

4 March 2005

Technical Memorandum No. 5

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Subject: Solids Handling System Objectives and Operations
MMWD Seawater Desalination Pilot Plant Program
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INTRODUCTION

Separate technical memoranda describe the preliminary performance objectives and operations for the different primary components of the MMWD Seawater Desalination Pilot Plant program. The Pilot Plant Program Technical Memoranda (TM) include:

- TM No. 1: Intake and Return Water System Objectives and Operations
- TM No. 2: MF/UF Filtration System Objectives and Operations
- TM No. 3: Conventional Treatment System Objectives and Operations
- TM No. 4: SWRO System Objectives and Operations
- TM No. 5: Solids Handling System Objectives and Operations
- TM No. 6: Water Quality Sampling and Analysis Program
- TM No. 7: Post Treatment System Objectives and Operations

This memorandum, TM-5, outlines the preliminary performance objectives and operations plan for the Solids Handling Systems for the MMWD Seawater Desalination Pilot Plant Program. Process and Instrumentation Diagrams (P&ID) P-7 shows a detailed schematic diagram of the pilot plant Solids Handling System.

SOLIDS HANDLING SYSTEM OBJECTIVES

The overall objectives for the Solids Handling System include:

- Capture and discharge pilot plant suspended solids to the sanitary sewer.
- Capture and discharge neutralized cleaning solutions to the sanitary sewer.
- Evaluate physical and chemical characteristics of the solids from the different processes.
- Evaluate suitability of solids for disposal at a common landfill (Redwood Landfill)
- Determine solids handling processes and operating parameters for a full-scale facility.

Technical Memorandum No. 5

4 March 2005

Page 2 of 4

SOLIDS HANDLING SYSTEM COMPONENTS

The Solids Handling System will capture all of the spent washwater and concentrated suspended solids produced by the strainer, MF/UF System and Conventional Treatment Systems and pump the spent washwater to the sanitary sewer at a controlled rate. The periodic CIP solution wastes will be neutralized and sent to the sanitary sewer via the Solids Handling System. The Solids Handling System includes:

- Spent Washwater Tank
- Sludge Sump and Pump
- Spent Washwater Return Pump
- Miscellaneous equipment and instrumentation

Spent Washwater Tank

The Spent Washwater Tank will capture the spent washwater and sludge from the pilot plant treatment systems for controlled discharge to the sanitary sewer. The tank will also periodically receive neutralized spent membrane system cleaning solutions for controlled discharge to the sanitary sewer.

The expected daily average spent washwater flowrate from the pilot plant once it has been optimized is 6 gpm. During the startup of the pretreatment systems, the daily average spent washwater flowrate could be as high as 9 gpm. The 4000-gallon tank will be able to receive the backwash from the granular media filters and will have a hydraulic detention time of approximately 11 hours.

Sludge Sump

Periodically, the settled solids from the clarifier will be manually, gravity discharged to a small sump containing a package submersible pump. The sump pump will operate automatically with a float switch to pump the sludge to the Spent Washwater Tank. The sump will also receive spent washwater from the intake strainer.

Spent Washwater Pump

The Spent Washwater Pump will be a stainless steel centrifugal pump controlled by level switches in the Spent Washwater Tank. The spent washwater will be pumped at a controlled rate into the sanitary sewer at the Marin Rod and Gun Club site and monitored with a flow meter.

Sewage from the Marin Rod and Gun Club is currently pumped through a 2-inch sewage force main approximately 1200 feet into a gravity manhole in the City of San Rafael collection system. Kennedy/Jenks proposes to discharge the spent washwater from the MMWD pilot plant into the 2-inch sewage force main approximately 800 feet from the discharge to the gravity system. The MMWD Pilot Plant spent washwater will cause an increased head on the existing Rod and Gun

Technical Memorandum No. 5

4 March 2005

Page 3 of 4

Club Sewage Pump. This is due to increased flow and consequently an increased friction head loss in the 800 feet of pipe. Kennedy/Jenks evaluated the Marin Rod and Gun Club System to confirm that this approach would not adversely impact the club's sewage pump.

The Rod and Gun Club has advised us that their sewage pump is a Gould's model 3887. Since, neither the motor HP nor the size of the impeller size was provided, we conservatively chose the smallest motor HP and impeller to calculate pump performance. We also assumed the wastewater flow based on that typically produced by a Country Club type facility, which is estimated at 100 gallons per member present per day (Metcalf & Eddy, *Wastewater Engineering*, 3rd edition, McGraw-Hill, New York, 1991).

Based on the characteristics of the pump and the system hydraulics for varying flow rates, Kennedy/Jenks calculated the capacity of the Rod and Gun Club pump under different pilot plant discharges. When the pilot plant is discharging at a maximum rate of approximately 10 gpm, the Rod and Gun Club pump would at 12.5 gpm or 18,000 gal/day, which corresponds to approximately 180 members using the club per day. When the pilot plant is discharging at a more typical rate of approximately 6 gpm, the Rod and Gun Club pump would at 15 gpm or 216,000 gal/day or 216 members using the club per day. The Rod and Gun Club does not typically have this many people using their facilities. Therefore, the addition of 6 gpm to 10 gpm of spent washwater to the Marin Rod & Gun Club 2-inch sewer force main should not adversely impact the ability of the sewage pump to discharge flows for the typical capacity of the club.

Kennedy/Jenks proposes to make a connection to the buried sewer force main near the pilot plant site as shown on the drawings.

PROPOSED SOLIDS HANDLING SYSTEM OPERATIONS PLAN

The following Solids Handling System operational parameters will be monitored and evaluated during the course of the pilot study:

- Spent Washwater Tank High-High Level – SCADA
- Spent washwater discharge flowrate – manual
- Spent washwater and solids characterization and quality analysis (see TM-6).

Preliminary Operations Plan

The Solids Handling System operations will be automatic. Flow from the spent washwater pump will be manually set at approximately 6 gpm to approximately match the average flows going into the Spent Washwater Tank. The pump will be controlled to stop at a low level in the Spent Washwater Tank and to start at a high level. The Pilot Plant SCADA system will alarm on Spent Washwater Tank high-high level. The intake pump will stop on Spent Washwater Tank high-high level to prevent pilot plant site flooding from a failure of the spent washwater pump.

Each of the spent washwater waste streams from the pilot units will be sampled independently, before the wastes are combined to permit characterization of the solids.

Technical Memorandum No. 5

4 March 2005

Page 4 of 4

The solids from the pretreatment systems will be characterized and evaluated to determine the solids handling and dewatering processes that will be required for a full scale facility and to confirm their suitability for disposal at a common landfill. A discussion of the characterization and analysis of the pilot plant solids is presented in Technical Memorandum 6.

TM No. 5 Document Review History:

1. Tom Pankratz and Todd Reynolds reviewed first Draft 11/5/04.
2. Joel Faller and Val Frenkel reviewed Final Draft 1/10/05.
3. Tom Pankratz reviewed Final Draft on 2/18/05.

cc: Joel Faller
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