VOLUME 1 CHAPTER 9

9.0 CORRECTIVE ACTION PLAN FOR GROUNDWATER

Hazardous constituents were detected in ground water beneath the Idaho Falls Pole Yard during investigations performed for the RCRA Part B Permit Application (the "Application") submitted to EPA on December 27, 1984, and subsequently amended. A RCRA Part B Permit (the "Permit") was issued for the site on March 25, 1988 and then reapproved in November 2000. Corrective action has been performed in accordance with the Applications and permit, and significant progress has been made toward removing the mobile fraction of the dense nonaqueous phase liquid (DNAPL) creosote from the subsurface. Extensive activities have been performed and numerous documents have been submitted to the EPA and the State of Idaho which describe the site conditions and corrective actions taken to date. Updated RCRA groundwater protective standards for the site were recalculated in March of 2008 using the latest toxicity factors and are presented in Volume II Chapter 7 of this permit reapplication.

In 2009, PacifiCorp plans to automate the existing groundwater treatment system. The automated system will include the installation of pressure transducers in 26 on-site wells. The transducers will be in communication with a programmable logic controller (PLC). The pumps in each extraction well will be connected to a variable frequency drive (VFD) that is also in communication with the PLC. Upon completion of the system automations, a remote operator will be able to access the PLC through an electronic modem, take a snap shot reading of all pumping rates and the groundwater elevations, make evaluations of the capture zones for Aquifers 1 and 2, and then adjust the individual extraction rates as needed. Automated sensors connected to the PLC will also monitor the treatment process and report alarm conditions to the appropriate authorities and or governmental agencies. The PLC will be programmed to detect leaks in the system piping, overflow conditions in the system wet well, high pressure in the granular activated carbon vessels, and provide protection from fire through the use of smoke detectors. The PLC will automatically shut down the groundwater extraction pumps upon select alarm conditions. A general schematic of the automated treatment system is provided on Figure 9.1. Refer to Volume I Chapter 10 and Volume II Chapter 1 of this

permit reapplication for further details regarding the plant operation and proposed changes to the existing system.

In May of 2009 Pacificorp plans to install an additional point of compliance monitoring well (E-2) in Aquifer 2. This well will be located as shown on Figure 4.2 and will help define the down gradient extent of the creosote plume in Aquifer 2. Well E-2 will be positioned along the centerline of the projected plume in Aquifer 2 as shown on Figure 4-1C. It is proposed that well E-2 replace A-2 as an Aquifer 2 point of compliance and that it be sampled quarterly for the first year after installation and then annually thereafter.

In the future, Pacificorp will interpret all of the historical sampling results and hydrogeologic site information before determining when to petition the Idaho Department of Environmental Quality (IDEQ) for authorization to move from the corrective action monitoring program (CAMP) to the compliance monitoring program (CMP). Historically, all points of compliance except well A-2 have shown creosote constituent concentrations below RCRA groundwater protective standards. Even if well A-2 is no longer a point of compliance well, and two consecutive sampling events report creosote constituent concentrations below the RCRA groundwater protective standards, PacifiCorp will not petition IDEQ for permission to turn off the extraction pumps until:

- the plumes in Aquifers 1 and 2 are stable or shrinking and
- creosote concentrations at the points of compliance are below the RCRA groundwater protective standards.

PacifiCorp will not turn off the pumps or initiate the compliance monitoring program until IDEQ reviews their petition and sends back a letter authorizing the change in system operations and monitoring. The petition process will involve a thorough presentation of the site hydrogeologic conditions for each aquifer and fate and transport evaluations for each of the creosote constituents of concern.

9.1 FEASIBILITY OF ALTERNATIVE CORRECTIVE ACTIONS

9.1.1 General

Detection monitoring and assessment studies performed as part of the original RCRA investigations indicated the presence of hazardous constituents in ground water and within the bedrock fractures and voids. Therefore, a screening study was performed to evaluate the feasibility of alternative remedial responses that could be implemented to contain and/or remove existing contamination. Corrective action activities consisting of the removal of contaminated soils were immediately implemented after the leakage of creosote was discovered. Contaminated soils were excavated and removed to a depth of over 20 feet and the upper bedrock surface was removed. Further excavation of the solid basalt bedrock was found to be extremely difficult. Attempts were made to remove creosote by pumping from borings in the bedrock above the static water level, but were unsuccessful because virtually no creosote accumulated in the borings.

During early investigations, a screening study was performed to evaluate the feasible alternatives to effectively contain and/or remove contamination from the unsaturated and saturated bedrock zones. Two specific EPA guidance documents were utilized in performing the initial alternative remedial response evaluation. These were:

1. Methodology for Screening and Evaluation of Remedial Responses (EPA, 1984).
2. Handbook - Remedial Action at Waste Disposal Sites (EPA, 1982).

The initial screening consisted of an objective evaluation of all applicable remedial technologies. The results of this initial screening are summarized below in Section 9.1.2. Once feasible alternatives were developed, a detailed screening of those alternatives was performed. This evaluation is presented in Section 9.1.3 of the Application.

9.1.2 Initial Screening of Remedial Action Alternatives by Dames and Moore

The initial screening performed by Dames and Moore in the early 1980s included using Work Sheet 1 and Tables 3-3 through 3-11 in the EPA guidance document (EPA, 1984). All soil and waste that could reasonably be excavated was removed. Since ground water was approximately 110 to 140 feet below the ground surface, and the bedrock surface generally at a depth of 20 to 30 feet, it was concluded that the removal of the remaining contamination must utilize methods other than excavation.

Surface water could infiltrate through the upper gravels into the unsaturated bedrock zone, resulting in the possible leaching of creosote downward toward the saturated intervals. Capping of the surface minimized the potential for infiltration and directed runoff away from the contaminated area. A multi-layer cap with an asphalt surface was considered the best method to cover the leakage area and still provide good trafficability for the PacifiCorp hazardous waste management facility operations. This cap has been placed as discussed in Volume I Chapter 2 of this permit reapplication. Along with the construction of the cap, surface grading was performed to improve drainage of the site. Since that time, the entire site has been paved with asphalt as presented in Volume II Chapter 2 of this reapplication permit.

The removal and/or containment of creosote contamination in the bedrock both above and below the ground water was not considered to be feasible. It was recognized that the complete removal of creosote from the unsaturated bedrock zone would be extremely difficult due to the site geologic conditions, and any such attempt would presumably remove only a relatively small amount of creosote. The placement of containment barriers was evaluated as an alternative to complete removal. The only feasible type of containment barrier within the bedrock was a grout curtain. However, if a vertical grout curtain that circumferentially contained the contamination was installed, the creosote could still move vertically into the ground water and also downward through the ground water due to the heavier-than-water constituents. Thus, in addition to the vertical barrier, a horizontal bottom barrier would have to be placed. A horizontal seal or barrier would be very difficult to install and would be of questionable effectiveness because of the

discontinuous and highly variable and fractured nature of the lava flows, cinder beds and interflow zones that comprise bedrock at the site.

In situ treatments were evaluated by Dames and Moore with their preliminary conclusions being that none of the existing methods could be relied upon to effectively reduce the existing contamination in the ground water and within the unsaturated bedrock zone. Pumping of contaminated ground water was evaluated as a method of removing creosote contamination. However, impacts upon existing water rights, and the disposal of the contaminated ground water were considered significant problems. A solution to the problem of disposal of contaminated ground water is to provide chemical and/or physical treatment to remove hazardous components, dispose of these hazardous constituents at an approved facility, and discharge the treated water. It was determined that treatment could occur at an on-site facility and/or in the existing Idaho Falls wastewater treatment plant. Pumping the dilute ground water waste source through a treatment system concentrates the waste constituents and minimizes waste disposal requirements. Discharge of treated water could then be made to the Snake River, by land application or reinjection into the aquifer. Reinjection would minimize impacts upon existing ground water rights.

The alternative of pumping and treatment was selected as the most feasible remedial method to provide for control of existing contamination and more detailed studies were performed upon these treatment alternatives as discussed in the following sections.

9.1.3 Treatment Technology Screening

Pumping water from the extraction wells completed within the plume of creosote contaminated ground water required the development and implementation of a system to treat, concentrate, and minimize waste volumes and dispose of treated water. This system had to render the contaminated ground water fit for disposal and accomplish final disposal in such a way that human health and the environment were not endangered due to residual contaminants in the treated water.

An initial feasibility study of corrective action treatment alternatives was conducted to 1) determine one or more feasible programs for further development, and 2) identify

technical, economic, environmental, scheduling and institutional concerns that had to be addressed prior to corrective action program implementation. A range of contaminated ground water management approaches was considered, a treatment technology review was performed, and economic and institutional issue analyses were conducted for six selected technology options. The detailed results of these studies are contained in Appendix E. 1 of Addendum II in the 1998 Post Closure Care permit reapplication. For the two recommended treatment and discharge options, bench-scale treatability studies were performed (Appendix E. 2 of Addendum II in the 1998 Post Closure Care permit reapplication) to assess the need for, feasibility of, and process design criteria for the unit treatment processes recommended on a preliminary basis.

Contaminated ground water management options that were evaluated included:

1. Treatment and surface-water discharge
2. Treatment and reinjection
3. Evaporation
4. Discharge to the Idaho Falls municipal wastewater treatment plant
5. Land application

A treatment technology review was conducted in which alternative technologies were evaluated for each of four treatment steps expected to be necessary based on available ground water quality: primary separation, secondary separation, dissolved organics removal and final polishing (Figure 3-1, Appendix E-1 of Addendum II in the 1998 Post Closure Care permit reapplication). From a listing and evaluation of various unit processes potentially effective on the creosote contamination six potentially feasible alternatives were formulated (Figure 3-2, Appendix E. 1 of Addendum II in the 1998 Post Closure Care permit reapplication).

The six alternatives included:

1. API Gravity Separator; Flocculation - Dissolved Air Flotation; Activated Sludge - Powdered Activated Carbon Biological Treatment (PACT); Sand Filtration
2. API Gravity Separator; Flocculation - Sand Filtration; Granular Activated Carbon (GAC)
3. API Gravity Separator; Flocculation - Sand Filtration; Reverse Osmosis (RO); Granular Activated Carbon
4. API Gravity Separator; Flocculation - Dissolved Air Flotation; Aerated Lagoons; Settling Ponds
5. API Gravity Separator; Flocculation - Dissolved Air Flotation; Land Application; Runoff and Leachate Collection
6. API Gravity Separator; Flocculation - Dissolved Air Flotation; City Discharge

The first four alternatives were expected to provide a level of treatment adequate for surface water discharge (Snake River) or ground water reinjection. Alternative 5, employing the property-intensive land application process, would use ground water recharge and/or leachate/runoff evaporation for final disposal. In Alternative 6, partial onsite treatment would be supplemented by treatment in the Idaho Falls activated bio-filtration/activated sludge plant prior to Snake River discharge. Alternative 2 (GAC) and Alternative 6 (City Discharge) were selected for further evaluation based on treatment effectiveness, waste minimization, and economic considerations. These two alternative treatment methods were further evaluated by performing bench-scale treatability studies as presented in Section 9.1.4 below and in Appendix E.2 of Addendum II in the 1998 Post Closure Care permit reapplication.

9.1.4 Evaluation of Selected Ground Water Treatment Technologies

Bench-scale treatability studies were conducted on the selected treatment technologies using 30 gallons of bulk ground water samples collected from contaminated Well MW-9. The objectives of these studies were to evaluate the appropriateness of the selected technologies, determine treatment efficiencies and estimate design criteria for pilot or plant-scale treatment units. Details of the treatability studies are presented in Appendix E.2 of Addendum II in the 1998 Post Closure Care permit reapplication. A summary is presented in the following paragraphs.

Treatment processes investigated in the bench-scale treatability work included chemical addition, flocculation, filtration, and granular activated carbon adsorption. Analysis of these processes was conducted using the following creosote contamination indicator parameters:

- Naphthalene
- Phenanthrene
- Fluoranthene
- Pyrene
- Benzothiopene
- Total chromatographable organics

The bench-scale treatability studies showed that highly efficient treatment of creosote-contaminated ground water from the PacifiCorp hazardous waste management facility was potentially feasible using granular activated carbon adsorption. Filtration of the raw ground water substantially reduced PAH loading rate on the carbon, but chemical addition provided no apparent incremental improvement in treatment for the low levels of contamination and suspended solids studied.

9.1.5 Pilot Plant Studies

Treatment technology evaluation and bench-scale treatability tests indicated that adsorption using granular activated carbon was the most feasible treatment alternative. A pilot plant was constructed to investigate the following objectives:

- Determine the hydraulic and water quality responses of the aquifer to pumping;
- Measure changes in contaminant concentrations with pumping time, volume of water removed, and pumping rate.
- Further characterize the aquifer hydraulic properties within the contaminant plume.
- Determine effects of contaminant removal upon ground water quality elsewhere in the aquifer.
- Define design criteria for treatment of contaminated ground water in a full-scale treatment facility.
- Improve ground water quality by removing contaminants during the pilot plant operation.
- Develop a final plan for removal of the creosote contaminants from the aquifer.

See the July 1985 "Ground Water Treatment Pilot Plant Study Plan" (Appendix A of Addendum V in the 1998 Post Closure Care permit reapplication) for more information on the design and implementation of the pilot plant study. At the end of this initial study period (April 1986) the performance of the pilot plant was evaluated to see if the previously stated objectives were met and to determine if a full-scale treatment system could be designed based on the collected data. A report entitled "Ground Water Treatment Pilot Plant Study Report, (Appendix B of Addendum V in the 1998 Post Closure Care permit reapplication) was written and submitted to the U.S. EPA in June 1986. In summary, the report verified the general effectiveness of the selected ground

water treatment system consisting of an oil absorbing column followed by granular activated carbon treatment. The report also indicated, however, that there were further studies required prior to the design of the treatment process that would suffice for the corrective action program. The future studies fell into three general categories:

1. Characterization of the insoluble portion of the creosote oil that is produced during pumping.
2. Evaluation of pretreatment options to minimize the waste volume and increase the life of the absorptive media.
3. Evaluation of final treatment plant effluent disposal options.

A second report titled "Hydrologic Investigations and Design Recommendations" (Addendum IV in the 1998 Post Closure Care permit reapplication) was prepared by Dames & Moore as part of the pilot plant study. That report evaluated the ground water monitoring and pumping test data gathered during the study and, on the basis of that evaluation, recommended a well field design for the final corrective action plan.

In response to these recommendations, Utah Power implemented a second phase at the pilot plant study in an effort to complete the collection of information necessary to finally develop the post-closure corrective action plan for the Pole Yard. The objectives of this additional pilot plant work were discussed in the 1986 report "Ground Water Treatment Pilot Plant Study Plan Phase 2" (Appendix C of Addendum V in the 1998 Post Closure Care permit reapplication). In the Phase 2 study, Utah Power completed its design and evaluation, and finalized the treatment plant configuration that was used in the corrective action plan. A major result of the Phase 2 study was the removal of free creosote from the contaminated ground water by flotation and sedimentation. The flotation and sedimentation solids were thickened and dewatered to reduce their volumes. This minimized the waste volume produced by the treatment system during the initial years of treatment.

9.2 CORRECTIVE ACTION PLAN

9.2.1 Pumping System

9.2.1.1. Pumping Objectives

The overall goal of the well pumping system is to contain and recover creosote-contaminated ground water. Pumpage of the wells has removed contaminated water and a large part of the immiscible fraction of the creosote. Part of the immiscible fraction of the contaminant will remain coated on fractures or rock pores and will require time to solubilize and move toward the wells. Because of the fractured nature of the bedrock, effective porosity of the rock is relatively low and the quantity of contaminated water is relatively small. Continued pumpage will draw fresh water through the contaminated zone, thereby continuing to sweep the aquifer of creosote oils. As creosote concentrations decrease and as water is swept through rock, biodegradation will further aid removal of some of the creosote contaminants such as naphthalene. Creosote entering ground water from fractures above the static water level will gradually decrease because of the lack of a concentrated source of creosote and because leaching by precipitation entering the unsaturated zone is prevented by the impermeable cap.

Specific goals of the pumping system include the following:

1. Local reversal of hydraulic gradients in areas where creosote contaminated ground water is detectable in order to prevent off-site migration.
2. Local reversal of vertical hydraulic gradients from downward to upward.
3. Removal of creosote.

9.2.1.2. Current Wells And Equipment

In order to achieve these goals, a recovery well pumping system which includes recovery wells, monitoring wells and Point of Compliance wells, completed in Aquifer 1 and Aquifer 2, was designed and operated. Design recommendations were presented in detail

in "Hydrologic Investigations and Design Recommendations, Well Field For Creosote Recovery, Pole Treatment Yard, Idaho Falls, Idaho, for Utah Power & Light Company" (Dames & Moore, 1986a). The system has the capability to provide to the treatment plant combined flows of about 9 to 46 gallons per minute (gpm) from the Aquifer 1 wells (depending upon regional static water level conditions) and up to 150 gpm from the Aquifer 2 wells. The effectiveness of the system to date has been demonstrated in the semi-annual reports submitted to EPA and the State of Idaho.

The locations of Aquifer 1 wells and Aquifer 2 wells are shown on Figure 4.2. Tables 4.1 through 4.5 summarize information concerning all wells completed during the course of the program including five wells drilled offsite. Their selection was based on extensive hydrogeologic and water quality investigations conducted at the site as presented in the original application and subsequent investigations. Decommissioning of these wells will occur in accordance with the provision of Section 9.2.4.4.

The wells have been pumped with electric, submersible pumps. Pumped water has been piped to the treatment plant in above-grade pipelines with secondary containment. Details of the recovery pipeline construction with diagrams are provided on Figures 4.9 through 4.11. Water rights for pumpage of 200 gallons per minute from the site have been obtained.

The following wells have been closed, grouted shut and abandoned in accordance with requirements of the Idaho Department of Water Resources: MW-7 and MW-8.

9.2.1.3. Progress To Date

Reviews of ground water flow and progress towards meeting ground water protection standards are contained in the semi-annual/annual reports submitted to EPA and Idaho DEQ and have shown the following:

- Pumpage from the remediation system has been sufficient for capture of contaminated ground water for the dates evaluated,

- Carbon usage has dropped to the point where replacement is required only every four to five years, and
- Dissolved PAH constituent concentrations in Aquifer 2 point of compliance well A-2 remain above solubility limits and well above RCRA groundwater protective standards.

Reviews and the results of ground water modeling (Dames & Moore, April, 23, 1986) indicate that total pumpage rates of 9 to 45 gallons per minute (gpm) from Aquifer 1 (depending upon static water level) and 80 to 150 gpm from Aquifer 2 (depending upon ground water levels and the need to reverse *flow* from the area of well A-2) have been sufficient to contain contaminated ground water. Monitoring of wells down gradient of the Point of Compliance has shown no detectable PAH and phenols, indicating that pumping has been adequate to contain creosote contaminated ground water. Considerable improvements in the contaminant levels and distribution have occurred within the contaminated area in the Pole Yard as a result of the remediation activities, which now allows lower total pumping rates than in the past.

9.2.1.4. Description Of Aquifers

Aquifers at the site are formed within a sequence of basalt flows and interflow zones between the basalt flows. Aquifer 1 lies between the static water level and a dense basalt zone at a depth of about 160 ft. In the northern and eastern portions and western edge of the PacifiCorp hazardous waste management facility, Aquifer 1 is comprised of fractured basalt, cinders, and gravel. In the area of contamination, Aquifer 1 has a low permeability due to the low fracture density. Aquifer 2 is separated from Aquifer 1 by a very dense basalt *flow* which extends from 160 to 250 ft in depth. Aquifer 2 is an interflow zone characterized by the presence of cinders, broken rock and rubble, and fractured basalt. Aquifer 3 is separated from Aquifer 2 by a very dense basalt flow which extends from 270 to 370 ft in depth. Aquifer 3 is similarly characterized by cinders, broken rock and rubble, and fractured basalt.

Ground water levels vary seasonally and from year to year in response to irrigation and water supply practices, and long-term climatic and hydrologic conditions. The static water level lies at depths typically ranging from 110 to 140 ft below the ground surface under non-pumping conditions.

9.2.1.5. Aquifer And Well Capabilities

The transmissivities of Aquifer 1 are highly variable from area to area at the Pole Yard. In the northern and eastern parts of the yard and along the western edge of the yard, transmissivities are very high and individual wells are capable of producing over 1000 gallons per minute per foot of drawdown (gpm/ft) (See Table 4.6).

Creosote contamination has been encountered in the lower transmissive parts of the aquifer. In this part of the yard, the transmissivity of Aquifer 1, which is an unconfined aquifer, varies greatly with the static water elevation (seasonal water level fluctuations are typically on the order of 30 ft and are greater over the longer-term). With a drop in the static water level, the available drawdown in the aquifer also decreases. In addition, pumping of one well causes drawdown at other wells in the vicinity and further decreases the capacity of the aquifer to yield to wells. These factors make well yields (and aquifer flow rates) highly variable from season-to-season and year-to-year. Specific capacities of individual wells showing creosote contamination vary between 6 gpm/ft to less than 0.6 gpm/ft. Several wells in Aquifer 1 are completed in rock with so few fractures that the wells produce very little ground water; during the low water level conditions, some wells produce virtually no flow.

Aquifer 2 is hydrogeologically more uniform than Aquifer 1 and is not subject to variations in transmissivity due to water level fluctuations. However, ground water level changes affect the available drawdown in the Aquifer 2 wells and influence their yield rates. Measured specific capacities of Aquifer 2 recovery wells range from 0.5 to 12 gpm/ft.

Specific capacities of Aquifer 3 wells range from 100 to over 1200 gpm/ft. Aquifer 3 wells are not pumped for recovery. No contamination has been detected in Aquifer 3.

9.2.1.6. Pumping Strategy

The objectives of the pumping strategy are to remove creosote contaminants from the subsurface and to minimize the off-site migration of dissolved creosote constituents by maintaining a reversal of hydraulic gradient at the property boundary. The table below summarizes the permit requirements, current pumping plan, and the proposed modifications to the plan.

Permit Reference	Current Permit Requirements	Current Operations	Proposed Operations
Pumping Wells Aquifer 1 (Permit Reference I.V.B.)	R4,R5,R6,R11,R12,A1,B1, C1,D1,MW4	R6,A1,B1,and C1	Standard pumping wells R6,A1,B1,C1 Contingency wells capable of pumping R5,R11,R12
Pumping Wells Aquifer 2 (Permit Reference I.V.B)	R2,R7,R8,R9,R10,A2,B2, C2,D2,MW14	R2,R7,A2,MW9	Standard pumping wells R2,R7,A2, MW9 Contingency wells capable of pumping R8,R10,B2

Since there are no extraction wells located in the area of the primary release (the former creosote vat near boring BH-5), the pumping strategy is to intercept DNAPL and dissolved phase creosote as it migrates down gradient toward the property boundary.

The proposed strategy for Aquifer 1 is to pump from wells A-1, B-1, R6, and C-1. Wells R5, R11, and R12 would be designated as “contingency” wells and would be used for groundwater extraction as-needed to maintain hydraulic capture of the plume in Aquifer 1. In accordance with IDEQ requirements, wells R5, R11, or R12 would also be pumped any time there is an odor or sheen observed in the contingency well.

After completion of the proposed system automations in 2009, regular evaluations of the capture zone for Aquifer 1 will be possible via remote monitoring data and the optimal pumping scenario will be established for the site. Based on prior capture zone analyses for the site, the anticipated total extraction rates from Aquifer 1 are expected to range from 10 to 40 gallons per minute. Figure 9.2 presents the location of the proposed Aquifer 1 pumping wells in relation to historically documented creosote impacts.

With the presence of PAH constituents above solubility limits in well A-2 at the property boundary, pumping from wells R-2, R-7, A-2, and MW-9 is recommended for Aquifer 2. During the automation of the system in 2009, wells B-2, R-8, and R-10 will be designated as "contingency pumping wells" and will be capable of being added to the pumping program if needed to maintain hydraulic capture of the plume in Aquifer 2. In accordance with IDEQ requirements, wells B-2, R-8, and R-10 would also be pumped any time there is an odor or sheen observed in the contingency well.

Following completion of the system automations in 2009, pumping from various combinations of wells A-2, B-2, R-2, R-7, R-8, R-10, and MW-9 will be monitored and controlled remotely to maintain hydraulic capture of Aquifer 2. Based on prior capture zone analyses for the site, the total required extraction rates from Aquifer 2 are expected to range from 60 to 150 gallons per minute. Figure 9.3 presents the location of the proposed Aquifer 2 pumping wells in relation to historically documented creosote impacts.

It is not prudent to set specific pumping rates for wells at the site since individually and collectively ground water flow through the aquifers and well yields vary greatly from season to season and year to year. Pumping rates should be greater in high water seasons than in low water seasons. These variations are greatest in Aquifer 1.

The operator should be allowed flexibility in the above pumping strategy since aquifer and well performance in terms of yield and water quality change with time and season.

9.2.2 Groundwater Treatment Plant

Figure 4.11 shows the yard layout for the hazardous waste management facility, including the location of the treatment plant building, monitoring and recovery well locations and yard piping layout.

The treatment system, consisting of a flow measurement weir, settling operation, granular activated carbon adsorption systems, and a wet well is designed to treat ground water at a maximum supply rate of 200 gpm, 24 hours a day. The actual flow to the treatment plant will vary depending on which wells are being pumped.

Treated ground water will be discharged to the Snake River under NPDES Permit No [ID-G91-000]. Spent media will be regenerated or characterized and disposed of in accordance with federal and state regulations. Solidified sludges (if any) will be disposed at an approved hazardous waste landfill or incinerated at an approved hazardous waste incinerator facility. Details relating to the operations and monitoring of the treatment plant are provided in Volume I Chapter 10 of this permit reapplication.

9.2.3 Protection of the Site Cover

In compliance with 40 CFR 264.3 10, the entire site has been graded and paved with asphalt in order to promote drainage and minimize erosion or abrasion of the constructed site cover. This system prevents run-on and run-off from eroding or otherwise damaging the final cover.

The PacifiCorp hazardous waste management facility does not receive any run-on from adjacent areas. The railroad tracks that run on the west edge of the site prevent water from flowing onto the yard from the west. The area to the north slopes away from the hazardous waste management facility. This keeps water from the north from running onto the yard. The east and south sides of the site are adjacent to Leslie Avenue and 23rd Street, respectively. Each of these streets employ storm drainage systems that collect water, preventing it from running onto the PacifiCorp hazardous waste management facility.

PacifiCorp will operate and maintain the run-off management system for the length of the post-closure period.

Figure 9.4 and Volume II Chapter 2 provide topographic maps of the PacifiCorp hazardous waste management facility. Two catch basins in the yard collect storm water

runoff. Catch Basin No. 1 is located in the northeast corner of the yard and collects runoff from Area No. 1. Catch Basin No. 2 is located in the southeast corner of the yard and collects run-off from Area No. 2. Both catch basins drain to the City of Idaho Falls storm sewer system on Leslie Avenue. The pipe size from the catch basin is eight inches in diameter at a one percent slope.

9.2.4 Standby Operations and Decommissioning of Treatment Plant and Wells

9.2.4.1. Introduction

Following the authorization by IDEQ for Pacificorp to enter into the compliance monitoring phase of the RCRA process, the treatment plant will exist under three distinct states of readiness through the remainder of the post-closure period. These states of readiness (phases) are:

- Standby operations during compliance monitoring
- Standby operations during detection monitoring
- Decommissioning of the treatment plant

The following is a description of the state of readiness, the associated decontamination and removal activities, and timeframe for each phase.

9.2.4.2. Standby Operations During Compliance Monitoring

During compliance monitoring , the treatment plant will be shut down but be maintained in a high state of readiness.

Compliance monitoring will continue for a 3-year period. The treatment plant will remain in a high state of readiness to allow reactivation within 90 days of sample test results exceeding the Ground Water Protection Standard at a point of compliance. On a quarterly basis, the treatment plant will be reactivated and operated for several days to verify its

state of readiness. Treatment plant operation and testing will coincide with the quarterly compliance monitoring events.

The only contaminated material to be removed from the treatment plant during this phase will be the sludge accumulated in the backwash waste tank and concentrated through the gravity filter system. This waste material will be pumped into drums, manifested, and shipped to an approved hazardous waste disposal facility. No removal of equipment will occur during this phase. PacifiCorp will document in compliance monitoring reports the date at which no contaminant concentration above background is detected at the point of compliance. A following compliance report will document when the treatment plant has operated for one year without detection of contaminants above background levels at the point of compliance. This compliance report will document the start of standby operations during compliance monitoring.

The standby operations during compliance monitoring will last 3 years following the one year of continued operations without contaminant detection above background levels at the point of compliance. Reactivation of the treatment plant during this phase will occur within 90 days of a detected noncompliance condition as required by the Permit.

9.2.4.3. Standby Operations During Detection Monitoring

The standby operations during detection monitoring will occur following four years of compliance monitoring without detection of contaminants above background at the point of compliance. The treatment plant will be maintained in a lower state of readiness during this phase.

Major portions of the treatment plant such as tanks, piping, valves and filters will remain in place so that the treatment system can be reactivated within 180 days of detection of noncompliance conditions at the point of compliance. The components of the treatment plant will be operated semiannually during detection monitoring testing to verify their readiness to operate.

The only contaminated material to be removed from the treatment plant during this phase will be the sludge accumulated in the backwash waste tank and concentrated through the gravity filters during the semi-annual testing. The waste material will be pumped into drums, manifested and shipped to an approved hazardous waste disposal facility. Equipment such as lab equipment, pumps, and flow meters may be decontaminated and removed for use elsewhere by PacifiCorp.

PacifiCorp will report the date that detection monitoring begins. As equipment is removed from the treatment plant, the removal will also be documented in semiannual status reports. The operational reports documenting the operational readiness of remaining portions of the treatment plant will be prepared semiannually.

The standby operations during the detection monitoring will last until the end of the post-closure period.

9.2.4.4. Decommissioning of Treatment Plant and Wells

The total decommissioning of the treatment plant and wells will occur after the end of the detection monitoring period.

9.2.4.4.1. Treatment Plant

All contaminated materials will be removed and disposed of at a hazardous waste disposal facility. All liquids and sludges accumulated in the tanks and the filter media will be pumped or shoveled into drums, manifested, and shipped to an approved hazardous waste disposal facility.

All the piping will be disassembled, manifested, and shipped to an approved hazardous waste disposal facility.

Equipment such as tanks, valves, motors, flow measurement devices, and laboratory equipment will be emptied, cleaned with a solvent and wipe-tested. All materials generated in such cleanup will be disposed of at an approved hazardous waste disposal facility.

Following decontamination, the tanks will be removed from the building and either reused or disposed of as a solid waste.

Upon removal of the tanks and equipment within the treatment building, the concrete floor will be swept, washed and triple rinsed. Following this cleaning procedure, the floor will be chemically wipe tested. Cleaning of the floor will continue until a wipe test indicates that the floor can appropriately be characterized as non-hazardous waste. If the floor can not be characterized as non hazardous waste following the cleaning and rinsing activities, it will be broken up and disposed of at an approved hazardous waste disposal facility.

The total decommissioning procedures will be observed by a professional engineer. Upon completion the engineer will certify the decommissioning of the treatment plant in accordance with the process described above.

9.2.4.4.2. Wells

Monitor and recovery wells will be decommissioned and abandoned by first removing pump assemblies and discharge pipe. Pump assemblies and discharge pipe from wells that produced ground water with detectable levels of organic compounds associated with creosote will be handled as contaminated material as is described for the treatment plant. Pump assemblies and discharge pipe that did not produce ground water with detectable levels of organic compounds associated with creosote may be disposed of at a municipal landfill.

At the time of decommissioning of the corrective action facility and/or at the end of the post-closure period, monitor wells and recovery wells will be abandoned. Procedures for abandonment will, at a minimum, be in accordance with Rule 12.1 of the State of Idaho

Department of Water Resources Rules and Regulations for Well Construction Standards. Abandonment will proceed by tremieing from the bottom of the well to about 1-foot below surface grade a neat-cement, sand-cement or concrete grout inside the screen and inner casing. The casing will be cut off about 1-foot below grade. The surface will then be filled with base-course backfill and/or asphalt patching, leaving the surface in a condition similar to the surrounding area.

9.3 COST ESTIMATE

An estimate of the future post-closure cost is provided in Volume II Chapter 9 Section 9.1 of this permit reapplication.

9.4 ANNUAL REPORTING

Annual reports will be prepared and submitted to the state and U.S. EPA as required by the Permit.

9.5 REFERENCES

Utah Power & Light Company, Part B Permit Application For Hazardous Waste Management Facility, Pole Treatment Yard, Idaho Falls, Idaho, dated December 27, 1984.

Dames & Moore, report dated April 23, 1986, Hydrologic Investigations and Design Recommendations, Well Field for Creosote Recovery, Pole Treatment Yard, Idaho Falls, Idaho, For Utah Power & Light.

Dames & Moore, report dated December 2, 1988, entitled: As-Built Drawings, Well and Piping System, Pole Treatment Yard, Idaho Falls Idaho, For Utah Power & Light Company.

Ecova Corporation, 1995, Response to OPB Concerns, Idaho Falls Pole Yard, EPA ID No. IDD000602631, report dated March 28, 1995.

PacifiCorp/Utah Power, Idaho Falls Pole Yard RCRA Post Closure Semi-annual Report For October 1993 Through March 1994

PacifiCorp/Utah Power, Idaho Falls Pole Yard RCRA Post Closure Semi-annual Report For April 1994 Through September 1994

PacifiCorp/Utah Power, Idaho Falls Pole Yard Appendix IX Analytical Reports, August 1994

Ground Water Flow Evaluation Reports:

Dames & Moore, report dated March 18, 1988: Covers date 12-31-87.

Dames & Moore, report dated March 2, 1989: Covers date 1-26-89.

Dames & Moore, report dated March 7, 1989: Covers dates 3-30-88, 6-30-88, 9-30-88. Dames & Moore, report dated June 5, 1990: Covers dates 5-22-90.

Dames & Moore, report dated January 16, 1991: Covers dates 5-23-90, 8-1-90, 10-10-90. Dames & Moore, report dated July 3, 1991: Covers dates 11-13-90, 1-11-91, 3-11-91.

GeoWest Golden, Inc., report dated July 9, 1992: Covers dates 1-6-92, 3-25-92.

GeoWest Golden, Inc., report dated January 26, 1993: Covers dates 8-18-92, 10-29-92.

GeoWest Golden, Inc., report dated May 17, 1993: Covers dates 6-23-92, 8-18-92, 10-29-92, 3-23-93.

GeoWest Golden, Inc., report dated November 22, 1993: Covers dates 6-24-93, 9-20-93.

GeoWest Golden, Inc., report dated May 2, 1994: Covers dates 12-20-93, 3-15-94.

Ecova Corporation, report dated January 30, 1995: Covers dates 6-20-94, 8-16-94.

Ecova Corporation, report dated May 30, 1995: Covers dates 11-1-94, 3-29-95.

VOLUME 1 CHAPTER 10

10.0 GROUNDWATER TREATMENT PLAN OPERATION AND MAINTENANCE MANUAL

10.1 INTRODUCTION

10.1.1 General

In 1983, Utah Power & Light (UP&L) discovered that creosote was leaking from their pole treatment facility located in Idaho Falls, Idaho as shown in Figure 1.1. They immediately began corrective action including the excavation of contaminated gravel from below the leak area. After contaminants were removed from the site to the extent possible by excavation, further investigation revealed that the unsaturated bedrock and the bedrock aquifer below the leak area were also contaminated with creosote constituents. The Environmental Protection Agency (EPA) determined that the site constituted a Hazardous Waste Management Facility and that it must be closed under existing federal Resource Conservation and Recovery Act (RCRA) regulations. In compliance with these regulations, a groundwater monitoring system was installed to monitor creosote contaminants in the groundwater at the facility. Since some contamination was detected, a plan for cleanup of the aquifer was necessary. Findings obtained from this groundwater monitoring study were reported in UP&L's RCRA Part B Application submitted to EPA on December 31, 1984.

A pumping program for six onsite wells was initiated to characterize groundwater quality and to determine the aquifer's response to pumping. The extracted groundwater was treated in the Phase 1 pilot plant that operated for a 6-month period (October 29, 1985 to April 29, 1986). This pilot plant had a design capacity of 100 gallons per minute. The Phase 1 pilot plant provided design data that could be used in subsequent pilot testing as well as for a full-scale treatment facility. The Phase I pilot plant results are described in "Groundwater Treatment Pilot Plant Report" (CH2M HILL, June 1986).

Based on the results of the Phase I testing, a number of design changes were recommended. These recommendations included the following:

- Use of black steel in place of PVC in yard and plant piping materials. PVC materials have a tendency to become brittle and rupture after exposure to creosote contaminants.
- Need of a pretreatment process to reduce influent concentration of insoluble oils and to remove creosote slugs. This prevents overloads in the oil absorption column (OAC).
- Use of hydraulic weirs to measure untreated groundwater flows into the treatment plant. Paddlewheel flow sensors and nonresettable totalizer indicator flow meters are satisfactory only for use after OAC treatment.
- Use of a pressure-sensing safety system to shut down the plant in the case of high or low pressure in the yard and plant piping and a mechanical system to sense high water levels within the treatment plant building.
- Use of an inside drums storage area. This will eliminate potential problems associated with winter storage of generated wastes.
- Use of 6-inch diameter casing in onsite wells. This aids the circulation of cooling water around the pumps and facilitates pump installation and removal. Larger pump screen sizes should be used to prevent caking of these screens with creosote.

The Phase 2 pilot plant included most of these design changes. The Phase 2 pilot plant had a design capacity of 200 gpm and was fed by eight wells.

This 2008 RCRA permit reapplication includes a description of proposed system automations. The 1998 permit reapplication by Dames and Moore documented the existing full scale system. Much of the 1998 operation manual is recreated in this permit reapplication with new and modified sections provided to describe the proposed system automations. The automated system will continue to treat 200 gpm of groundwater.

Fourteen extraction pumps will have adjustable flow rates that are specified by the operator and maintained by computerized speed controllers. The wet well pump operation inside the treatment building and other monitoring devices will also be controlled by the central programmable logic controller (PLC). The PLC controller will communicate with a supervisory control and data acquisition, SCADA, computer. The SCADA computer provides an operator interface, manages alarms with operator notifications, and archives data for report generation. Figure 10.1 illustrates the computer hardware components of the system automation. The automated system will be monitored multiple times per week by the HWMF Manager or designated representative. The on-site Environmental Technician will also check the status of the automated system during weekly site visits. Alarm conditions which occur when the Environmental Technician is not on-site will be addressed by the automated system according to their severity and an auto-dialer will notify the appropriate emergency response personnel where appropriate.

As groundwater enters the treatment plant building from the recovery wells, it currently enters the weir box on the platform where the flow rates are manually recorded. The system automation will replace the weir box with electronic flow measurement, provide improved process control at the wet well, and establish computerized management of data for facility alarms and report generation. The circular clarifier will continue to be used to provide equalization of the groundwater and gives the ability to observe any sheen that might occur on the water surface. Originally the suspended solids in the groundwater required flocculation with polymer addition although improved water clarity has eliminated the need for chemical addition. Also the groundwater solids and creosote sludge previously deposited in the clarifier required disposal using the sludge dewatering system but this operation is no longer necessary. Currently, level switches control the wet well pumps but they will be replaced by continuous level monitoring. In the original system insoluble oil compounds were removed with two oil absorption columns although over time the groundwater quality has improved and granular activated carbon, GAC, is used in place of the oil adsorption media. Increasing pressure drops across the adsorption media no longer occur and thus backwashing operations with the backwash storage and waste tanks is performed less infrequently.

The chapter describes the treatment plant program, including the program objectives, description of the plant facilities, facility operation, monitoring plan, sampling and analysis plan, and general and emergency safety procedures. It has been written to provide the plant operators with a simple reference manual describing the complete plant operation procedures.

Recovery wells supply the treatment plant with groundwater at a maximum design rate of 200 gpm. The treatment system is designed to operate 24 hours a day during normal operation. This allows for groundwater characterization, as well as improves groundwater quality. The actual flow to the plant varies depending on which wells are being pumped.

Figure 4.11 shows the facility layout, including the location of the treatment plant building, monitoring and recovery well locations, and yard-piping. Treated groundwater is discharged to the Snake River by authority of NPDES Permit No. ID-002656-5.

10.1.1.1. Hazardous Waste Management Facility

Groundwater that will be pumped out of the ground and into the treatment plant building may contain hazardous constituents. Safety precautions must be practiced at all times during plant operation.

Under no circumstances are persons onsite to be without required safety gear as in HSAP.

10.1.1.2. Project Description

The objectives of the treatment plant are to:

- Contain the contaminant on site.
- Determine the hydraulic and water quality response in the aquifer to pumping.
- Identify the frequency, volume, and characteristics of insoluble creosote oil produced by the aquifer in response to pumping.

- Improve groundwater quality by removing contaminants during the plant operation.

10.1.2 Operation Plan

10.1.2.1. Introduction

This section of the report describes in detail the operation of the treatment plant. It is intended to be used as a reference section for the plant operator and contains all of the necessary information for operations. Before operating any equipment, the operator will read the information provided in this manual. All equipment referenced in this manual is summarized in the Equipment Information Manual. Please refer to Figure 10.2 during discussions on proper valving.

10.1.2.2. Wells and Pumps

Submersible pumps have been installed in all twenty-six onsite monitoring and recovery wells. Pump specifications, installation, anticipated production, and specific capacity data for both onsite and offsite wells are summarized in Table 4.6. This data will be useful in evaluating when maintenance is required for individual wells and pumps. Fourteen of these pumps are identified in the table for continued groundwater extraction.

Criteria used to select the extraction pumps include the following:

1. Suitability of performance characteristics to specific capacity of well and pumping rate required as part of the recovery well pumping system.
2. High reliability, low maintenance, and long expected lifetime.

Because these submersible pumps are water-cooled and lubricated, routine maintenance is not required. However, experience to date at the Hazardous Waste Management Facility, HWMF, indicates that malfunctions do occur that require a trained technician to remove and service pumps. The objective of this section is to provide the operator with

procedures and information to help distinguish pump malfunctions from changes in yield due to seasonal variations of the water table.

Specific Capacity Testing

Expected yields were estimated by conducting specific capacity tests, a technique that is also useful as a trouble-shooting method to distinguish changes in pump performance from changes in well performance. Specific capacity is defined as yield per unit drawdown and is indicative of both the transmissivity of the aquifer in the immediate vicinity of the well and the efficiency of the well. A specific capacity test is typically conducted by first measuring the static water level (nonpumping water level). The pump is then turned on, and the pumping rate and water level in the pumping well are both measured at regular intervals until drawdown stabilizes (drawdown = pumping water level - static water level). Note that the pumping rate is held constant. Specific capacity is then calculated by dividing the pumping rate by the observed drawdown depth. Results of specific capacity tests of individual wells are listed in Table 4.6.

Specific capacities of wells completed in Aquifer 1 have been observed to change as a function of the water level in the aquifer. Water level elevations in Aquifers 1, 2, and 3 fluctuate in an annual cycle that has an amplitude of about 20 to 25 feet. Water level elevations are highest during mid-October and lowest during late May. Specific capacities are smaller in Aquifer 1 during the low water season than during the high water season because of the reduced saturated thicknesses and corresponding reduction in transmissivities.

Specific capacity of wells completed in Aquifer 2 do not change with seasonal water level fluctuations because the aquifer is semiconfined and the primary flow interval found between the depths of 250 and 270 feet bgs does not become dewatered. The seasonal water level fluctuations, however, do change the yield of the pumps in Aquifer 2 (and Aquifer 1) because of the change in total pumping head.

After the system is automated in 2009, specific capacity tests will be conducted annually on seven wells (Aquifer 1: A-1, C-1, R-6 and Aquifer 2: A-2, R-2, R-7, MW-9). These tests will be performed during the high water level season (September-October). If additional data is needed to assess whether a well or the surrounding formation has become biofouled or clogged with sediment, a specific capacity test will be run remotely by manipulating the pumping rate and observing the corresponding change in drawdown. These data will then be interpreted in comparison to historical trends.

Data associated with the annual specific capacity field tests, will be recorded on Form 4.3. Because the specific capacity of each recovery well is likely to be diminished by interference from nearby wells in the pumping system, each specific capacity test will be conducted under "normal circumstances"; that is, when the other wells in the system are being pumped. Once the treatment system automations have been completed, specific capacity testing would be performed by first recording the pumping rate and corresponding drawdown at the well. The pump would then be turned off and the rebound of water levels recorded using the dedicated pressure transducers and the onsite PLC system. Select hand measurements of groundwater elevations would be taken to confirm the pressure transducer data. Following recovery of groundwater elevations to approximate static water level conditions, the pump would be restarted and then pumped at rates of approximately 30 and then 60 percent of the targeted flow rate. During each step of the specific capacity test, water levels would be allowed to begin to approach steady state conditions before advancing to a higher flow rate. As a general rule, changes in water level equal to or less than 0.05 foot per minute would be considered a reasonable threshold to achieve before adjusting the pumping rate. Professional judgment will be used if and when this threshold can not be reached.

Pump Selection

Before the extraction well pumps were selected, extensive aquifer testing and computer modeling were conducted. This was done to estimate what each recovery well would

yield and determine the pumping rate from that well that would help achieve one or more of the design goals. These goals can be summarized as follows:

- Local reversal of horizontal hydraulic gradients in areas where creosote compounds are detectable in the groundwater to prevent off-site migration of contaminated groundwater.

- Local reversal of vertical hydraulic gradients from downward to upward.

- Removal of creosote.

Once the specific capacity of each recovery well was established, a pump was selected and a pumping rate estimated that would help achieve one or more of the design goals without exceeding the specific capacity of the well. When pumping water at a rate that exceeds the specific capacity, the water level in the well will be drawn down to the intake of the pump, allowing air to contact and enter the pump. When a submersible pump is allowed to pump air it can heat up, causing damage to the motor. Pumps with the appropriate water yielding characteristics were selected by inspecting and comparing rating curves.

Discharge rate, plotted against total dynamic head for each of the pumps installed at the HWMF is included in the "Pumps" section of the Equipment Information Manual. Note on the pump rating curves that the pumping rate decreases as the total dynamic head increases. Total dynamic head is equal to the sum of the total pressure lift against which the pump is operating and the total friction loss. Friction loss is caused by pipe, fittings, valves, etc. and can be estimated using standard tables. Total lift can be calculated from the difference between the water level elevation in the well and the elevation of the discharge point of the piping.

The extraction well pumps were selected because their rating curve covers the required total dynamic head variations within a reasonable efficiency range. Since total lift increases as the water level elevations become lower during the annual cycle, the water yielding capacity of the pumps decreases. Pumps that have flat pump rating curves for the

desired pumping rate were selected for recovery wells that have constant specific capacities, such as Aquifer 2 wells. Pumps with relatively steep pump curves were selected for recovery wells that exhibit significant seasonal variation in specific capacities.

Pump Installation

All the pumps listed in Table 4.6 were installed by trained submersible pump technicians. Any change of pumps, discharge pipe, pump settings, etc. will also be made by trained pump technicians. Note that this table includes motor size, voltage requirements, discharge pipe diameter and material, and approximate pump settings as of March 2008. Data for some of the wells will change as pumps are replaced, switched, moved, taken off-line, etc. It is imperative that the operator maintain an up-to-date version of the above information that always represents the current pump model number, voltage requirement, pump setting, etc. Up-to-date information will help prevent misdiagnosis of malfunctions and accidental damage to pumps.

Pump Operation

Proper operation of the pumps in the extraction wells includes, but is not limited to, the following:

1. Maintaining discharge rate that will achieve the design goals of the extraction well system.
2. Maintaining up-to-date versions of Pump Installation and Well Capacity Data as shown in Table 4.6.
3. Maintaining up-to-date versions of SCADA Computer set points as shown in Table 10.1.
4. Maintaining a discharge rate for each pump that does not cause the water level in the well to be drawn down to the pump.

5. Recognizing pump malfunctions when they occur and distinguishing them from seasonal changes in the aquifer transmissivity and/or changes in well efficiency.

6. The automated groundwater extraction system accomplishes these tasks with the operator's input of a flow setpoint for each extraction pump. The PLC computer will adjust the speed of each pump in order to achieve the specific pump's flow setpoint. The values chosen for the setpoints must satisfy the above requirements.

Table 4.6 lists anticipated maximum pumping rates for extraction well pumps and for other installed monitoring well pumps not included in the pumping strategy. Table 10.1 lists the flow and/or level setpoints for individual groundwater extraction pumps.

10.1.2.3. General Description of the Treatment Plant

Normal operation consists of pumping the well water from outside well locations into the treatment building. The extraction wells are individually piped into the building. Flowmeters on these individual pipelines permits flow control by means of variable frequency drive (VFD) adjustment. The flows are combined into a common header that goes into the pre-treatment clarifier. The clarifier effluent flows by gravity to the wet well/pump station. Next, the water is pumped from the wet well to granular activated carbon (GAC) adsorption columns. After the GAC columns the temperature, pH, and flowrate are measured before discharging to the Snake River. Organic polyaromatic hydrocarbons (PAH) samples are collected manually. These details will be discussed in the order they occur in the flow stream during normal operation.

The automated system measures the individual fourteen extraction pump flowrates with in-line electronic flowmeters. The flow measurement signals are wired to the PLC. If a given extraction pump's measured flowrate differs from the operator's setpoint for that pump then the PLC will adjust the pump's speed. The speed for each of the extraction pumps is adjusted in order to bring about flowrates that match operator inputted setpoints.

The flow meters are installed on the extraction pump discharge piping after it enters the building. They are followed by a check valve to prevent reverse flow from the pressurized manifold downstream. Isolation ball valves permit maintenance of either the flow meter or check valve. The flow from each well is then combined into a common header pipe that feeds the clarifier.

The initial step in the treatment process is a clarifier tank for separation of the heavy and light fractions in the groundwater. The clarifier effluent flows by gravity into a wet well with submerged pumps. If necessary the clarifier effluent flow will be stopped with an automatic valve on the clarifier discharge pipe to prevent the wet well from overflowing. GAC column adsorptions follow the wet well pumps. Two lead GAC columns operate in parallel followed by three lag GAC columns in parallel. The GAC removes the organic contaminants from the extracted groundwater.

Under the pressure of the wet well pumps the groundwater passes through the GAC adsorbers and flows in a pipeline to the Snake River. Before exiting the facility analytical devices measure process conditions and these records are used for environmental reporting.

The GAC columns are backwashed every one to two weeks and have the carbon replaced after approximately five years of service. The automated system provides continuous pressure measurement at the GAC inlet and outlet piping. The PLC receiving this information will record an increase in GAC column differential pressure and will notify operations of any problem causing excessive pressure drop across the GAC.

If a backwash is required the backwash storage tank acts as a water reservoir to supply clean water for backwashing. During backwashing, spent backwash water will be stored in the backwash waste tank. In this tank, the water will be allowed time for the solids to settle. The decanted water will overflow to the floor sump where it will be recycled as influent to the treatment plant.

In the event that clarifier solids result in the process they are thickened in a gravity filter system. If necessary thickened sludge is shipped to an approved hazardous waste disposal facility. Filtrate from the process is piped to the wet well/pump station for recycling through the treatment process.

Figure 9.1 shows the treatment process mechanical pipe and control scheme, and Figure 10.3 provides a plan drawing of the treatment plant building. Table 10.2 provides a comprehensive list of tag numbers and PLC input/output points. See Section 10.1.2 of this report for further details.

10.1.2.4. Plant Design Criteria

Treatment plant unit sizes, plant design criteria, and design factors are presented in Table 10.3.

Sludge Dewatering

When the sludge level builds up to the second sludge tap on the side of the pretreatment tank, sludge must be removed and dewatered. When the sludge is piped to the dewatering bed, water is released through the filter media without the creosote compounds.

Groundwater Extraction System Depth Measurement

There are presently 39 wells located on-site and 5 off-site. During the system upgrade, twenty six of these forty four wells will be enhanced to provide remote monitoring of water level elevations. There are 12 monitoring wells and 14 extraction wells in the existing system. The extraction and monitoring wells are equipped with submersible pumps capable of transferring water from the wells to the groundwater treatment system located in a dedicated building on the site. Each monitoring well and extraction well will be equipped with a submersible pressure transducer that measures the total pressure of fluids over the device and provides a signal that can be converted into water level, water depth, true elevation or any scaleable measurement. The signal from each transducer will

be fed into a data logger that reads the continuous output and stores the data for each well at a frequency and in a format selected by the operator.

A barometric probe will be connected to the data logger located within the equipment shed. The baroprobe will continuously record atmospheric pressure and then send a signal to the data logger for storage. The data logger will input the data from the transducers (adjusted using the baroprobe readings) to the SCADA Computer for storage and integration into graphical displays and input to the pump operating controls. Level input from the wells will provide the operator with real-time water levels in each well without having to manually collect the data from each well using a water level indicator. The depth data will be stored in the SCADA Computer and used for determining the effects on the potentiometric surfaces in Aquifers 1 and 2 resulting from pumping water out of the wells.

The water level signal on the SCADA Computer can be used to control the pumps if the operator chooses to do so. The extraction well pump primary means of control adjusts motor speed in response to that pump's flowrate to match a flow setpoint. An alternate secondary means of control adjusts motor speed in response to the measured well level to match a level setpoint. The flow control is preferred because it does not introduce interactive effects like control on level might exhibit that would cause the pump motor speeds to wander. It is important to emphasize here that by either means the SCADA Computer control does not ensure the main goal of hydraulic gradient reversal. The corrective action plan in Volume I Chapter 9 addresses how the contaminant capture is based upon the evaluation of site groundwater hydraulics and this evaluation is necessary to determine the SCADA Computer setpoints necessary.

The water level signals indicate if the aquifer is being pumped to the optimum level to achieve a reversal of groundwater gradient in the vicinity of the wells. Installing a water level sensor in each well gives more real-time information about the wells and the aquifer and makes it unnecessary to take groundwater depth measurements at each well by hand.

Flow Measurement and Control

Each well that pumps water to the treatment system will have a flow meter installed in the discharge line to record and totalize the quantity of water produced from the well. Each flow meter will transmit a 4 to 20 milliamp signal through a transmitter on the meter to the PLC that converts the signal to a flow scale and displays it in gallons per minute (gpm). Each flow meter will have a totalizer that sums the total amount of flow and displays it locally at the meter. The operator can collect the totals by reading the meter locally or can use the SCADA Computer to generate a summary of flow using the flowrate provided by the PLC. Flowrate for each well will be averaged by the SCADA Computer over 24 hours and the value will be entered into a database for use in generating the daily operating report. The operator can also take an instantaneous reading of flow from each well by reading the values off a display screen on the SCADA Computer.

Each pump in the well field will be connected to a dedicated VFD that modulates the speed of the pump motor. The VFD drive has inputs and outputs that allow the operator to automatically change the motor frequency and thus speed up or slow down the pump.

Each VFD will have a signal connected to the PLC that can be translated using software on the SCADA Computer into a visual display showing percent of full speed. This feature will allow manual adjustment of the pumping rate at each well by changing the display on the SCADA Computer. Remote control of the pumps will provide control of the amount of water that the wells are producing. Level measurement from each well sensor will be used by the PLC to ensure that the well water level does not drop below the intake level of each submersible pump.

The system operator will be able to remotely and locally start and stop each pump, change the pumping rate, and set the system into manual pump control mode or automatic control mode. Pump manual or automatic status will be displayed on the SCADA Computer and pump on or off status will be displayed similarly.

The system will be equipped with an interlock that shuts off any pump that draws the water down below a safe operating level. Also in the event that a major spill is detected the extraction well pumps will enter fail mode until an operator intervenes. An alarm will be sent to the SCADA Computer indicating pump shutdown. The system will also send a pump failure alarm to the SCADA Computer if the VFD fails or additional alarms if the VFD detects over or under current conditions within the pump motor.

Treatment System Influent Weir Box

The existing system uses a large steel box divided into separate compartments to measure the incoming flow from each well. Each compartment in the box has a V-notch weir and measuring gauge that is used to determine the height of water behind the weir plate. The height measurement is converted manually to a flowrate using the equation below. There are no electronic instruments used in the weir box. The treatment system update will include the weir box as a secondary or backup flow measurement device.

The rates of flow into the individual weir boxes are determined by reading the water head in the weir box from the staff gauge attached to the side of the influent box and converting the head to a flow rate using the nomograph shown in Figure 10.4 for the 60-degree, V-notch weir. The water head is the distance from the bottom point of the V-notch to the top of the water. The flow rate can also be calculated using the formula:

$$\text{Flow rate (gpm)} = 1.2664 \times [\text{water head (inches)}]^{2.5}$$

With no flow through the weir box and with the water level at the bottom of the V-notch, the water head should read zero.

Opening or closing the butterfly valve immediately above each weir box may change groundwater flows. These valves are easily accessible from the catwalk around the weir box unit. Each weir box has a drain valve underneath for draining of water below the

bottom of the V-notch. This valve is to remain closed unless the plant is being shut down. See the Shutdown Procedures chapter for more information.

The weir box will be used as a backup means of measurement of the extraction well flows and providing visual observation of the water quality from each well. The structure also combines groundwater into a common 6-inch composite pipe that flows to the next treatment operation. Water will normally be directed to the pretreatment tank, but maybe bypassed under certain conditions.

Clarifier

Flow from the wells is combined into a single pipe that discharges into a circular clarifier. The clarifier is designed to remove solids through settling. The clarifier provides residence time to equalize flows from the wells and if the water is unusually laden with organics the clarifier permits the operator to check for a sheen on the water surface. The clarifier is gravity operated and requires no pumps or equipment to process water. There is a sludge collection rake connected to a motor-driven rotating center well on the clarifier, but it is seldom used and is locally operated. The only SCADA computer instrumentation tied to the clarifier is an automated block valve on the discharge pipe. The valve actuator is energized to keep the valve open during normal operation. If there is a loss of power the valve will assume its de-energized state and close to prevent the downstream wet well from overflowing. Also if the wet well pumps fail the SCADA computer will shutdown the extraction well pumps and close the clarifier outlet valve.

Water enters the center of the clarifier (called the feedwell) and is forced downward and outward to exit the tank. In the process, the heavy fraction settles to the bottom as sludge. Potentially the sludge accumulates and may need to be dewatered for disposal. In order to determine if it is necessary to dewater the sludge, open the sample taps on the side of the clarifier to determine how high the sludge is in the tank. If the sludge level is between the top two ports, the sludge must be thickened and dewatered. The thickening and dewatering process will be discussed in a later section. During normal operation of the clarifier, there will be no valves to change.

Flows enter the tank through a 6-inch composite line from the weir box. A bypass valve exists in this line to direct flow to the wet well/pump station, bypassing the clarifier. Normally, flow will not be bypassed. For normal operation with flows going through the tank valve MV-16 should be open and MV-17 closed as shown in Figure 10.2. For bypassing, the position of these two valves should be reversed.

Early in the remediation effort creosote-contaminated groundwater entering the tank with entrained air bubbles and lighter than water product floated to the water surface. This does not occur since the extracted groundwater has improved in quality, however the procedure for handling the float is described here. The floatable contaminants will be trapped on the surface of the tank between the center feedwell and the outside baffle. A skimming mechanism will channel the floatable portion to a scum trough located on the side of the tank. This trough is piped to the sludge dewatering system along with the sludge piping. The skimmer mechanism may be locked in the engaged or disengaged position during normal operation, depending on whether the scum needs to be pushed into the scum trough.

Sludge Dewatering

Once the appropriate valving is in place, do the following:

1. Lock the skimmer on the pretreatment tank in a disengaged position so that it will not skim.
2. Turn the speed controller (mounted on the top of the catwalk) so that the rotational seed of the raker arm slowly increases to the point where the tank contents are being thoroughly mixed.
3. Keep the raker arm spinning for 5 minutes and then slowly turn back the rotational speed until it is stopped.
4. Turn on the motor that drives the old filter media off the end of the bed into the container. This can be done by turning the motor control switch to the "HAND" position until enough paper has been removed and then turning it

back to the "off" position. If the controller is in the "auto" position, the filter paper will automatically scroll off the end of the bed until the float switch returns to a down position. You will probably not want to operate in auto mode if you wish to solidify each bath of dewatered sludge.

5. Continue to dewater until no more sludge can be piped out of the tank.

6. When dewatering is complete, place into a 55-gallon drum.

Please note that the pretreatment tank may be bypassed during sludge dewatering if the treatment plant must be operated. See the Clarifier section of this chapter for more information on tank bypassing. If the tank is bypassed the operator should consider the nature of the groundwater quality in the event that it is too contaminated to send straight through the GAC adsorption columns without pretreatment.

Wet Well / Pump Station

Automating the treatment system will involve controlling the amount of groundwater being pumped from each extraction well, then controlling the three wet well pumps in the concrete basin to match incoming flow from the clarifier. The purpose of the wet well/pump station is twofold. It acts as a containment basin for spills that occur on the floor of the building, and it provides the hydraulic pressure to pump the water through the remaining treatment processes.

The wet well is designed to provide suction head prior to pumping to the carbon adsorption tanks. The wet well will be equipped with continuous level measurement that provides an input signal to the PLC. The PLC will use the level signal data to start and stop the three transfer pumps in the wet well, and the pumps are programmed to turn on and off based on a target water level. As water rises in the wet well the first pump will turn on. If the flow rate of the incoming water is higher than the first pump capacity, the water will continue to rise and trigger the start of the second pump. The same sequence will be used for operation of the third pump. The wet well operates with six liquid level setpoints that control the operation of the three vertical turbine pumps. These floats are

designed to operate according to the setpoint levels in Table 10.1. The wet well level measurement and each pump operational status will be displayed on the SCADA Computer. The system software will allow the operator to adjust the wet well level setpoints.

The discharge from the wet well pumps needs to be valved so that it can be paced to the flow entering the wet well. Close pacing of the flows will prevent the pumps from turning on and off frequently and will extend the life of the pump.

Occasionally the plant operator must determine if the wet well pumps are cycling on and off too frequently. This may occur following the changing of GAC media whereby the clean media brings about a higher flow from the wet well pump. The solution involves a slight manual adjustment to the wet well pump discharge valve while observing the water level in the wet well rising or falling. If the level is too quickly rising, open some of the throttling valves equally; if it is too quickly falling, close the valves equally. The goal of throttling is to keep any one pump from turning on or off more than once every 30 minutes. It is not important how many pumps are being used to pace the incoming flow, so long as the 30-minute rule is obeyed. It may be possible to have one pump keeping pace, with a second turning on occasionally; or have two keep pace, with the third operating occasionally. Plant operators will rotate wet well pumps monthly to equalize amount of time each pump is operating. If the 30-minute rule is violated by any one of the wet well pumps the SCADA Computer will send a notification to the operator. Check valves are located on the discharge of each pump prevent the backflow of water through an off pump.

The pumps in the wet well discharge into a common 4-inch composite line that leads to the GAC adsorption columns. Prior to the common line, each discharge pipe is tapped with a pressure gauge to determine the hydraulic pressure the pump is producing. The pressure versus flow produced should be checked periodically for each pump. A pump curve for the pumps (the three pumps are identical) is contained in the Equipment Information Manual. If a pump is not producing the flows specified in the pump curve, the pump supplier should be contacted for repair and/or advice.

The discharge piping for each pump also contains a flanged coupling adapter. This adapter prevents motor vibration from vibrating the discharge piping. It also allows a location where the pump can be removed from the piping for service. It is important to always have this adapter on the discharge piping.

The system operator will be able to remotely and locally start and stop each pump, Pump on or off status will be displayed on the SCADA Computer. The system can be set in automatic mode or manual mode allowing the operator the flexibility of starting or stopping pumps as needed. Automatic mode will operate using a signal from the level transmitter in the sump and will automatically start and stop pumps as they are needed to keep up with the flow.

The system will be equipped with an interlock that shuts off all pumps if the water level in the sump rises above a high water set point for the continuous level sensor. A backup level switch in the wet well provides an identical interlock to shut off the pumps in the event that the continuous level sensor fails. In a high water level shutdown situation the well pumps will be stopped and flow to the clarifier will stop. The clarifier will continue to discharge for several minutes after the pumps have stopped. An alarm will be sent to the SCADA Computer indicating pump shutdown for high water level. The system will also send a pump failure alarm condition to the SCADA Computer if one of the wet well pumps fails.

GAC Adsorption Columns

Flow from the sump is directed to the GAC adsorption columns. There are five tanks in the system that will receive flow from the wet well. Flow will be divided into two streams feeding GAC Tanks 4 and 5 with parallel flow of approximately 50 % to each tank or 100 gpm. Effluent from the tanks is combined and is pumped in parallel to GAC Tanks 1, 2, and 3, with each receiving approximately 30% of the flow or 67 gpm.

Each set of tanks, will be equipped with a pressure transmitter located on the influent and effluent common pipeline. The transmitters will send a 4 to 20 milliamp signal to the

PLC and the PLC will send the data to the SCADA Computer which will display it as an active pressure in pounds per square inch gauge pressure (psig). The operator will enter a reference pressure that represents a clean carbon tank and the difference between the clean tank reading and the current reading will be displayed on the SCADA Computer. This information will allow the operator to determine when the carbon in the tank has become clogged and needs to be backwashed or changed.

Wastewater leaving the first set of tanks will be sampled prior to entering the second set of tanks to determine if the carbon is still actively treating the wastewater. Operator experience will determine when to change the GAC media. See the Replacement of Column Media section for more information on sluicing.

Final Effluent Flow, pH, and Temperature

Following treatment in the carbon tanks, the wastewater is combined into a single pipe and ultimately discharges into the Snake River. The effluent pipeline will be equipped with an electronic flowmeter that will record the flow rate and total quantity of water leaving the plant. The flow rate will be transmitted to the PLC and the data will be displayed on the SCADA Computer. Flow rate and totalized flow will be displayed locally on the meter and can be read by the operator on a monthly basis. The SCADA Computer is programmed to store the flowrate and display it, producing a daily average, a monthly average and yearly average as needed for reporting. The real-time flow readings can also be presented in daily graphs that show flow trends, peaks and minimums for each day, using the operating software.

A meter will be installed in the effluent discharge line that provides real-time pH readings on the water that leaves the plant. The pH reading will be displayed on the meter locally and transmitted to the PLC for display on the SCADA Computer. Like the flow meter, pH readings can be averaged or plotted in a trend as needed using the SCADA software. The daily readings will be stored in the SCADA Computer and used to generate the daily report.

A temperature probe will also be installed in the effluent line to provide a real-time temperature reading. The probe will send a signal to the PLC which will convert it to a scaled reading for display on the SCADA Computer. As with the other readings, the SCADA Computer software will display and store the temperature readings for use in generating the daily report.

Final Effluent Disposal

The backwash storage tank acts as the clean water supply for backwashing each of the columns. The effective volume available for backwashing is 3,000 gallons.

Floor Sump Pump

The floor sump pump operates locally from level switches in the sump and is not controlled by the SCADA computer. Operation of the floor sump pump will produce a notification to the operator. If a leak occurs and fills the sump this will start the pump and the operator will be notified. If the operator is on-site conducting a backwash operation this will involve the sump pump and will also cause a notification which is simply acknowledged by the operator.

Leak Detection

Leak detection alarms occur in response to high level switches located in both the floor sump and the wet well that sense the overflow of wastewater. Leak detection alarms also occur with the sensing of water on the floor by cables located in each room. Leak detection alarms invoke the system failure status causing system shutdown and operator notification.

SCADA Computer System

The automated system will be monitored by a part time operator that inspects the wells and treatment system weekly. The system will be designed with alarms that activate on the SCADA Computer when there are equipment failures, fire, or security breaches. The

control computer will be programmed to call the operator's cell phone or home number to alert him of problems at the treatment building. They can then access the SCADA Computer by logging in remotely. If problems at the site justify a visit, the operator will respond. A list of general and preventive maintenance tasks are included in Form 10.1, Weekly Inspection List. Regular maintenance will help reduce premature or unexpected mechanical failures.

The desktop PC SCADA Computer runs proprietary commercial plant operation software and is located in the water treatment building. The SCADA computer receives the instrument input and output data handled by the PLC. It also provides data to the PLC from the operator such as setpoint values and equipment status selections like auto/manual or start/stop settings. The software will graphically display the process monitoring and control.

The SCADA Computer will be equipped such that it can be accessed remotely over the internet. Remote access allows full control of the system and access to all stored data and reports. The system allows the operator and the system designer to monitor the process, review and analyze data, and make adjustments to the system. The SCADA Computer will have a data backup feature to ensure redundant copies of the data are made to locations both on and off-site. Should something happen to the computer the data can be reloaded and retrieved from another computer.

The system generates alarms if there are mechanical or electrical failures in the equipment. For example, if the VFD detects that a pump has stopped or is having electrical problems, it will create an alarm and display it on the SCADA Computer. Also, if there is a leak in the building piping and water completely fills the wet well or floor sump then level sensing will shut off treatment system equipment to prevent the leakage from accumulating. An alarm will be sent to the SCADA Computer and the operator will be notified.

The SCADA Computer is set up to send notification of any system alarms to a responsible people. This can be done by dial-out to a telephone, computer, or cell phone.

Notification should result in rapid response to problems that arise. If any operating problems require a report to the State, the operator can generate the report using data stored on the SCADA Computer. Detailed logic for computer notification of the operator is included in Table 10.4. The operator is notified for any of the reasons listed in Section 10.1.5, SCADA Computer System Shutdown. The operator will also receive notification when any single extraction well pump motor fails or an extraction well pump flow alarm occurs. In addition a notification will be given with any GAC column differential pressure alarm.

The system operating permit requires the preparation of a daily report that records the flowrates from each well, effluent pH, temperature, and other operating observations. The SCADA Computer will be configured to generate a daily report that summaries this information and stores it for download or future reference. The permit also requires a semi-annual report that summarizes all the daily activity for six months. The operating data will be accessed to generate trend graphs, data summaries, and any operating information needed to complete the reports.

10.1.3 Startup Procedures

10.1.3.1. Normal Startup Procedures

These startup procedures will need to be followed after the treatment plant has been shut down manually such as for maintenance. To start up the plant, do the following:

1. Close the drain valves for the individual weir boxes. They are located on the bottom of each box.
2. Open and close the appropriate valves so that the treatment plant will be in the desired mode of operation when the well extraction pumps are turned on. For an overview of the treatment system and the valving scheme refer to Figure 10.2.

3. Set SCADA computer status to Manual and Off for the wet well pumps P-50-1, P-50-2, and P-50-3. Turn the pumps from Manual/Off to Auto at the motor control center. Return to the SCADA and change the status to Auto thereby starting the pumps if sufficient water is in the wet well. If the wet well is empty the pumps will not start until groundwater from the extraction pumps arrives to the wet well.

4. One at a time set SCADA computer status to Manual and Off for the extraction pumps identified in Table 10.1. One at time, turn the pumps from Manual/Off to Auto at the motor control center. Return to the SCADA and one at a time change the status to Auto thereby starting the pumps and controlling the individual flowrates. Groundwater should flow through the pre-treatment clarifier and into the wet well. The flowrate setpoints should be such that no more than 200 gpm goes through the plant at any one time. If the individual extraction well setpoints sum to a quantity greater than 200 gpm then the SCADA Computer will activate an alarm.

5. Monitor the wet well pumps to assure that they are operating properly.

10.1.3.2. Emergency Startup Procedures

These startup procedures will need to be followed after the treatment plant has been automatically shut down by the SCADA computer for any reason. To start up the plant, do the following:

1. Review the specific alarm that has caused the SCADA computer to initiate a shutdown. Determine the cause of the alarm and correct the problem. Do this by inspecting the floor sump level, the wet well level, and the general area for the presence of groundwater.

2. Document the incident in the operator's log. Determine if there is a spill outside the containment as described in Volume I Chapter 6 and if so describe the spill in the dedicated system logbook.

2. Verify that valves are opened and closed appropriately so that the treatment plant will be in the desired mode of operation when the well extraction pumps are turned on. For an overview of the treatment system and the valving scheme refer to Figure 10.2.

3. Verify that the wet well pumps in the SCADA computer remain in the auto mode. If not, set the SCADA computer status to Manual and Off for the wet well pumps P-50-1, P-50-2, and P-50-3. Turn the pumps from Manual/Off to Auto at the motor control center. Return to the SCADA and change the status to Auto thereby starting the pumps if sufficient water is in the wet well. If the wet well is empty the pumps will not start until groundwater from the extraction pumps arrives to the wet well.

4. One at a time set SCADA computer status to Manual and Off for the extraction pumps identified in Table 10.1. One at time, turn the pumps from Manual/Off to Auto at the motor control center. Return to the SCADA and one at a time change the status to Auto thereby starting the pumps and controlling the individual flowrates. Groundwater should flow through the pre-treatment clarifier and into the wet well. The flowrate setpoints should be such that no more than 200 gpm goes through the plant at any one time.

5. Verify that the clarifier discharge piping valve has opened so that groundwater can flow to the wet well. Monitor the wet well pumps to assure that they are operating properly.

10.1.4 Manual Shutdown Procedures

For manual emergency shutdown or maintenance shutdown of the treatment plant, all pumps shall first be shut off at the SCADA computer and secondly shut off at the motor control center. The motor control center has engraved nameplates located at each control switch that indicate which pump is operated by each switch. During equipment maintenance lock out tag out procedures shall be followed to ensure that electrical power from the motor control center has been removed.

It is advisable to shut off the sump pump during sampling.

To shutdown the treatment plant for any reason, do the following:

1. Decant as much of the water from the BWT (backwash waste tank) as possible.
2. Turn off all of the well field pumps.
3. Drain the well field yard piping by opening all sample taps where they enter the building.
4. Drain the weir boxes by opening the drain valves beneath each box.
5. Process all of the water in the sump and wet well through the system.

10.1.5 SCADA Computer System Shutdown

The SCADA computer will invoke a system failure for as many as eight reasons. The system failure status will shut down the extraction well pumps, shut down the wet well pumps, and close the clarifier discharge valve. The system failure status will also notify the operator. The associated setpoints are listed in Table 10.1, SCADA Computer Setpoints. The following alarms will cause a system failure:

1. Smoke detector signal
2. Leak detection signal
3. Pre-treatment clarifier discharge valve failure
4. Wet well pump motor failure
5. High pressure alarm at the lead GAC column inlet piping
6. Final effluent pH alarm

7. Final effluent temperature alarm

8. Final effluent flowrate alarm

10.1.6 Backwashing

The media in both the GAC adsorption columns performs both filtering of suspended solids and removal of dissolved organics. Two factors will lead to excessive pressure loss across a column and, therefore, necessitate backwashing.

- Particulate matter will be trapped in the column media bed.
- The media in the columns will compress over time.

During backwash, previously treated water will be pumped through the bed in a direction opposite to normal flow. This will cause particulates to dislodge and be carried out of the system into the backwash waste tank.

The treatment plant is designed so that any single column may be backwashed at any given time while the others remain on-line. The lead GAC adsorption columns are the first vessels to receive groundwater and will trap the greatest amount of particulate matter, and therefore, will need to be backwashed more often than the lag GAC columns.

The GAC adsorption columns will be backwashed one at a time per the backwash flowrate in Table 10.3. This table also describes the allowable flowrate in the lead GAC adsorption column that continues treating groundwater while the other lead vessel is being backwashed. Since these columns will normally run in parallel, they will probably need backwashing at about the same time. These columns should be backwashed one after the other with sufficient time allowed in between to refill the backwash storage tank and to decant the backwash waste tank.

When a lag GAC column needs to backwashed, the treatment system will be taken off-line.

By virtue of the piping arrangement the sequence of lead and lag GAC carbon adsorption columns is never reversed.

10.1.6.1. Pressure Indicators

Each treatment column is equipped with two pressure gauges. The difference between the two gauge pressures for a given column indicates the pressure loss across each individual column. When the differential pressure across a column is greater than the value in Table 10.1, the columns shall be backwashed.

There are also three electronic pressure measurement devices in the full flow piping. The first and second electronic pressure transducers measure the pressure drop across the two lead columns in parallel. The second and third pressure transducers measure the pressure drop across the three lag columns. When the pressure drop measured electronically exceeds the alarm setpoint in Table 10.1, the SCACA computer will initiate an Differential Pressure Alarm and an operator autodialer notification.

10.1.7 Maintenance

10.1.7.1. General

The upkeep and maintenance of the facility is of prime importance so that no doubts ever arise as to the quality of the operation or the quality of the treated effluent. Every possible step must be taken to operate the plant in its cleanest, most well maintained state. Timely and proper equipment maintenance housekeeping and ground keeping are important aspects of the program.

10.1.7.2. Planning and Scheduling

This treatment facility needs to operate as much as possible to remove contaminants from the groundwater and clean up the aquifer beneath the site. It will be operated 24 hours per day, 365 days a year. Under these conditions maintenance must be planned and

scheduled so that as little downtime as possible occurs. When scheduling, personnel must take into account the operating needs of the plant.

Preventive Maintenance

The manufacturer's maintenance manual is generally the best guide for preventive maintenance instructions for specific equipment. Most equipment is mass-produced on a competitive basis, and the cost of maintenance should be consistent with the equipment's value, life expectancy, and replacement costs.

The following list is a preventative maintenance schedule suggested for the groundwater treatment plant:

Weekly

- Completely check all control panels.
- Check all operating supplies and replace as required.
- Perform weekly lubrication or as needed.

Annually

- Inspect each pump and service as required.
- Clean all ventilation screens and openings.
- Clean or replace ventilation filters.
- All electrical devices should be inspected for proper operation and condition.

10.1.7.3 Major Equipment Information

The equipment information manual lists the supplier, manufacturer, and installer of the major equipment at the groundwater treatment plant. The manufacturer or supplier should be contacted for spare or replacement parts, or for information regarding unusual

problems. Changes in addresses, phone numbers, and representatives' names should be recorded.

Manufacturer's literature on operation and maintenance where available is included in each chapter of the Equipment Information Manual. Maintenance is required on pumps and HVAC equipment at the site. The following sections discuss this maintenance.

Pumps

Groundwater Extraction Pumps And Wells

The submersible pumps that have been installed in the monitoring and recovery wells, some of which are extraction well pumps, are water-cooled and lubricated and should require very little maintenance. Pumps do malfunction on occasion, and it is possible that the yields of some wells will diminish beyond what is expected from the seasonal water level fluctuations. It is the objective of this section to provide some simple tests to help the operator distinguish decreases in well yield due to the seasonal water level cycle and/or interference from other wells in the recovery well pumping system from pump malfunctions and actual deterioration of well performance.

Usually the first indication that a pump or well is malfunctioning is an observed decrease in yield. As has been pointed out, well yield in most wells at the HWMF and Aquifer. 1 wells in particular decrease as water levels fall during winter and spring and increase as water levels rise during summer and fall. Well yields will also decrease as water levels fall due to the combined drawdowns of all the extraction wells in the pumping system. If the decrease in yield is greater than would be expected or than has been previously observed from the seasonal or pumping system lowering of water levels, then further checking is required.

If the flow rate measured electronically, calculated from the weir, or, by timing the discharge into a 55-gallon drum, is less than expected, a specific capacity test will be

conducted. Results will be compared with what would be expected, or ideally what has been previously observed, for the time of year, interference from nearby wells, etc.

If the resulting specific capacity is significantly different from what would be expected, then the pump will be checked. Before a pump technician is consulted, the operator will compare the performance of the pump with that which is predicted by its rating curve. Brand names and model numbers of pumps installed in individual wells are listed in the "Pumps" section of the Equipment Information Manual. The rating curves for the pumps are also shown in the "Pumps" section of the Equipment Information Manual. Total dynamic head is equal to the sum of the static head and the friction losses. Static head can be estimated by measuring the pumping water level elevation and subtracting it from elevation (approximate) of the discharge point. Friction losses should be negligible for the pipe diameters and recommended pumping rates when compared to the total head.

If the discharge rate of the pump indicates a total dynamic head that is much less than what it is estimated, then the pump may be malfunctioning. Before a trained pump technician is called in, the operator will surge the pump. At the HWMF, creosote has been observed to adsorb strongly to clay particles and become stuck to the screens of some pumps. Sometimes a pump screen that is clogged in such a way can be cleared by alternately turning on and turning off the pump. This will be done in 5-minute intervals taking care that the pump is not turned on while water is still flowing back down through the pump. Because the check valve has been removed from the pumps, when a pump is turned off the water in the discharge pipe above the water level in the well will flow backward through the pump and out the pump screen, effectively surging the pump. If the pump is turned on while the water is still flowing backwards, the pump motor can be seriously damaged. If back flushing does not significantly increase the discharge rate, a trained pump technician will be called in by the operator to service the pump

Remember that when surging the pump, have the sample tap open immediately inside the treatment building so that an air release occurs and a water hammer does not develop. Otherwise, pipe damage may occur and water will not backflow through the pump as desired.

If the pump appears to be operating up to its specification and the specific capacity appears to be smaller than would be expected as the result of seasonal water level fluctuations or interference from other pumping wells, then the actual yield of the well may have diminished. Driscoll (1986) lists five major causes of deteriorating well performance, which can be summarized as follows:

1. Growth of biological material on the well screen and formation materials surrounding the well screen.
2. Chemical precipitation of mineral matter on the well screen and formation materials surrounding the well screen.
3. Plugging of the formation around the well screen by fine particles.
4. Sand pumping which can cause localized corrosion of the well screen or casing, pitting of the pump impellers, and damage to the pump bearings.

Of these five possibilities, biological growth and clay and silt plugging have the greatest potential to affect the yield of wells in the extraction well pumping system at the HWMF.

If performance deteriorates for a well or wells in the extraction well pumping system, then remedial measures may be required and an experienced hydrogeologist or engineer may need to be consulted.

In summary, maintenance of the submersible well pumps should be minimal. The operator can conduct some simple tests to help identify the cause of deteriorating well yield and will contact the trained pump technician specified in the Equipment Information Manual if the pump itself appears to be malfunctioning.

Wet Well Vertical Turbine Pumps

No routine maintenance is required for the pump, but there is maintenance required for the motor. The motors must be inspected at regular intervals. Keep the motors clean and the ventilation openings clear of dust dirt or other debris. Lubricate the units in accordance with the operating instructions in the Equipment Information Manual and the instruction plate on the unit. Excessive lubrication may damage the unit.

Horizontal Centrifugal Pumps

Backwash Pump

The water running through the pump keeps it lubricated. So long as it never runs dry, it will require no routine lubrication. Periodically check the output of the pump versus its performance curve to be assured that the pump is operating properly. See the Equipment Information Manual for more detailed information.

Sump Pump

This pump requires no periodic maintenance; however, occasional manual priming and draining may be required.

Pump Priming

1. Use nipple, tee, and pipe plug in discharge opening of the pump.
2. Remove plug from tee in the discharge piping.
3. Fill the pump with water through the opening in tee until it remains full or above the inlet of the pump.
4. Replace the plug.
5. A steady flow of water will be noted if the pump is properly primed.

6. If the pump does not prime in 5 to 10 minutes, check all pipe connections or use vacuum gauge to determine a possible leak.

Pump Draining

1. Turn off the electrical power to the pump.
2. Drain pump body by removing the drain plug in the bottom of the body.
4. Disconnect the power before working on the pump or motor.

10.1.8 Safety

Due to the nature of this facility, and the fact that it deals with a hazardous waste, safety is a top priority.

10.1.8.1. Normal Operating Conditions

Under normal operating conditions, the following items will be available:

1. Air purifying respirator with an organic vapor cartridge.
2. Chemical resistant coveralls.
3. Fire extinguisher.
4. Protective goggles.
5. Rubber boots and gloves.
6. Hard hat.
7. Safety glasses.
8. Steel tipped boots

10.1.8.2. Replacement Of Column Media

An air purifying respirator, APR, either half or full-face, with an organic vapor cartridge, must be worn at all times during the removal of column media or the filling of a tank with new media. Rubber boots, gloves, and coveralls must be worn when media is being sluiced.

10.1.8.3. Emergency Phone Numbers

In case of an emergency, contact information for the Emergency Coordinator is available in Table 5.1. This table also includes emergency contact numbers for the fire department, the police, and the medical center.

10.1.9 Recordkeeping

Daily treatment plant information electronically archived and recorded in an automated report by the SCADA computer includes the following:

- Flow rates and volumes pumped from each well and for the entire treatment system final effluent.
- pH and temperature of effluent.

It is the responsibility of the operator to verify that clear and accurate records of all data are being collected automatically and that manual weekly inspection records are happening at the site. The daily records of extraction well pump flows are necessary to verify capture of contaminants and the daily record of flow, pH, and temperature of the final effluent is needed for NPDES permitting.

10.1.10 Personnel Training for Treatment Plant Operations

10.1.10.1. Introduction

The PacifiCorp groundwater treatment plant in Idaho Falls has been constructed to allow the proper treatment and disposal of the hazardous constituents that are currently in the groundwater beneath the site. The employee's sole purpose at the site is the handling and supervision of regulated waste. This chapter details the staff-training program for the successful operation of the treatment plant. It discusses training issues related only to the operation of the treatment system. Refer to Volume I Chapter 7 of this permit reapplication for further training requirements.

10.1.10.2. Job Descriptions

The three classifications of PacifiCorp employees involved with system operations or emergency response at the site are:

1. Hazardous Waste Management Facility Manager
2. Emergency Coordinator
3. On-site Environmental Technician

The role of the Emergency Coordinator is defined in detail in Volume I Chapter 5 and therefore is not discussed in the follow section. Further descriptions of the roles of the on-site Environmental Technician and HWMF Manager with respect to operation of the treatment plant are presented below.

On-site Environmental Technician

The Environmental Technician is responsible for the successful weekly operation of the treatment plant under the guidance and direction of the HWMF manager. His/her duties with respect to treatment plant operation include, but are not limited to:

1. Managing computer generated daily reports of flows into the treatment plant from each of the pumped groundwater extraction wells.
2. Routine weekly inspection of the treatment facility.
3. Exchange of treatment media.
4. Infrequent dewatering of hazardous sludge with proper containerization, labeling, and manifesting of dewatered sludge.
5. Routine maintenance of all associated equipment.

Hazardous Waste Management Facility Manager

A HWMF Manager is responsible for remotely monitoring the facility and overseeing the activities of the Environmental Technician. He or she must understand all aspects of treatment plant operation and comply with all federal, state, and local regulations. The supervisor's duties with respect to treatment plant operation include, but are not limited to:

1. Liaison with local officials.
2. Maintain the necessary records to comply with regulations.
3. Oversee and communicate with the on-site Environmental Technician.
4. Coordinate the infrequent shipment of containerized regulated wastes.
5. Coordinate training of the on-site Environmental Technician.

10.1.10.3 Treatment Plant Operations Training

This section discusses the training program for treatment plant operation including content, frequency, and techniques to be used. The training is grouped into two categories: new employee training, and continuing education. Also refer to Volume I Chapter 7 for additional training requirements.

New Employee Training

Following completion of the appropriate health and safety training, each new on-site Environmental Technician will be instructed by experienced personnel in each of five areas:

1. Unit operations.
2. Pumps and VFDs.
3. Sampling procedures.
4. Routine equipment maintenance.
5. General operation of the treatment plant.
6. SCADA computer operation of the treatment plant.

Hazardous Waste Management Facility Manager

New employees hired as HWMF Managers will have the current HWMF Manager work with him/her for period of time to transfer knowledge about the following topics:

1. Scheduling of infrequent hazardous waste shipments.
2. Introduction to local authorities as deemed necessary.
3. Required paperwork and computer data management.
4. Employee evaluation process.
5. Applicable regulations.
6. Routine equipment maintenance.
7. Sampling procedures.
8. General operation of the treatment plant.

9. SCADA computer operation of the treatment plant.

10. Any other topics as deemed necessary by the current supervisor.

10.1.10.4 Training Duties

The HWMF Manager is responsible for implementing and overseeing the training program. He/she will be responsible for the following duties:

1. Ensuring proper training of employees.
2. Reviewing training documents and the training plan to ensure adequacy with all regulations.
3. Reviewing test scores when required.
4. Coordinating and scheduling training.
5. Reviewing continuing education certificates and maintaining training records.

10.2 ORIGINAL TREATMENT PLANT EQUIPMENT

This section contains information on the suppliers, manufacturers, and installers of the equipment associated with the treatment plant. The original equipment covered in this section is listed below while new equipment acquired with the 2008 system automation design is described in Section 10.3.

- Laboratory Fume Hood
- HVAC
- HVAC Control System
- Pumps
- Pressure Switches
- Pressure Indicators

- Floor Sealer
- Sludge Dewatering System
- Treatment System Media
- Polymer and Feed System
- Fiberglass Tanks
- Yard Piping
- Valves
- Treatment Columns
- Electrical

For more detailed information in any of these listed areas, refer to the Equipment Information Manual in the treatment building at the Idaho Falls Hazardous Waste Management Facility.

LABORATORY FUME HOOD

Description	Type
Fume Hood	Hamilton Industries Model 5545858-EVectaire Fume Hood, Vectrol Auxiliary Air Assembly, 6-foot hood size, 100-FPM exhaust, 70-percent hood air requirement. Gas, air, and vacuum excluded.
Manufacturer:	Hamilton Industries Two Rivers, Wisconsin 54241 (414) 793-1121

SUPPLY FANS

Item	Description	Type
SF-1	Plant Supply	Greenheck Model BSQ HP 36-50 6,000-CFM, 2.25” H O total static pressure, 5-hp, 460-V, 3-phase
SF-2	Plant Supply	Greenheck Model BSQ HP 14-10 1,600-CFM, 2.0’ H O total static pressure, 1-hp, 460-V, 3-phase
SF-3	Laboratory Supply	Greenheck Model BSQ 12-7, 1,400 CFM, 1.5’ H O total static pressure, ¾-hp, 460-V, 3-phase
SF-4	Fume Hood Supply	Greenheck Model BSQ 9-3, 875-CFM, .625” H O total static pressure, 1/3-hp, 460-V, 3-phase

EXHAUST FANS

Item	Description	Type
EF-1	Plant Addition Exhaust	Greenheck Model BSQ HP 36-50 6,000-CFM, 2.25” H O total static pressure, 5-hp, 460-V, 3-phase
EF-2	Plant Exhaust	Greenheck Model BSQ HP 14-10 1,600-CFM, 2” H O total static pressure, 1-hp, 460-V, 3-phase
EF-3	Fume Hood Exhaust	Greenheck Model BSQ 12-3 1,250-CFM, .625” H O total static pressure, 1/3-hp, 460-V, 3-phase
EF-4	Laboratory Exhaust	PACE Model SCF 73A, 800-CFM, .75’ H O total static pressure, 1/3-hp, 115-V, 1-phase
EF-5	Toilet Exhaust	Greenheck Model CSP-55, 400-CFM, .45” H O total static pressure, 360-watts, 115-V, 1-phase

HEAT PUMP

Type:	Trane Company Outdoor Unit Mode No. BWA060A400A Heating/Cooling Coil Model No. BxA 748 P Type A with Coil Casing

THERMAL RECOVERY UNITS

Item	Description	Type
TRU #1	Plant Thermal Recovery Unit	Q-Dot Corporation TRU 120 AL5-42, 6,000-CFM, 36”H x 84”W x 10”D, 6 rows, 8 fins/in., Model TP 120-10 tilt package
TRU #2	Plant Thermal	Q-Dot Corporation TRU 120 AL5-24, 1,600-CFM, 18” H x 48”W x 100”, 6 rows, 8 fins/in., Model TP 120-20 tilt package

LOUVERS

Item	Description	Type
L-1	Plant OSA Louver Intake	Construction Specialties Model 4110, 72”W x 6”D, 6,000-CFM
L-2	Plant Exhaust Louver	Construction Specialties Model 4110, 64”W x 4”H x 6”D, 6,000-CFM
L-3	OSA Louver Intake for Plant	Construction Specialties Model 4110, 48”W x 24”H x 6”D, 1,600-CFM
L-4	Exhaust Louver for Existing Plant	Construction Specialties Model 4110, 48”W x 24”H x 6”D, 1,600-CFM
L-5	Laboratory OSA Intake	Construction Specialties Model 4110, 48”H x 48”W x 4”D
L-6	Laboratory Exhaust Louver	

BACK DRAFT DAMPERS

Item	Description	Type
BDD #1	EF-3 Exhaust	American Warming and Ventilating Inc., Model BD-12 with flanged frame, 16x15, 1,250-CFM
BDD #2	EF-4 Exhaust	American Warming and Ventilating Inc., Model BD-12 with flanged frame, 15x9, 800-CFM
BDD #3	EF-5 Exhaust	American Warming and Ventilating Inc., Model BD-12 with flanged frame, 12x6, 460-CFM

MANUAL OPPOSED BLADE DAMPERS

Supply	Rectangular Dampers	Carnes Model 5-60 with externally operated gang damper blades
Exhaust	Round Dampers	American Warming Model VC-23

MOTORIZED DAMPERS

Item	Description	Type
MD-1A	TRU-1 Supply	Ruskin Model CD-50 opposed blade damper with electric operator, 24”W x 24”H, 6,000-CFM
MD-1B	TRU-1 Exhaust	Ruskin Model CD-50 opposed blade damper with electric operator, 24”W x 24”H, 6,000-CFM

MD-2A	TRU-2 Supply	Ruskin Model CD-50 opposed blade damper with electric operator, 16:W x 12”H, 1,000-CFM
MD-2B	TRU-2 Exhaust	Ruskin Model CD-50 opposed blade damper with electric operator, 16:W x 12”H, 1,600-CFM
MD-3	Laboratory Intake	Ruskin Model CD-50 opposed blade damper with electric operator, 24”W x 24”H, 1,400-CFM
MD-4	Fume Hood Intake	Ruskin Model CD-50 opposed blade, damper with electric operator, 24”W x 24”H, 875-CFM
MD-5	TRU-2 Intake and Building Intake	Ruskin Model CD-50 opposed blade, with electric operator, 48”W x 24”H, 1,600-CFM
MD-6	TRU-2 Exhaust and Building Exhaust	Ruskin Model CD-50 opposed blade, with electric operator, 48”W x 24”H, 1,600-CFM
MD-7	TRU-1 Intake and Building Intake	Ruskin Model CD-50 opposed blade, with electric operator, 75”W x 48”H, 6,000-CFM
MD-8	TRU-2 Exhaust and Building Exhaust	Ruskin Model CD-50 opposed blade, with electric operator, 72”W x 48”H, 6,000-CFM

DUCT HEATERS

Item	Type
EDH-1	Indeeco Model QUA, open coil, 75kW, 4-stage, 480-V, 3-phase, 42”W x 20”H, airflow switch interlock, control Option #, right terminal box overhang.
EDH-2	Indeeco Model QUA, open coil, 25-kW, 3-stage, 480-V, 3-phase, 24”W x 16”H, airflow switch interlock, control Option E, left terminal box overhang
EDH-3	Indeeco Model QUA, open coil, 20-kW, 1-stage, 480-V, 3-phase, 16”W x 16”H, airflow switch interlock, control Option E, right terminal box overhang
EDH-4	Indeeco Model QUA, open coil, 20-kW, 1-stage, 480-V, 3-phase, 16”W x 16”H, airflow switch interlock, control Option E, right terminal box overhang
EDH-5	Indeeco Model QUA, open coil, 12.5kW, 2-stage, 480-V, 3-phase, 14”W x 14”H, airflow switch interlock control Option E, right terminal box overhang
EDH-6	Indeeco Model QUA, open coil, 12.5-kW, 2-stage, 480-V, 3-phase, 14”W x 14”H, airflow switch interlock, control Option E, right terminal box overhang

FILTERS

Item	Description	Type
FH-1	Serves SF-1	Farr30/30, 6,000 CFM, 4 @ 24”x24”x2”, 4@ 16”x25”x2”, 14”x14” sheet metal blank
FH-2	Serves SF-2	Farr 30/30, 1,600 CFM, 2 @ 12”x24”x2”, 1 @ 24”x24”x2”, 12”x12” sheet metal blank
FH-3	Serves SF-3	Farr 30/30, 1,400 CFM, 1 @ 24”x24”x2”
FH-4	Serves SF-4	Farr 30/30, 875 CFM 1 @ 16”x25”x2”
FH-5	Serves TRU-1	Farr 30/30, 6,000 CFM, 2 @ 24”x24”x2”, 2 @ 12”x24”x2”
FH-6	Serves TRU-1	Farr 30/30, 6,000 CFM, 2 @ 24”x24”x2”, 2 @ 12”x24”x2”
FH-7	Serves TRU-2	Farr 30/30, 1,600 CFM, 1 @ 24”x24”
FH-8	Serves TRU-2	Farr 30/30, 1,600 CFM, 1 @ 24”x24”

RETURN/EXHAUST REGISTER AND GRILLES

Item	Description	Type
RG-1	Return Grille	Metal Aire Model CC-5,18”x18”, 800-CFM
RG-2	Return Grille	Metal Aire Model CC-t, 12”x12”, 400-CFM

SUPPLY DIFFUSER AND REGISTER GRILLES

Item	Description	Type
SR-1	Supply Register	Metal Aire Model 1-14004D 12”x12”, 26’ throw, 450-CFM
SR-2	Supply Register	Metal Aire Model 1-14004D 12”x8”, 26’ throw, 400-CFM
SR-3	Supply Register	Metal Aire Model 1-14004D 12”x6”, 32’ throw, 320-CFM
SR-4	Supply Register	Metal Aire Model 1-14004D 12”x6”, 23’ throw, 300-CFM
CD-1	Ceiling Diffuser	Metal Aire Series 8000, Model U3, 12”x6”, 8’ throw, 400-CFM
CD-2	Ceiling Diffuser	Metal Aire Series 8000, Model U3, 8”x8”, 7’ throw, 200-CFM

EXTRACTORS

Carnes Type 1250, Style 3, with synchronized steel curved extractor blades. Heavy side rails and screw operator.

TURNING VANES

Elgin All Tight Type VR with vane side rails and shop fabricated double turning vanes.

ACCESS PANELS AND DOORS

Ventlock size 12” x 16” steel frame with gasket-ground perimeter with hinged plexiglass visual panel or separate size 6” x 8” access door on smaller ductwork.

PUMPS

Item	Description	Type
P-1	Wet Well Vertical Turbine Pump	Peerless Pump Model 6LB 4-stage, with 4” discharge, 4-15/32” impeller, 10 hp, 460-V, 3-phase, 3,600-rpm
P-2	Wet Well Vertical Turbine Pump	Peerless Pump Model 6LB 4-stage, with 4” discharge, 4-15/32” impeller, 10-hp, 460-V, 3-phase, 3,600-rpm
P-3	Wet Well Vertical Turbine Pump	Peerless Pump Model 6LB 4-stage, with 4” discharge, 4-15/32” impeller, 10-hp, 460-V, 3-phase, 3,600-rpm
P-4	Backwash Pump	Berkeley B 2-1/2 TPM-S centrifugal gal with 3” discharge, 5-11/16 impeller, 480-V, 3-phase, 15-hp
P-5	Floor Pump	Tait 20 SP, 2-hp, 1-1/2” discharge 220-V, 3-phase

Manufacturer: Peerless Pump
1200 Sycamore Street
Montebello, California 90640
(213) 726-1232

PRESSURE SWITCHES

Item	Description	Type
PS	All recovery well discharge	Mercoid DA-31-3 Range 0-15 psig with a ¼" NPT lower brass connection and Ashcroft gauge 20-1,000', H-026-15, 2" dial, 0-15 psig range, with ¼" NPT back brass connection

Manufacturer: The Mercoid Corporation
4201 West Belmont Avenue
Chicago, Illinois 60641

PRESSURE INDICATORS

Item	Description	Type
PI	All treatment plant pressure indicators	Ashcroft Commercial Pressure Gauge Model 45-1000-H-02L-60# 4-1/2" diameter dial with 1 psi increments, ¼" NPT lower brass connection, 0-60 psi range

Manufacturer: Ashcroft
250 East Main Street
Stratford, Connecticut 06497
(203) 378-8281

FLOOR SEALER

Sikagard 62 Epoxy (red) 4-gallon units
Sikagard 62 Epoxy (gray) 4-gallon units
Sikagard Granuals – Case

Manufacturer:	Sika Corporation P. O. Box 297 Lyndhurst, New Jersey 07071 (201) 933-8800

SLUDGE DEWATERING SYSTEM

Type: J-1800 Gravity Filter System with Disposable Filter Media 25-Micron-Mesh Filter Paper

Manufacturer/ Supplier:	Water Reclamation, Inc. P.O. Box 68 Florence, Kentucky 41042 (606) 283-2121

FIBERGLASS TANKS

Both fiberglass tanks were made to the same specifications as listed below. The gray tank is for backwash waste, while the blue tank holds the treated groundwater to be used as a backwash supply.

Material	Fiberglass reinforced polyester
Diameter (ft)	10
Side Height (ft)	6.5
Volume (ft^3)	500

The observation tank was also produced by the same manufacturer with the same construction materials.

Tanks Supplied By:	George Fisher Fisher Company 3015 South 3600 West West Valley City, Utah 84119 (801) 973-8250

YARD PIPING

All yard piping materials and construction were provided by:

Bingham Mechanical of Wyoming
P.O. Box 2082
Idaho Falls, Idaho 83402
(208) 522-4484

NPDES DISCHARGE LINE

Discharge lines, piping materials and construction were provided by:

Atlas Mechanical
1380 Enterprise
Idaho Falls, Idaho 83402
(208)523-7030

VALVES

Supplier/Installer: Bingham Mechanical of Wyoming
1085 Milligan Road
P.O. Box 2082
Idaho Falls, Idaho 83402
(208) 522-4484

MANUAL VALVES

Valve No.	Type
MV-1 through MV-9	Two-inch Stockham butterfly valve, Teflon seats, stainless steel shaft, 200-psi, lug body, 10-position lever operator
MV-16, MV-17	Six-inch Stockham butterfly valve, Teflon seats, stainless steel shaft, 200-psi, lug body, 10-position lever position
MV-18, MV-19, MV-20	Four-inch Stockham butterfly valve, Teflon seats, stainless steel shaft, 200-psi, lug body, 10-position lever operator
MV-21 through MV-28	Four-inch Dezurik wafer-type butterfly valve with TFE seats, bronze disc, stainless steel shaft, 10-position lever operator
MV-29, MV-30	Four-inch Jamesbury full-bore ball valve, stainless steel body, TFE seats and seals, Type 6150-11-3600TT-1
MV-31, MV-32	Four-inch Dezurik lug-type butterfly valve, TFE seats and seals, bronze disc, stainless steel shaft, 10-position lever operator
MV-35 through MV-68	Four-inch Stockham butterfly valve, Teflon seats, stainless steel shaft, 200-psi, lug body, 10-position lever operator
MV-69, MV-70, MV-71	Two-inch Conbraco Industries Appollo full-bore threaded ball valve, bronze body, TFE seats and seals
MV-72, MV-73	Four-inch Stockham butterfly valve, Teflon seats, stainless steel shaft, 200-psi, lug body, 10-position lever operator
MV-74, MV-76	Four-inch Chemtrol PVC threaded ball valve, Teflon seats and seals
MV-75, MV-77	Four-inch Stockham butterfly valve, Teflon seats, stainless steel shaft, 200-psi, lug body, 10-osition lever operator

CHECK VALVES

CV-1 through CV-9	Two-inch Watts Series 600 threaded spring check valve, bronze body
CV-17, CV-18, CV-19	Four-inch Stockham steel swing check valve
CV-20	Two-inch Stockham steel swing check valve
CV-21	Four-inch Stockham steel swing check valve

SAMPLING VALVES

S-1 through S-9	One-inch Watts or Conbraco Industries Appollo full-bore threaded ball valve, bronze body, TFE seats and seals
S-10, S-11	One-half inch Watts threaded ball valves, bronze body, TFE seats and seals
S-12	One-inch Watts threaded ball valve, bronze body, TFE seats and seals
S-13, 14, 15	One-half inch Watts threaded ball valves, bronze body, TFE seats and seals
S-20, 21	Pressure gauge drain taps, ¼-inch steel gate valve
S-22 through S-27	One inch Watts threaded ball valve, Teflon seats, bronze body

TREATMENT COLUMNS

Supplier: Hungerford and Terry
226 Atlantic Avenue
P.O. Box 45
Clayton, New Jersey 08312-0045
(609) 881-3200

ELECTRICAL

Installer: Arco Electric
1460 Pedersen Street
Idaho Falls, ID 83402
(208) 522-2185

10.3 SYSTEM AUTOMATION TREATMENT PLANT EQUIPMENT

The following equipment will be new when the system is automated. The system automation is expected to occur in the calendar year 2009.

- Pressure Transducers for Wells
- Pressure Transducers for GAC Columns
- Flow Meters and Sensors
- Wet Well Level Transmitter
- Leak Detection Switches
- Leak Detection Cable
- Pre-treatment Clarifier Discharge Valve and Actuator
- Variable Frequency Drive, VFD, Speed Controllers
- VFD Panel
- Programmable Logic Controller, PLC
- PLC Panel
- SCADA Computer
- Autodialer

This section of the O&M Manual will be updated after completion of the system automations. At that time, further details relating to the equipment listed above will be

added to the Equipment Information Manual in the treatment building at the Idaho Falls Hazardous Waste Management Facility.

System Component	Tag #	Item Description	ControlSetpoint	Alarm Code Name	Alarm Setpoint
Monitoring Wells	LE/LT - 10 - 1	Monitoring Well Level Sensor/Transmiter - Well 1D1			
	LE/LT - 10 - 2	Monitoring Well Level Sensor/Transmiter - Well 1MW1			
	LE/LT - 10 - 3	Monitoring Well Level Sensor/Transmiter - Well 1MW4			
	LE/LT - 10 - 4	Monitoring Well Level Sensor/Transmiter - Well 1MW13			
	LE/LT - 10 - 5	Monitoring Well Level Sensor/Transmiter - Well 1MW16			
	LE/LT - 10 - 6	Monitoring Well Level Sensor/Transmiter - Well 1R4			
	LE/LT - 10 - 7	Monitoring Well Level Sensor/Transmiter - Well 2C2			
	LE/LT - 10 - 8	Monitoring Well Level Sensor/Transmiter - Well 2D2			
	LE/LT - 10 - 9	Monitoring Well Level Sensor/Transmiter - Well 2MW12			
	LE/LT - 10 - 10	Monitoring Well Level Sensor/Transmiter - Well 2MW14			
	LE/LT - 10 - 11	Monitoring Well Level Sensor/Transmiter - Well 2MW17			
	LE/LT - 10 - 12	Monitoring Well Level Sensor/Transmiter - Well 2R9			
Pumping Wells	LE/LT - 20 - 1	Pumping Well Level Sensor/Transmitter - Well 1A1			
	LE/LT - 20 - 2	Pumping Well Level Sensor/Transmitter - Well 1B1			
	LE/LT - 20 - 3	Pumping Well Level Sensor/Transmitter - Well 1C1			
	LE/LT - 20 - 4	Pumping Well Level Sensor/Transmitter - Well 1R6			
	LE/LT - 20 - 5	Pumping Well Level Sensor/Transmitter - Well 1R5			
	LE/LT - 20 - 6	Pumping Well Level Sensor/Transmitter - Well 1R11			
	LE/LT - 20 - 7	Pumping Well Level Sensor/Transmitter - Well 1R12			
	LE/LT - 20 - 8	Pumping Well Level Sensor/Transmitter - Well 2A2			
	LE/LT - 20 - 9	Pumping Well Level Sensor/Transmitter - Well 2B2 (c)			
	LE/LT - 20 - 10	Pumping Well Level Sensor/Transmitter - Well 2MW9			
	LE/LT - 20 - 11	Pumping Well Level Sensor/Transmitter - Well 2R2			
	LE/LT - 20 - 12	Pumping Well Level Sensor/Transmitter - Well 2R7			
	LE/LT - 20 - 13	Pumping Well Level Sensor/Transmitter - Well 2R8 (c)			
	LE/LT - 20 - 14	Pumping Well Level Sensor/Transmitter - Well 2R10 (c)			
	P - 20 - 1	Pumping Well Groundwater Pump - Well 1A1			
	P - 20 - 2	Pumping Well Groundwater Pump - Well 1B1			
	P - 20 - 3	Pumping Well Groundwater Pump - Well 1C1			
	P - 20 - 4	Pumping Well Groundwater Pump - Well 1R6			
	P - 20 - 5	Pumping Well Groundwater Pump - Well 1R5			
	P - 20 - 6	Pumping Well Groundwater Pump - Well 1R11			
	P - 20 - 7	Pumping Well Groundwater Pump - Well 1R12			
	P - 20 - 8	Pumping Well Groundwater Pump - Well 2A2			
	P - 20 - 9	Pumping Well Groundwater Pump - Well 2B2 (c)			
	P - 20 - 10	Pumping Well Groundwater Pump - Well 2MW9			
	P - 20 - 11	Pumping Well Groundwater Pump - Well 2R2			
	P - 20 - 12	Pumping Well Groundwater Pump - Well 2R7			
	P - 20 - 13	Pumping Well Groundwater Pump - Well 2R8 (c)			
	P - 20 - 14	Pumping Well Groundwater Pump - Well 2R10 (c)			
	SC - 20 - 1	Well Pump Speed Control - Well 1A1			
	SC - 20 - 2	Well Pump Speed Control - Well 1B1			
	SC - 20 - 3	Well Pump Speed Control - Well 1C1			
	SC - 20 - 4	Well Pump Speed Control - Well 1R6			
	SC - 20 - 5	Well Pump Speed Control - Well 1R5			
	SC - 20 - 6	Well Pump Speed Control - Well 1R11			
	SC - 20 - 7	Well Pump Speed Control - Well 1R12			
	SC - 20 - 8	Well Pump Speed Control - Well 2A2			
	SC - 20 - 9	Well Pump Speed Control - Well 2B2 (c)			
	SC - 20 - 10	Well Pump Speed Control - Well 2MW9			
	SC - 20 - 11	Well Pump Speed Control - Well 2R2			
	SC - 20 - 12	Well Pump Speed Control - Well 2R7			
	SC - 20 - 13	Well Pump Speed Control - Well 2R8 (c)			
	SC - 20 - 14	Well Pump Speed Control - Well 2R10 (c)			
	FIT - 20 - 1	Well Flow Meter - Well 1A1			
	FIT - 20 - 2	Well Flow Meter - Well 1B1			
	FIT - 20 - 3	Well Flow Meter - Well 1C1			
	FIT - 20 - 4	Well Flow Meter - Well 1R6			
	FIT - 20 - 5	Well Flow Meter- Well 1R5			
	FIT - 20 - 6	Well Flow Meter- Well 1R11			

System Component	Tag #	Item Description	ControlSetpoint	Alarm Code Name	Alarm Setpoint
	FIT - 20 - 7	Well Flow Meter - Well 1R12			
	FIT - 20 - 8	Well Flow Meter - Well 2A2			
	FIT - 20 - 9	Well Flow Meter - Well 2B2 (c)			
	FIT - 20 - 10	Well Flow Meter - Well 2MW9			
	FIT - 20 - 11	Well Flow Meter - Well 2R2			
	FIT - 20 - 12	Well Flow Meter- Well 2R7			
	FIT - 20 - 13	Well Flow Meter - Well 2R8 (c)			
	FIT - 20 - 14	Well Flow Meter- Well 2R10 (c)			
	PLC	calculation - Well Flow Setpoint Sum Quantity Alarm High		QAH	200 gpm
Floor Sump	LS - 30 - 2	Floor Sump High Level Switch			
	LS - 30 - 1	Floor Sump Low Level Switch			
	M - 30 - -	Floor Pump			
Pretreatment System	SB - 40 - 1	Clarifier Settling Basin			
	M - 40 - 1	Clarifier Outflow Motorized Valve			
Wet Well	LE/LT - 50 - 1	Wet Well Level Sensor/Transmitter		LAHH	
	P - 50 - 1	Wet Well Transfer Pump			
	P - 50 - 2	Wet Well Transfer Pump			
	P - 50 - 3	Wet Well Transfer Pump			
GAC	P - 60 - 1	Pressure Transmitter Upstream of all GAC Filters			
	2	Pressure Transmitter in between Lead and Lag Filters			
	3	Pressure Transmitter Downstream of all GAC Filters			
Backwash System	T - 70 - -	Backwash Storage Tank			
	M - 70 - -	Backwash Storage Tank Discharge Pump			
	T - 75 - -	Backwash Waste Tank			
Discharge	FIT - 80 - 1	Effluent Totalizer Flow Indicating Transmitter		FAH	150 gpm
		(averaged over 12 hours twice daily)		FAHH	200 gpm
	FE - 80 - 1	Effluent Totalizer Flow Element			
	AIT - 80 - 2	Effluent pH Indicating Transmitter		AAH	7 to 8.5 SU
	AE - 80 - 2	Effluent pH Sensor		AAHH	6.5 to 9 SU
	TIT - 80 - 3	Effluent Temperature Indicator Transmitter		TAH	13.7 deg C
	TE - 80 - 3	Effluent Temperature Sensor		TAHH	19 deg C
		Floor Sump Low Level Switch		LAL	
Leak Detection		Floor Sump High Level Switch		LAH	
		Wet Well Level Switch		YA	
		Wet Well Leak Detection Strip		LAH	

System Component	Tag #	Item Description	New or Existing Equipment	PLC Input / Output	Count = 82 Sum of AI	14 Sum of AO	48 Sum of DI	16 Sum of DO
Monitoring Wells	LE/LT - 10 - 1	Monitoring Well Level Sensor/Transmiter - Well 1D1	New	Level Measurement	1	0	0	0
	LE/LT - 10 - 2	Monitoring Well Level Sensor/Transmiter - Well 1MW1	New	Level Measurement	1	0	0	0
	LE/LT - 10 - 3	Monitoring Well Level Sensor/Transmiter - Well 1MW4	New	Level Measurement	1	0	0	0
	LE/LT - 10 - 4	Monitoring Well Level Sensor/Transmiter - Well 1MW13	New	Level Measurement	1	0	0	0
	LE/LT - 10 - 5	Monitoring Well Level Sensor/Transmiter - Well 1MW16	New	Level Measurement	1	0	0	0
	LE/LT - 10 - 6	Monitoring Well Level Sensor/Transmiter - Well 1R4	New	Level Measurement	1	0	0	0
	LE/LT - 10 - 7	Monitoring Well Level Sensor/Transmiter - Well 2C2	New	Level Measurement	1	0	0	0
	LE/LT - 10 - 8	Monitoring Well Level Sensor/Transmiter - Well 2D2	New	Level Measurement	1	0	0	0
	LE/LT - 10 - 9	Monitoring Well Level Sensor/Transmiter - Well 2MW12	New	Level Measurement	1	0	0	0
	LE/LT - 10 - 10	Monitoring Well Level Sensor/Transmiter - Well 2MW14	New	Level Measurement	1	0	0	0
	LE/LT - 10 - 11	Monitoring Well Level Sensor/Transmiter - Well 2MW17	New	Level Measurement	1	0	0	0
	LE/LT - 10 - 12	Monitoring Well Level Sensor/Transmiter - Well 2R9	New	Level Measurement	1	0	0	0
Pumping Wells	LE/LT - 20 - 1	Pumping Well Level Sensor/Transmitter - Well 1A1	New	Level Measurement	1	0	0	0
	LE/LT - 20 - 2	Pumping Well Level Sensor/Transmitter - Well 1B1	New	Level Measurement	1	0	0	0
	LE/LT - 20 - 3	Pumping Well Level Sensor/Transmitter - Well 1C1	New	Level Measurement	1	0	0	0
	LE/LT - 20 - 4	Pumping Well Level Sensor/Transmitter - Well 1R6	New	Level Measurement	1	0	0	0
	LE/LT - 20 - 5	Pumping Well Level Sensor/Transmitter - Well 1R5	New	Level Measurement	2	0	0	0
	LE/LT - 20 - 6	Pumping Well Level Sensor/Transmitter - Well 1R11	New	Level Measurement	2	0	0	0
	LE/LT - 20 - 7	Pumping Well Level Sensor/Transmitter - Well 1R12	New	Level Measurement	2	0	0	0
	LE/LT - 20 - 8	Pumping Well Level Sensor/Transmitter - Well 2A2	New	Level Measurement	1	0	0	0
	LE/LT - 20 - 9	Pumping Well Level Sensor/Transmitter - Well 2B2 (c)	New	Level Measurement	2	0	0	0
	LE/LT - 20 - 10	Pumping Well Level Sensor/Transmitter - Well 2MW9	New	Level Measurement	1	0	0	0
	LE/LT - 20 - 11	Pumping Well Level Sensor/Transmitter - Well 2R2	New	Level Measurement	1	0	0	0
	LE/LT - 20 - 12	Pumping Well Level Sensor/Transmitter - Well 2R7	New	Level Measurement	1	0	0	0
	LE/LT - 20 - 13	Pumping Well Level Sensor/Transmitter - Well 2R8 (c)	New	Level Measurement	2	0	0	0
	LE/LT - 20 - 14	Pumping Well Level Sensor/Transmitter - Well 2R10 (c)	New	Level Measurement	2	0	0	0
	M - 20 - 1	Pumping Well Groundwater Pump - Well 1A1	Existing	Well Pump Motor	-	-	-	-
	M - 20 - 2	Pumping Well Groundwater Pump - Well 1B1	Existing	Well Pump Motor	-	-	-	-
	M - 20 - 3	Pumping Well Groundwater Pump - Well 1C1	Existing	Well Pump Motor	-	-	-	-
	M - 20 - 4	Pumping Well Groundwater Pump - Well 1R6	Existing	Well Pump Motor	-	-	-	-
	M - 20 - 5	Pumping Well Groundwater Pump - Well 1R5	Existing	Well Pump Motor	-	-	-	-
	M - 20 - 6	Pumping Well Groundwater Pump - Well 1R11	Existing	Well Pump Motor	-	-	-	-
	M - 20 - 7	Pumping Well Groundwater Pump - Well 1R12	Existing	Well Pump Motor	-	-	-	-
	M - 20 - 8	Pumping Well Groundwater Pump - Well 2A2	Existing	Well Pump Motor	-	-	-	-
	M - 20 - 9	Pumping Well Groundwater Pump - Well 2B2 (c)	Existing	Well Pump Motor	-	-	-	-
	M - 20 - 10	Pumping Well Groundwater Pump - Well 2MW9	Existing	Well Pump Motor	-	-	-	-
	M - 20 - 11	Pumping Well Groundwater Pump - Well 2R2	Existing	Well Pump Motor	-	-	-	-
	M - 20 - 12	Pumping Well Groundwater Pump - Well 2R7	Existing	Well Pump Motor	-	-	-	-
	M - 20 - 13	Pumping Well Groundwater Pump - Well 2R8 (c)	Existing	Well Pump Motor	-	-	-	-
	M - 20 - 14	Pumping Well Groundwater Pump - Well 2R10 (c)	Existing	Well Pump Motor	-	-	-	-
	SC - 20 - 1	Well Pump Speed Control - Well 1A1	New	Current Indication, Speed Indication, Auto Indication, Fail Indication, Run Indication, Start/Stop Control, Speed Control	2	1	3	1
	SC - 20 - 2	Well Pump Speed Control - Well 1B1	New	Current Indication, Speed Indication, Auto Indication, Fail Indication, Run Indication, Start/Stop Control, Speed Control	2	1	3	1
	SC - 20 - 3	Well Pump Speed Control - Well 1C1	New	Current Indication, Speed Indication, Auto Indication, Fail Indication, Run Indication, Start/Stop Control, Speed Control	2	1	3	1
	SC - 20 - 4	Well Pump Speed Control - Well 1R6	New	Current Indication, Speed Indication, Auto Indication, Fail Indication, Run Indication, Start/Stop Control, Speed Control	2	1	3	1
	SC - 20 - 5	Well Pump Speed Control - Well 1R5	New	Current Indication, Speed Indication, Auto Indication, Fail Indication, Run Indication, Start/Stop Control, Speed Control	2	1	3	1
	SC - 20 - 6	Well Pump Speed Control - Well 1R11	New	Current Indication, Speed Indication, Auto Indication, Fail Indication, Run Indication, Start/Stop Control, Speed Control	2	1	3	1
	SC - 20 - 7	Well Pump Speed Control - Well 1R12	New	Current Indication, Speed Indication, Auto Indication, Fail Indication, Run Indication, Start/Stop Control, Speed Control	2	1	3	1
	SC - 20 - 8	Well Pump Speed Control - Well 2A2	New	Current Indication, Speed Indication, Auto Indication, Fail Indication, Run Indication, Start/Stop Control, Speed Control	2	1	3	1
	SC - 20 - 9	Well Pump Speed Control - Well 2B2 (c)	New	Current Indication, Speed Indication, Auto Indication, Fail Indication, Run Indication, Start/Stop Control, Speed Control	2	1	3	1
	SC - 20 - 10	Well Pump Speed Control - Well 2MW9	New	Current Indication, Speed Indication, Auto Indication, Fail Indication, Run Indication, Start/Stop Control, Speed Control	2	1	3	1
	SC - 20 - 11	Well Pump Speed Control - Well 2R2	New	Current Indication, Speed Indication, Auto Indication, Fail Indication, Run Indication, Start/Stop Control, Speed Control	2	1	3	1
	SC - 20 - 12	Well Pump Speed Control - Well 2R7	New	Current Indication, Speed Indication, Auto Indication, Fail Indication, Run Indication, Start/Stop Control, Speed Control	2	1	3	1
	SC - 20 - 13	Well Pump Speed Control - Well 2R8 (c)	New	Current Indication, Speed Indication, Auto Indication, Fail Indication, Run Indication, Start/Stop Control, Speed Control	2	1	3	1
	SC - 20 - 14	Well Pump Speed Control - Well 2R10 (c)	New	Current Indication, Speed Indication, Auto Indication, Fail Indication, Run Indication, Start/Stop Control, Speed Control	2	1	3	1
	SC - 20 - 1	Well Flow Meter - Well 1A1	New	Flow Rate 4-20 ma Input	1	0	0	0
	SC - 20 - 2	Well Flow Meter - Well 1B1	New	Flow Rate 4-20 ma Input	1	0	0	0
	SC - 20 - 3	Well Flow Meter - Well 1C1	New	Flow Rate 4-20 ma Input	1	0	0	0
	SC - 20 - 4	Well Flow Meter - Well 1R6	New	Flow Rate 4-20 ma Input	1	0	0	0
	SC - 20 - 5	Well Flow Meter- Well 1R5	New	Flow Rate 4-20 ma Input	1	0	0	0
	SC - 20 - 6	Well Flow Meter- Well 1R11	New	Flow Rate 4-20 ma Input	1	0	0	0
	SC - 20 - 7	Well Flow Meter - Well 1R12	New	Flow Rate 4-20 ma Input	1	0	0	0
	SC - 20 - 8	Well Flow Meter - Well 2A2	New	Flow Rate 4-20 ma Input	1	0	0	0
	SC - 20 - 9	Well Flow Meter - Well 2B2 (c)	New	Flow Rate 4-20 ma Input	1	0	0	0
	SC - 20 - 10	Well Flow Meter - Well 2MW9	New	Flow Rate 4-20 ma Input	1	0	0	0
	SC - 20 - 11	Well Flow Meter - Well 2R2	New	Flow Rate 4-20 ma Input	1	0	0	0
	SC - 20 - 12	Well Flow Meter- Well 2R7	New	Flow Rate 4-20 ma Input	1	0	0	0
	SC - 20 - 13	Well Flow Meter - Well 2R8 (c)	New	Flow Rate 4-20 ma Input	1	0	0	0
	SC - 20 - 14	Well Flow Meter- Well 2R10 (c)	New	Flow Rate 4-20 ma Input	1	0	0	0
Into Building	FIT - 25 - 1	Inflow Totalizer Flow Transmitter	New	Flow Measurement	1	-	-	-
	FE - 25 - 1	Inflow Totalizer Flow Indicator	New	-	-	-	-	-
Floor Sump	LS - 30 - 2	Floor Sump High Level Switch	New	Level Switch	0	0	1	0
	LS - 30 - 1	Floor Sump Low Level Switch	New	Level Switch	0	0	1	0
	M - 30 - -	Floor Pump	Existing	Pump Start/Stop	0	0	0	1
Pretreatment System	SB - 40 - 1	Clarifier Settling Basin	Existing	-	-	-	-	-
	M - 40 - 1	Clarifier Outflow Motorized Valve	New	Block Valve	0	0	0	1
Wet Well	LE/LT - 50 - 1	Wet Well Level Sensor/Transmitter	New	Level Indicate (LI), Level Switch, Pump Record, Pump Alarm	1	-	-	-
	P - 50 - 1	Wet Well Transfer Pump	Existing	Pump Record, Pump Alarm	-	-	1	-
	P - 50 - 2	Wet Well Transfer Pump	Existing	Pump Record, Pump Alarm			1	
	P - 50 - 3	Wet Well Transfer Pump	Existing	Pump Record, Pump Alarm			1	
GAC	P - 60 - 1	Pressure Transmitter Upstream of all GAC Filters	New	Pressure Measurement	1	-	-	-
	2	Pressure Transmitter in between Lead and Lag Filters		Pressure Measurement	1			
	3	Pressure Transmitter Downstream of all GAC Filters		Pressure Measurement	1			
Backwash System	T - 70 - -	Backwash Storage Tank	Existing	-	-	-	-	-
	M - 70 - -	Backwash Storage Tank Discharge Pump	Existing	Level Switch	0	0	1	0
	T - 75 - -	Backwash Waste Tank	Existing	-	-	-	-	-
Discharge	FIT - 80 - 1	Effluent Totalizer Flow Indicating Transmitter	New	Flow Rate Measurement	1	0	0	0
	FE - 80 - 1	Effluent Totalizer Flow Element	New	-	-	-	-	-
	AIT - 80 - 2	Effluent pH Indicating Transmitter	New	Analysis Indicator	1	0	0	0
	AE - 80 - 2	Effluent pH Sensor	New	-	-	-	-	-
	TIT - 80 - 3	Effluent Temperature Indicator Transmitter	New	Temperature Indicator	1	0	0	0
	TE - 80 - 3	Effluent Temperature Sensor	New	-	-	-	-	-
		Floor Sump Low Level Switch			82	14	48	16
Leak Detection		Floor Sump High Level Switch			82	14	48	16
		Wet Well Level Switch						
		Wet Well Leak Detection Strip						

Table 10.3
Treatment Plant Design Criteria

Extraction Pump Speed Control	
Type	motor variable frequency drive
Example Well Pump Flow (gpm)	
Example Well Pump Discharge Pressure (psig)	
Rated Motor Horsepower	
Rated Motor Speed	
Control Speed for Desired Flow	
Current Limit	
Flowmeter Fluid Face Velocity	

Pretreatment Sedimentation	
Type	Clarifier/Thickener
Maximum Flow (gpm)	200 gpm
Diameter (ft)	18
Side Water Depth (ft)	7
Tank Construction	$^{1}/4$" Steel
Manufacturer	Eimco
Hydraulic Loading Rate (gpm/ft^2)	1.3
Sludge Piping	4" Steel
Bottom Slope (H:L)	2.5:12

Lead Absorption Column (Specifications Per Column)	
Number of Columns	2
Design Flow Rate per Vessel (gpm)	100
Max Design Flow Rate per Vessel (gpm)	113
Hydraulic Loading Rate (gpm/ft^2)	3.5
Column Diameter (ft)	6
Side Shell Height (ft)	6
Media Depth (ft)	3
Media Volume (ft^3)	85
Media Density (lb/ft^3)	60
Media Weight (lb)	5,100
Media Type	Activated Carbon
Empty Bed Contact Time (min)	6.4
Backwash Rate (gpm)	300
Backwash Loading Rate (gpm/ft^2)	10.6
Backwash Bed Expansion	20%
Backwash Time (min)	10
Lead Vessel Inlet Pressure Range	
Lead Vessel Outlet Pressure Range	

Table 10.3
Treatment Plant Design Criteria

Lag Adsorption Columns (Specifications Per Column)	
Number of Columns	3
Design Flow Rate per Vessel (gpm)	67
Max Design Flow Rate per Vessel (gpm)	113
Hydraulic Loading Rate (gpm/ft^2)	7
Column Diameter (ft)	6
Side Shell Height (ft)	6
Media Depth (ft)	4
Media Volume (ft^3)	113
Media Density (lb/ft^3)	28
Media Weight (lb)	3,167
Media Type	Activated Carbon
Empty Bed Contact Time (min)	4.2
Backwash Rate (gpm)	300
Backwash Loading Rate (gpm/ft^2)	10.6
Backwash Bed Expansion	50%
Backwash Time (min)	10 to 15
Lag Vessel Inlet Pressure Range	
Lag Vessel Outlet Pressure Range	
Differential Pressure Range Backwash Criteria	
Differential Pressure Range Alarm Setpoint	

Wet Well / Pump Station	
Volume (ft^3)	600
Dimensions	10'L x 10'W x 6' Deep
Type	Vertical Turbine
Number	3
Maximum Flow Rate (gpm)	200
Example Well Pump Discharge Pressure (psig)	
Rated Motor Horsepower	
Rated Motor Speed	
Control Speed for Desired Flow	
Current Limit	

Floor Sump Pump	
Type	
Number	
Maximum Flow Rate (gpm)	
Horsepower, Each (hp)	

Table 10.3
Treatment Plant Design Criteria

Effluent Analytical	
Temperature Range (deg F)	
pH Range	
Flowmeter Fluid Face Velocity	
Flowmeter Range (gpm)	
Backwash Storage and Waste Tanks (each tank)	
Volume (ft^3)	500
Diameter (ft)	10
Straight Side Height (ft)	6.5
Materials	Fiberglass Reinforced Polyester
Polymer Feed System (no longer utilized)	
Type	Polyblend
Model	PB-100-1.0
Polymer	Nalco 8109
Sludge Dewaterin& System (no longer utilized)	
Type	Clow J-1400 Filter Bed With Disposable Filter Media
Media	25 or 50 Micron Paper
Maximum Sludge Flow Rate	50 gpm

VOLUME II CHAPTER 1

1.0 IDAHO FALLS POLE TREATMENT YARD REMEDIATION SYSTEM

PROPOSED SYSTEM AUTOMATIONS

PacifiCorp plans to make several mechanical and instrumentation improvements to the existing wastewater treatment system at the former Pole Treatment Yard in Idaho Falls, Idaho. These improvements are schedule for implementation in 2009 after approval of the RCRA Post Closure Reapplication Permit is granted. The proposed system automations will make it possible to operate the site remotely and reduce the amount of time that the operator works on the site to one day per week and as needed to respond to alarms, service the granular activated carbon, and to prepare reports. The proposed system automations are summarized graphically on Figure II.1.1.

1.1 PROPOSED MODIFICATIONS TO THE GROUNDWATER EXTRACTION SYSTEM

1.1.1 Depth Measurement. There are presently 39 wells located on-site and 5 off-site. During the system upgrade, twenty six of these forty four wells will be enhanced to provide remote monitoring of water level elevations. Currently the water level in each well is obtained manually using a water level indicator.

Proposed Changes:

- Twenty six wells will be equipped with one or more submersible pressure transducer(s).
- The signal from each transducer will be fed into the Operating Computer and displayed as a real-time readout.
- A barometric pressure probe will be installed to help convert the water levels to elevations.

- Electronic water level data will be used to monitor and adjust the pumping rate in each well.

1.1.2 Flow Measurement. Flow to the treatment plant from each well is measured manually using a v-notch weir and graduated scale.

Proposed Changes:

- Each well that pumps water to the treatment system will have an electronic flow meter installed in the discharge line to record and totalize the quantity of water produced from the well.
- Flow data for each well will be transmitted to the Control Computer and displayed as a real-time readout.
- Flowrate for each well will be averaged by the Control Computer over 24 hours and the value will be entered into a database for use in generating the daily report.
- The Control Computer will totalize the flow and store the data for weekly and monthly averages for use in preparing semi-annual reports.

1.1.3 Flow Control. All pumps in the current system operate in an on/off mode. Flow from the pumps is controlled by throttling the discharge with a valve.

Proposed Changes:

- Each operating pump in the well field will be connected to a new variable frequency drive (VFD) system that modulates the speed of the motor on each pump.
- Each VFD will be connected to the Control Computer and pump status and drive frequency will be displayed.
- The computer can be used to make incremental adjustments to the pumping rate at each well by changing the display on the Control Computer.

- The system operator will be able to remotely and locally start and stop each pump, change the pumping rate, and set the system into manual pump control mode or automatic control mode (using flow or level set points to control the pump speed).
- Pump on or off status will be displayed on the Control Computer.
- The system will be equipped with an interlock that shuts off any pump that draws the water down below a safe operating level.
- An alarm will be sent to the Control Computer indicating pump shutdown or VFD problems.

1.1.4 Automatic Operation. The only automated components of the current system are the wet well pumps

in the main treatment building.

Proposed Changes:

- By combining the signals from the flow meters and the level inputs from the transducers with the VFD controls, the system can be programmed to operate in a flow-based or level-based mode.
- The pumps can be set to maintain a selected water level, or a selected flowrate, depending on the needs of the system.
- Signals from transducers in each well can also be used to determine if there is a groundwater gradient reversal within the aquifers.

1.2 TREATMENT SYSTEM

1.2.1 Influent Weir Box. The existing system uses a large steel box divided into separate compartments to measure the incoming flow from each well.

Proposed Changes:

- Replace the weir box with individual flow meters for each well
- Use the weir box as a secondary or backup flow measurement device.

1.2.2 Clarifier. Flow from the wells is combined into a single pipe that discharges into a circular clarifier. The clarifier is designed to remove solids through settling. No changes are proposed for operation or control of the Clarifier.

1.2.3 Wet Well. Flow from the clarifier discharges to a concrete wet well. The wet well currently operates using mercury float switches that turn the pumps on and off based on water level in the sump.

Proposed Changes:

- The wet well will be equipped with a level transducer that provides a control signal to a process logic controller (PLC).
- The PLC will use the level signal data to start and stop the three transfer pumps in the wet well, and the pumps will be programmed to turn on and off based on target water levels.
- The system operator will be able to remotely and locally start and stop each pump
- Pump on/off status will be displayed on the Control Computer.
- The system will be equipped with an interlock that shuts off all pumps if the water level in the sump rises above a high water set point
- To prevent flooding of the sump, a motor-operated valve will be installed in the line from the clarifier to the sump to hold water until the pumps can be restarted
- An alarm will be sent to the Control Computer indicating pump shutdown for high water level.

- The system will send a pump failure alarm condition to the Control Computer if one of the sump pumps fails.

1.2.4 Carbon Tanks. Flow from the sump is directed to the carbon adsorption tanks. There are five tanks in the system that will receive flow from the wet well. The tanks are divided into two sets. One with two tanks and one with three tanks.

Proposed Changes:

- Each set of tanks will be equipped with a pressure transmitter located on the influent line to the tank
- The transmitters will send data to the Control Computer which will display it as an active pressure in pounds per square inch (psi)
- The operator can use the data to determine when the carbon in the tank has become clogged and needs to be backwashed or changed.

1.3 DISCHARGE SYSTEM

1.3.1 Flow Measurement. Following treatment in the carbon tanks, the wastewater is combined into a single pipe and ultimately discharges into the Snake River. The current system has no instrumentation to monitor outgoing flow.

Proposed Changes:

- The effluent pipeline will be equipped with a magnetic flow meter (Mag Meter) that will record the flow rate and total quantity of water leaving the plant.
- The flow rate will be transmitted to the PLC and the data will be displayed on the Control Computer.
- The flow data will be stored in the operating computer and used to generate the daily report.

1.3.2 pH Measurement. pH readings are done manually on plant effluent water.

Proposed Changes:

- A meter will be installed in the effluent discharge line that provides real-time pH readings on the water that leaves the plant
- The pH reading will be displayed on the meter locally and transmitted to the PLC for display on the Control Computer
- Daily readings will be stored in the Control Computer and used to generate the daily report

1.3.3 Temperature Measurement. Temperature readings are currently done manually on plant effluent water.

Proposed Changes:

- A temperature probe will be installed in the effluent line to provide a real-time temperature reading
- Control Computer software will display and store the temperature readings for use in generating the daily report.

1.4 CONTROL COMPUTER

1.4.1 Computer. The Control Computer will be a desktop PC capable of running a commercially available plant operation software package like Intellution, or Wonderware. The Control Computer will be equipped such that the computer can be accessed remotely over the internet allowing full control of the system and access to all stored data and reports. The Control Computer will have a data backup feature to ensure redundant copies of the data are kept. The data can be downloaded to an external storage device or another computer for security.

1.4.2 Alarms. The Control Computer will be set up to send notification of any system alarms to selected destinations. This would be done by dial-out to a telephone, computer, or cell phone and would be directed to the appropriate authorities as describe in the Contingency Plan (Volume I Chapter 6). Spill prevention would be enhanced by the new systems by having the central computer system compare the combined inlet flow rates from the wells to the plants discharge flow rate. If the average inlet and discharge flow rates exceed a programmed threshold, the plant would automatically shut down and notifications sent to the HWMF Manager. Floor sensors would also be installed and connected to the PLC/central computer to detect overflow conditions from the wet well or other portions of the treatment plant. Smoke detectors would be installed as a part of the proposed system automations and connected to the PLC/central computer. Upon detection of smoke, the installed PLC/central computer would immediately notify the Fire Department and other emergency response personnel as outlined in the Contingency Plan.

1.4.3 Reports. The system operating permit requires the preparation of a daily report that records the flowrates from each well, effluent pH, temperature, and other operating observations. The Control Computer Software will be configured to generate a daily report that summaries this information and stores it for download or future reference. The permit also requires a semi-annual report that summarizes all the daily activity performed over the preceding six months. The operating data will be accessed to generate the trend graphs, data summaries and any operating information needed to complete the reports.

1.5 OPERATING PERMIT

Table II.1.1 summarizes the proposed changes to the RCRA Post Closure Care permit that relate to the proposed system automation.

Table II.1.1

Summary of Proposed Permit Modifications

Treatment System Modifications

Permit Section	Existing Operations	Automated System
I.N.2	Copies of all records made available to IDEQ	Some records will be available electronically. Point of contact may change.
II.D.2	Equipment Information Manual	Will be updated to include changes
II.G.1	Inspection Requirements	A part time operator/technician will visit the site at least once per week to perform equipment maintenance and visual inspection of the wells and cap. This will not interfere with reporting requirements and Inspection Checklists required Weekly, Monthly and Semi-annually.

Well Field Modifications

Permit Reference	Current Permit Requirements	Current Operations	Proposed Operations
Pumping Wells Aquifer 1 (Permit Reference I.V.B.)	R4,R5,R6,R11,R12,A1,B1,C1,D1, MW4	R6,A1,B1,and C1	Standard pumping wells R6,A1,B1,C1 Contingency wells capable of pumping R5,R11,R12. Pumping from contingency wells will be performed when needed for plume containment and when evidence of contamination (sheen or significant odor) is present in the contingency wells.
Pumping Wells Aquifer 2 (Permit Reference I.V.B)	R2,R7,R8,R9,R10,A2,B2,C2,D2, MW14	R2,R7,A2, and MW9	Standard pumping wells R2,R7,A2, MW9 Contingency wells capable of pumping R8,R10,B2 Pumping from contingency wells will be performed when needed for plume containment and when evidence of contamination (sheen or significant odor) is present in the contingency wells.
Semi Annual Specific Capacity Tests (Permit Reference I.V.B)	R4,R11,A1,B1,C1	R4,R11,A1,B1, and C1	Run specific capacity tests annually only. Automated monitoring will allow for informal specific capacity tests as needed at any time.
Annual Specific Capacity Tests (Permit Reference I.V.B)	R2,MW9,A2	Same as permit	Aquifer 1: A1, C1, R6 Aquifer 2: A2, R2, R7, MW9

Table II.1.1

Permit Reference	Current Permit Requirements	Current Operations	Proposed Operations
Semiannual GW Elevation Monitoring (Permit Reference IV.D.1)	Aquifer 1: A1,B1,C1,D1,R4,R5,R6,R11,R12, MW4,MW13,MW16,MW1 Aquifer 2: A2,B2,C2,D2,R2,R7,R8,R9,R10, MW9, MW12, MW14, MW17.	Same as permit	Remote monitor of permit wells using automated system. Record elevations daily, interpret capture zone monthly during first year of automated operations. Report monthly interpretations of capture zone in semiannual reports.
CAMP Monitoring (Permit Reference III.C.1)	Aquifer 1: Semiannual sampling of wells: A1,B1,C1,D1,R6,MW4,MW13, MW16 Aquifer 2: Semiannual sampling of wells: A2,B2,C2,D2, MW12,MW14,MW17 Analyses of all samples for current RCRA Permit Table 4 parameter list.	Same as permit	Annual sampling of permit wells in Aquifers 1 and 2. Also install new Aquifer 2 POC well E-2 down gradient of well A-2. New well E-2 to be sampled quarterly for the first year and then annually thereafter. Every two years, sample Aquifer 1 and 2 plume core wells (R-1, R-2, R-5, R-7, R-8, R-11, MW-9, A-2). Analyze for permit Table 4 parameters.
CMP (Compliance Monitoring Program)	Aquifer 1: Semiannual sampling of wells: A1,B1,C1,D1,R6,MW4,MW13, MW16 Aquifer 2: Semiannual sampling of wells: A2,B2,C2,D2, MW12,MW14,MW17 Analyses of all samples for Current RCRA Permit Table 4 parameters semiannually and Appendix IX constituents annually.	Same as Permit	Continue semi-annual sampling events for current RCRA Permit Table 4 parameters only. Sample E-2 instead of A-2
DMP (Detection Monitoring Program)	Aquifer 1: Semiannual sampling of wells: A1,B1,C1,D1,MW4 Aquifer 2: Semiannual sampling of wells: A2,B2,C2,D2,MW14 Analyses of all samples for current RCRA Permit Table 4 parameters semiannually	Same as Permit	Continue semi-annual sampling events for current RCRA Permit Table 4 parameters only. Sample E-2 instead of A-2.