Cost Savings Result From Direct Discharge Treatment Plant

NIROP FRIDLEY

In October 1998, a milestone in environmental restoration was achieved at the Naval Industrial Reserve Ordnance Plant (NIROP) Fridley. The Phase II Groundwater Treatment Facility (GWTF) was completed and operations began. This system captures and removes groundwater contamination which could otherwise migrate off site to Anoka Park and ultimately to the Mississippi River. This system was constructed on schedule and features 24 hours per day, 7 days per week operation while meeting the conditions of all air and surface water discharge permits. Since groundwater capture system efficiency is being regularly evaluated, it may be determined that increased pumping to the treatment facility is necessary to prevent groundwater contamination from passing the capture system. The treatment plant was designed with excess capacity.

Project Summary

Under the SOUTHDIV RAC, Morrison Knudsen Corporation conducted the following construction activities from September 1997 through January 1999:

- Decommissioned the former Phase I GWTF, which would not be usable in the Phase II GWTF.
- Re-engineered the header pipe to optimize capacity.
- Installed new air stripping columns and associated feed and return piping.
- Designed and installed a polymer dosing system to prevent mineral hardness fouling of the process units.
- Installed new controls and monitoring system with improved operator interface and increased monitoring and alarm capabilities.

Regulatory Requirements/Community Involvement

Optimal project execution was promoted through beneficial working relationships with the state and federal regulatory agencies, local POTW oversight board, NIROP facilities personnel, and other partnering team members:

- While it was necessary to shut down the contaminated groundwater recovery wells during some phases of the construction, final downtime was weeks less than the most optimistic pre-construction estimates.
- Community and regulatory participation was promoted in facilitated partnering forums and in Restoration Advisory Boards (RAB) meetings. Attendants at these meetings participated in document reviews, fact sheet overviews, and status and update presentations.
- All project activities were coordinated with NIROP to ensure minimal impact to the plant's operational production status, existing environmental permits, waste management procedures, and other operational concerns.

Construction Challenges

Innovative approaches and flexibility in the field were required to address complex construction challenges:

- A new process water line would need to cross one of the facility's main parking lots. The lot in question was the contractor's main entrance. Rather than trench across this lot and thereby block access, a bore and jack method of installing the process line under the parking lot enabled traffic as usual.

Site/Location:	Naval Industrial Reserve Ordnance Plant, Operable Unit 1 Fridley, MN
Site Description:	Active site covering approximately 80 acres. Site is located 500 ft from the Mississippi River. Dissolved TCE and NAPLs found in Site groundwater.
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Technology:	Installation and operation of the Phase II Groundwater Treatment System including: extraction wells, treatment plant, and discharge piping.
Contaminant:	Trichloroethene (TCE) from various operations at NIROP Fridley
Action Levels:	MCLs. Prevent TCE from migrating into the Mississippi River and the Minneapolis/St. Paul drinking water supply wells.
Legal Driver:	Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). Site is listed on the US EPA Superfund National Priorities List. Minnesota Environmental Response and Liability Act (MERLA).
Decision Document:	CERCLA Record of Decision (ROD) signed September 28, 1990.

- Since Minneapolis can have some of the coldest winters in the contiguous U.S., process water lines and process equipment required suitable insulation, housing, or other protection against sub-zero temperatures.
- The groundwater recovery system extracts contaminated groundwater with high concentrations of iron and other dissolved minerals, which can rapidly foul process equipment. Two polymer-type additives were compared to see which sequestering agent would be most operationally effective and cost effective. Following plant operational start-up, both agents were run through the system to test fully operational performance.
- The performance of the GWTF had to be ensured through redundant instrumentation and fail-safe design. The discharge location of the GWTF into the Mississippi River is a half-mile upstream from the Minneapolis Water Works (MWW) which provides the drinking water supply to over half a million customers. The discharge from the GWTF meets the NPDES permit requirements. Even the polymer control system had to ensure that only a minor residual concentration of product entered the river, and that it would have no impact on the MWW treatment process.

Cost Avoidance Measures

The Navy took action to upgrade the existing Phase I GWTF into the Phase II GWTF because of the potential for the uncertain rate of escalation of Phase I costs:

- The Navy paid a fee to the local POTW, based on the gallons discharged, for the treatment of the Phase I GWTF wastewater. The Phase I GWTF operated only in a pretreatment capacity, and Phase I treatment was not adequate for discharge to local surface waters. Further, the rate of escalation of sewer fees was not known, so the Navy's annual costs would be beyond its control unless the Phase II GWTF was constructed.
- Even considering the Phase II plant's construction costs, the Navy projects 10-year savings of $2.7 million dollars. After 20 years, the projected savings increase to $9.7 million dollars. These costs include capital construction costs, annual operation and maintenance, and anti-scaling polymer addition.
- Recycling of as much of the Phase I GWTF equipment, piping, and treatment building area as possible were incorporated into the Phase II design.

Project Successes

Successful project execution was ensured through teamwork:

- Effective partnering enabled resolution of regulatory agency concerns by combining the necessary resources to resolve an issue in the same meeting room at the same time, with near proximity to the actual construction site.
- The project was completed ahead of schedule and within budget.

Lesson Learned

Experience gained while addressing construction challenges will provide added benefit to future projects:

- Mineral hardness fouling of process units can be controlled. By evaluation of the two anti-scale products during fully operational status, the Navy now has gained the knowledge of how to engineer-in the ability to operate a continuously online treatment system.
- The facility now knows that boring and jacking is an effective method to install system piping underground without the need for continuous open trenching.

Figure 1*: NIROP Fridley.*

Figure 2*: Conduit installation.*

Figure 3*: Foundation construction for building extension.*

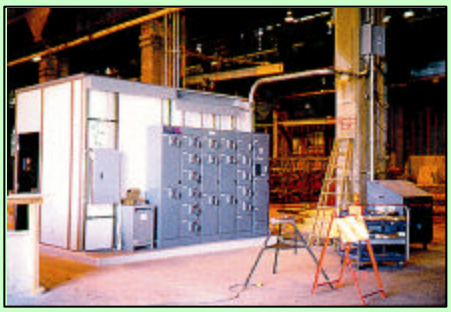

Figure 4*: Control room.*

Figure 5*: Completed ASU area.*