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Kennecott Minerals

November 10, 1995

Mr. Tom Bauman
Industrial Wastewater Section
Wisconsin Department of Natural Resources
101 S. Webster Street, Box 7921
Madison, WI 53707

Dear Mr. Bauman:

RE: Conceptual Design of Pump Stations for Type I Settling Ponds

Flambeau Mining Company (Flambeau) has enlisted the services of Foth & Van Dyke to refine the design of the untreated and treated stormwater runoff handling from the Type I stockpile area. The refinement of the current design is necessary for two purposes:

1) To minimize standing water within the unlined perimeter ditches of the Type I stockpile area. Standing water within these ditches has the potential to infiltrate into the ground, migrate towards the open pit, and impact the stability of the north wall of the open pit.

2) To add operational control to the 002 discharge. While the current design of the settling ponds and original projections of treatability predict full compliance with WPDES permit requirements, Flambeau prefers to refine the Outfall 002 discharge line to allow the flexibility of directing stormwater contacting Type I wasterock to either the WWTP's Surge Pond, the open pit, or, if WPDES permit limits are met, the Flambeau River.

Mr. Bob Chiesa and Mr. Jim Hutchison, both with Foth & Van Dyke, have provided to Flambeau the conceptual design concerning the pump stations to be constructed to handle stormwater runoff from the Type I stockpile.

Flambeau is providing the attached Conceptual Design to the Department for your initial informal review. A detailed design including specifications and plan sheets will be submitted at a later date. We would prefer to address any of the Department's concerns or comments on the Conceptual Design previous to Flambeau's formal submittal to the Department for approval of the modifications in the handling of Type I stormwater runoff.

I will be in touch to arrange the best manner in which to answer your questions. We look forward to receiving your comments.

Sincerely,

Jana E. Murphy

Attachment

cc: Tom Myatt, Flambeau
John Barnes, Flambeau
Von Shanks, Flambeau
Larry Lynch, WDNR
Ken Markart, WDNR
Jim Hansen, WDNR
Bernice Dukerschein, Rusk Co.
Al Christianson, City of Ladysmith
T om Riegel, Town of Grant
Melvin Spencer, Rusk Co. Zoning
Paul Kent, DeWitt, Ross & Stevens
Jim Hutchison, Foth & Van Dyke (Green Bay)
Bob Chiesa, Foth & Van Dyke (Madison)

Foth & Van Dyke
engineers · architects · scientists

November 3, 1995

Ms. Jana Murphy
Supervisor of Environmental Affairs
Flambeau Mining Company
N4100 Highway 27
Ladysmith, WI 54848

Dear Ms. Murphy:

Re: Conceptual Design of Pump Stations for Type I Settling Ponds

This letter summarizes the conceptual design developed by Foth & Van Dyke concerning the pump stations to be constructed to handle stormwater runoff from the Type I stockpile at the Flambeau Mining Company (Flambeau) mine in Ladysmith, Wisconsin.

Introduction

At a meeting at Flambeau, on October 12, 1995, Foth & Van Dyke and Flambeau agreed on the need for two new pump stations. A settling pond influent pump station will collect stormwater runoff from the Type I stockpile drainage ditches and pump the stormwater to the two settling basins. This influent pump station will include two pumps. In addition, there will be a polymer feed system to feed polymer into the stormwater entering the settling basins. The purpose of polymer addition is for coagulation of the suspended solids in the stormwater to promote settling of suspended solids in the basins. The need for a pH adjustment as part of treatment is currently being evaluated. This activity was expected, and was generally described in both *Mine Permit Application* and the *Final Engineering Report for Wastewater Treatment Facilities.*

It is uncertain at this time whether the polymer addition (and pH adjustment) and settling in the basins will provide sufficient treatment to meet the WPDES effluent limits under all operating conditions. Therefore, during periods when the stormwater in the settling basins does not meet the WPDES permit effluent limits, a settling pond effluent pump station will be used to pump the water collected in both basins to the surge pond for treatment at Flambeau's water treatment plant. Existing piping presently conveys mine drainage water from the mine pit to the surge pond and another pipe, which is presently not being used, connects into this piping. It was agreed that the effluent pump station discharge piping can connect to the existing piping (located inside the pit perimeter) which is presently not being used, so the existing mine drainage water pump and the new effluent pump station pump will share the same piping to the surge pond. The head and capacity of the new effluent pump station pump will be different from that of the existing mine drainage water

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pump. Therefore, to avoid problems resulting from simultaneous operation of both pumps, it was agreed that Flambeau will establish procedures for the operation of these two pumps so that only one pump will be in operation at any time. It was also agreed that the effluent pump station will have only one pump. The effluent pump station will also include an overflow to the mine pit to handle flows during periods when the flow rate from the settling basins into the effluent pump station is greater than the pumping rate from the effluent pump station to the surge pond or when the effluent pump station pump is not in service. The effluent pump station will be located at the end of the existing piping from the settling basins near Outfall 002. It is noted that the existing corrugated metal pipe (CMP) is designed for unpressurized gravity flow from the settling basins. Flambeau decided that the existing CMP pipe should be used to convey the water from the settling basins to the pump station, and that if during operation the CMP was found to be unacceptable Flambeau would replace the CMP pipe with pressure pipe. It was also agreed that the piping associated with the settling pond effluent pump station would be designed to be drainable so that the water in the piping will not freeze during cold weather.

The following are descriptions of conceptual design and operation for the settling basin influent and effluent pump stations.

Type I Settling Pond Influent Pump Station

Foth & Van Dyke recommends that this pump station contain two pumps as follows:

- One pump in the range of 500-600 gallons per minute (gpm), which will be able to handle the runoff from smaller precipitation events.

- One pump in the range of 1,000-1,200 gpm, which will be able to handle the runoff from larger precipitation events.

For very large precipitation events, both pumps will be used with a combined capacity of 1,500-1,800 gpm. The combined capacity of these pumps will be able to handle approximately 2 to 2½ inches per day of runoff from the 40-acre Type I stockpile, and will fill one 3.5 million-gallon settling pond in approximately 1½ days. Assuming a 10-foot total dynamic head (TDH) will be required to pump the runoff into the settling ponds, the smaller pump would require a 5 HP motor and the larger pump a 10 HP motor. The pump head and motor horsepower requirements will need to be verified during detailed design of this pump station. Each pump will include a running time meter, which can be used to estimate the quantity of stormwater pumped by each pump.

The pump station will include a wet well and piping to convey runoff from the existing Type I stockpile drainage ditches into the wet well. Regrading of the ditches to allow

gravity flow into the wet well may be required, depending on the existing grades of the ditches and the location and depth of the wet well. This issue will be addressed during detailed design of the pump station.

New piping will be provided to connect from the discharge of the pumps to the existing settling basins influent splitter box, and from the end of the pond entrance piping to the bottom of each pond.

The pumps will be automatically controlled based on the water level at the pump station. The controls will operate as follows. As the water level in the pump station begins to rise, a high level switch will start the smaller pump. If the level continues to rise, a high-high level switch will automatically start the larger pump. When the level drops to a low level, a low level switch will automatically stop both pumps.

A polymer feed system will automatically feed polymer solution into the pump station discharge piping using a metering pump. Flambeau is presently performing bench-scale testing of polymers to identify the type of polymer and range of polymer dosages which will provide effective coagulation and settling of suspended solids in the settling ponds. Foth & Van Dyke will design the polymer feed system based on the results of these tests. The polymer feed system will include a coagulation control system to continuously sense the dosage of polymer needed for proper coagulation of the suspended solids in the storm water, and automatically control the metering pump capacity to maintain the proper dosage. A pH adjustment chemical may also be fed into the pump station discharge piping if treatability testing, presently being conducted by Flambeau, indicates that pH adjustment would be necessary to achieve the effluent limits for discharge to Outfall 002. A static mixer will be located in the discharge piping to mix the polymer (and pH adjustment chemical, if necessary) with the stormwater. The polymer solution, coagulation control system, the metering pump, and the automatic controls for the pump station will be located in a small building adjacent to the pump station. This building will be provided with heating, lighting, and ventilation.

Type I Settling Pond Effluent Pump Station

A hydraulic analysis of the existing piping from the settling ponds indicates that if the settling pond water level is at elevation 1127, the flow rate through the existing piping to the effluent pump station will be approximately 2,800 gpm if the maximum water level in the effluent pump station is set at elevation 1106. At the minimum pond water level of elevation 1114.5, the flow rate will be approximately 2,000 gpm. These flow rates will allow one settling pond to be emptied in approximately one day.

A hydraulic analysis of the piping from the new effluent pump station to the surge pond, using the existing piping, indicates that a flow rate of 1,000 gpm will be produced by a

pump with TDH of 115 ft, based on the effluent pump station minimum water level at elevation 1100.

Foth & Van Dyke recommends that the effluent pump station be designed based on the hydraulic analysis, and that a pump with a capacity of approximately 1,000 gpm at a TDH of approximately 115 feet should be used to pump the stormwater from the effluent pump station to the surge pond. This pump may require a 75 horsepower motor, depending on the efficiency of the pump selected. The pump motor horsepower will need to be verified during detailed design of the pump station.

Foth & Van Dyke also recommends that settling pond operating procedures be developed and implemented to limit the flow rate to the effluent pump station to the capacity of the effluent pump. However, because the flow rate into the effluent pump station can exceed the pumping rate of the effluent pump station, a pump station overflow to the mine pit will be provided to prevent flooding of the effluent pump station. The overflow will include an overflow weir and overflow piping, and will be designed to pass approximately 3,000 gpm. The overflow piping will extend down to the elevation of the mine pit sump to prevent water from accumulating on the mine pit benches.

A flow meter will be installed on the piping from the settling ponds to allow continuous totalizing, and recording of the flow from the settling ponds. The pump station will include a wet well with an overflow weir and an overflow, piping and manual valves, level instrumentation, the pump controls, and alarms.

The effluent pump station would be operated as follows. If the quality of the water in a settling pond meets the WPDES permit limits for Outfall 002, a lockable valve on the effluent pump station inlet would be closed and a lockable valve on the effluent pump station bypass would be opened. The water from the settling pond would then flow by gravity to Outfall 002. If the quality of the water in a settling pond does not meet the WPDES permit limits for Outfall 002, the lockable valve on the effluent pump station bypass would be closed and the lockable valve on the effluent pump station inlet would be opened, and the water from the settling pond would flow by gravity to the effluent pump station wet well. As the water level rises in the effluent pump station wet well, a high level switch will start the pump, and the water in the effluent pump station will be pumped to the surge pond. If the flow rate into the effluent pump station exceeds the pump capacity or the pump is not operating, the water level in the wet well will rise to a level above the overflow weir and flow over the weir into an overflow pipe, and then flow by gravity to the mine pit. A high-high level switch will be located in the wet well at the elevation of the bottom of the weir, and would initiate a high-high level alarm if the water level in the effluent pump station rose above the weir elevation. When the level in the sump drops to a low level, a low level switch will automatically stop the pump.

A drain at the bottom of the wet well will allow the effluent pump station to be drained to the mine pit. A low-point drain in the piping from the effluent pump station to the surge pond will allow this piping to be drained to the mine pit.

The pump station will be located in a small building. The building will be provided with heating, lighting, and ventilation. The high-high level alarm will include a horn inside the building and a flashing light mounted on the outside of the building.

Foth & Van Dyke understands that Flambeau desires to have the option for revising some of the stormwater as water for dust suppression. Therefore, the pump station will include a truck loading station to allow water tanker trucks to be filled with treated water from the settling basins. The truck loading station will include the piping, lockable valves, instrumentation, and controls needed to allow the water tanker truck drivers to control the truck filling operation from the loading station. The truck loading station piping will be drainable.

Conclusion

As requested by Flambeau at the October 12, 1995 meeting, Foth & Van Dyke is in the process of developing a detailed design of these two pump stations. Detailed design will be based on the conceptual design contained in this letter and will meet the general requirements of the Mine Permit.

Sincerely,

Foth & Van Dyke

Robert Chiesa, P.E.
Senior Wastewater Engineer

James B. Hutchison, P.E.
Project Manager

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