure Water Program EIR to JPA	
~~10/06/2016~~	Pure Water Program Update to JPA	
~~10/19/2016~~	Pure Water Cost Allocation to Metro TAC	
~~11/08/2016~~	Election day	
~~12/14/2016~~	Pt Loma Permit Public Hearing at RWQCB	Comment Letter submitted requesting permit condition remain unchanged
2017		
	Political strategy for OPRA II approval in DC	
01/05/2017	Pure Water Cost Allocation to JPA	
02/10/2017	Revised Pt Loma Permit Issued with Pure Water construction milestones in 2022 (14 day comment period)	Comment letter submitted requesting continuance of public hearing
04/12/2017	Pt Loma Permit Second Public Hearing at RWQCB	
5/10-12/17	Coastal Commission Meeting in San Diego (supposed to have Pt Loma permit on agenda)	
05/17/2017	FY19-FY23 Sewer rates to Metro TAC	
	Begin drafting updated wastewater dispoal agreement	

Milestone Progress Dashboard



Amount of pie filled = % complete
Green = on schedule
Yellow = behind schedule
Red = late