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MEMORANDUM

DATE: October 24, 2009

TO: Kaori Torigai, Project Manager

FROM: John Brodie, P. Eng.

SUBJECT: Faro WTP – Structural & Process Modifications

Following upon our detailed review of the Faro WTP, the recommended changes are presented below. Some options for assessment of future improvements are presented at the end of this memo.

1. clean the lime slurry storage tanks and pump area. Assessment of tank wall thickness should be conducted. This project should also include inspection of the agitator blades, shaft, bearings and motors. It is understood that the best way conduct the cleaning is to install an access port at the base of each tank.
2. the inflow pipe from the Intermediate pond is HDPE up to a point about 50 m from the mixing box. At this point there is a section of steel pipe. This section is at risk of corrosion failure due to the acidity of the Int. Pond water. It should be replaced. The replacement should be coordinated with the modification of pumping systems to facilitate pumping from the Int. Pond to the Faro pit.
3. seal the wooden planks at the top of the rougher/scavengers in the line conditioning portion of the WTP. The easiest way to achieve this is likely to be some cleaning with a pressure washer followed by application of a "spray-on" type of rubber membrane. This work is needed so that the depth of water in the tanks can be increased, so as to facilitate higher through-put in the WTP. It is understood that this approach may not fully meet the requirements for higher through-put and welding of steel plates may be required in the future.
4. the rakes and shroud in the thickener need to be repaired and modified. The rakes should be removed and new ones installed. To the extent which is practical, the new rakes should be

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installed higher than the existing ones. This will require cutting the shroud to increase clearance, and probably modifying the means of attachment of the rake to the spindle.

5. the discharge from the thickener is via a single discharge point rather than via the perimeter launder. This arrangement results in short-circuiting of the flow and less than optimal settling of precipitate. The thickener discharge should be modified to allow radial discharge. This may require some repairs to the skirt in front of the radial launder.
6. the clarifier has settled on the west side. Seepage up-welling onto the floor of the WTP has occurred in this area. Further seepage in this area could lead to further settlement and eventual loss of the clarifier. Means to monitor this condition should be installed. It is expected that this will consist of: clean up of debris and tailings around the base of the clarifier, monitoring of seepage in the spring and excavation of channel in the floor to route the seepage to a drain and also allow visual monitoring of the seepage problem.
7. discharge from the splitter tank immediately U/S of the thickener/clarifier is uneven, with the majority of the flow (approx 75% based on pipe diameter) going into the smaller thickener. Through-put would be improved with flow in proportion to the tank areas balanced flow. If both tanks were performing equally, then the flow should be split 60% to the clarifier and 40% to the thickener. In consideration of the problems with the clarifier, a 50-50% split would be acceptable. This will require approximately doubling the flow to the clarifier.
8. There are 2 pipes of uncertain support suspended above the flocculent mixing area. These were identified in the Cotterall report. This situation should be addressed by either complete removal of the pipes, or cutting off the cantilever portion of the pipes and adding additional support brackets for the remaining pipes.
9. the discharge line from the clarifier and thickener may be experiencing a build-up of precipitate, which will impede discharge from the WTP and limit maximum through-put. The most likely place for build up is where the slope of the discharge pipeline steepens suddenly such as where it drops over the waste rock slope above the ETA and where it drops steeply through the ETA area. The pipe should be opened in these areas to allow an inspection. This can be done by simply cutting a hole in the top of the pipe (say 30 cm dia) and covering the hole with a bracket around the pipe.
10. A program of improved instrumentation and monitoring of the Faro and Vangorda water management systems is being developed. This will also include an assessment of monitoring

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and recording requirements for the Faro WTP. Installation of the new systems is expected to be complete by March 31, 2010.

Areas of study for further improvements include:

1. assessment of the system for delivery and off-loading of lime. It is understood that DES has initiated this work. A report summarizing findings and recommendations is pending.
2. a concern has been raised as to the efficiency of the lime slaking system and the resulting utilization of lime in the treatment reactions. Further assessment is needed.

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