Figure 3-26

Injection Test Data

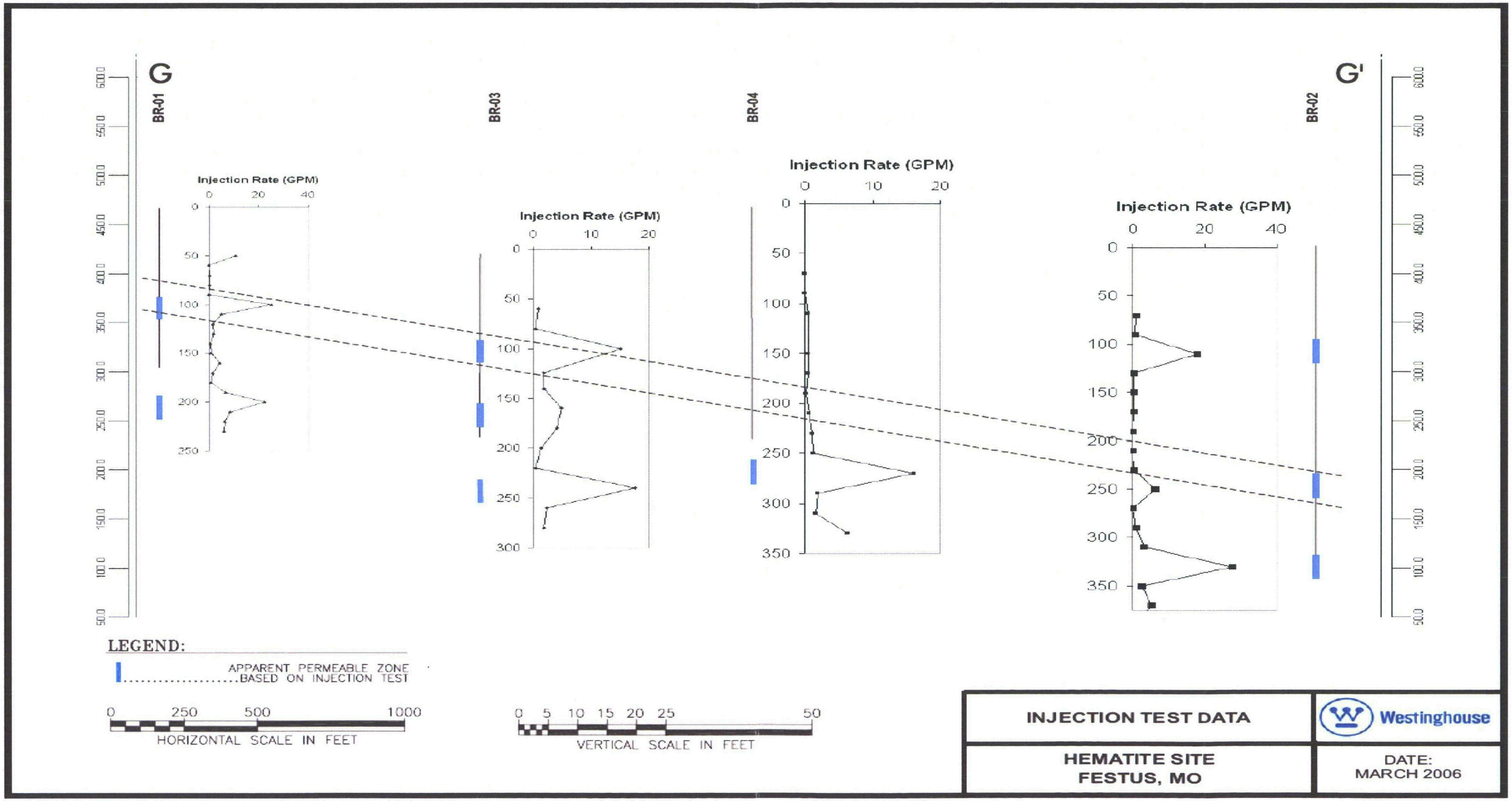


Figure 3-27

Hydraulic Summary

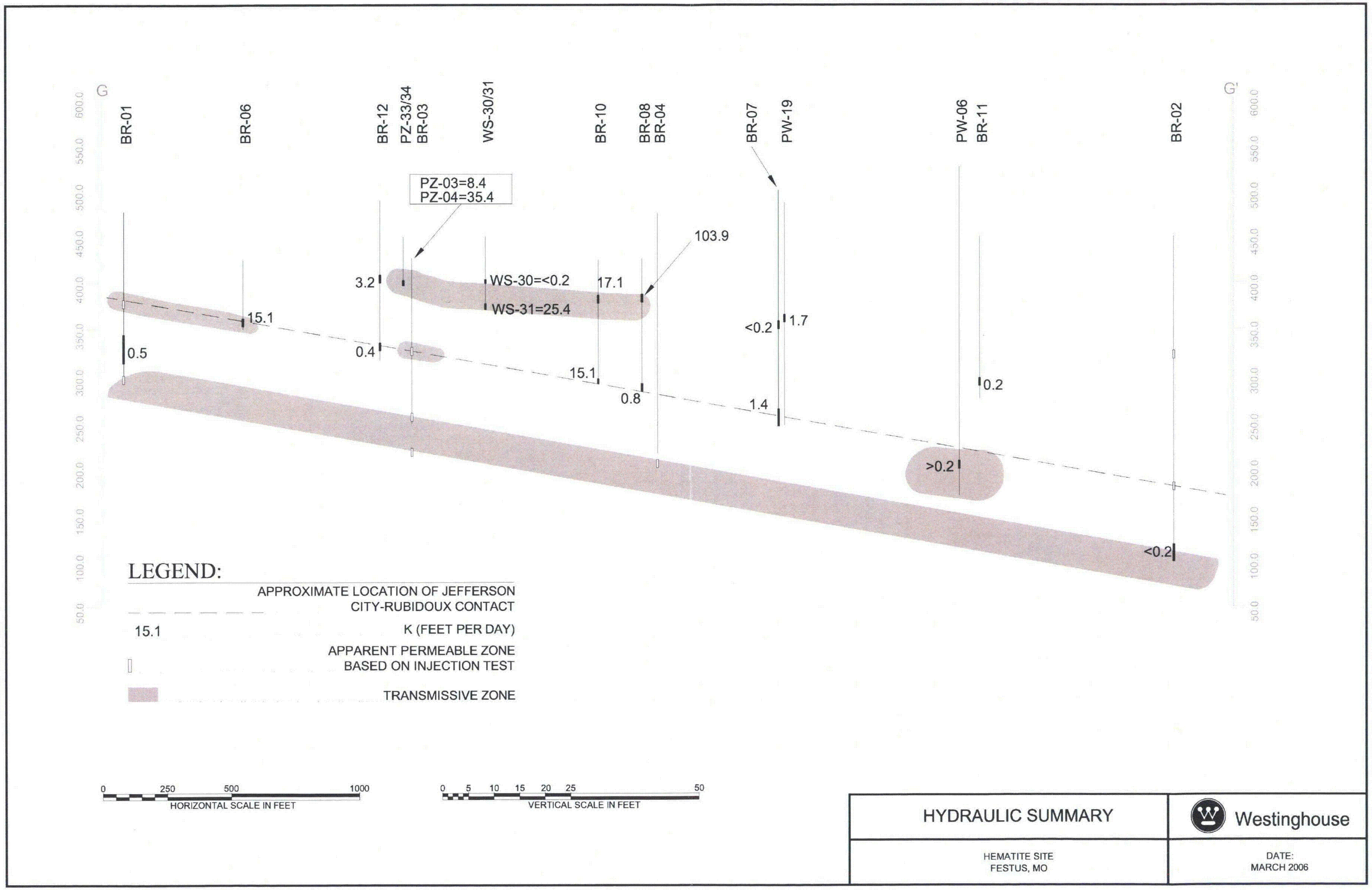


Figure 3-28

Potentiometric Surface Of Shallow Overburden Wells

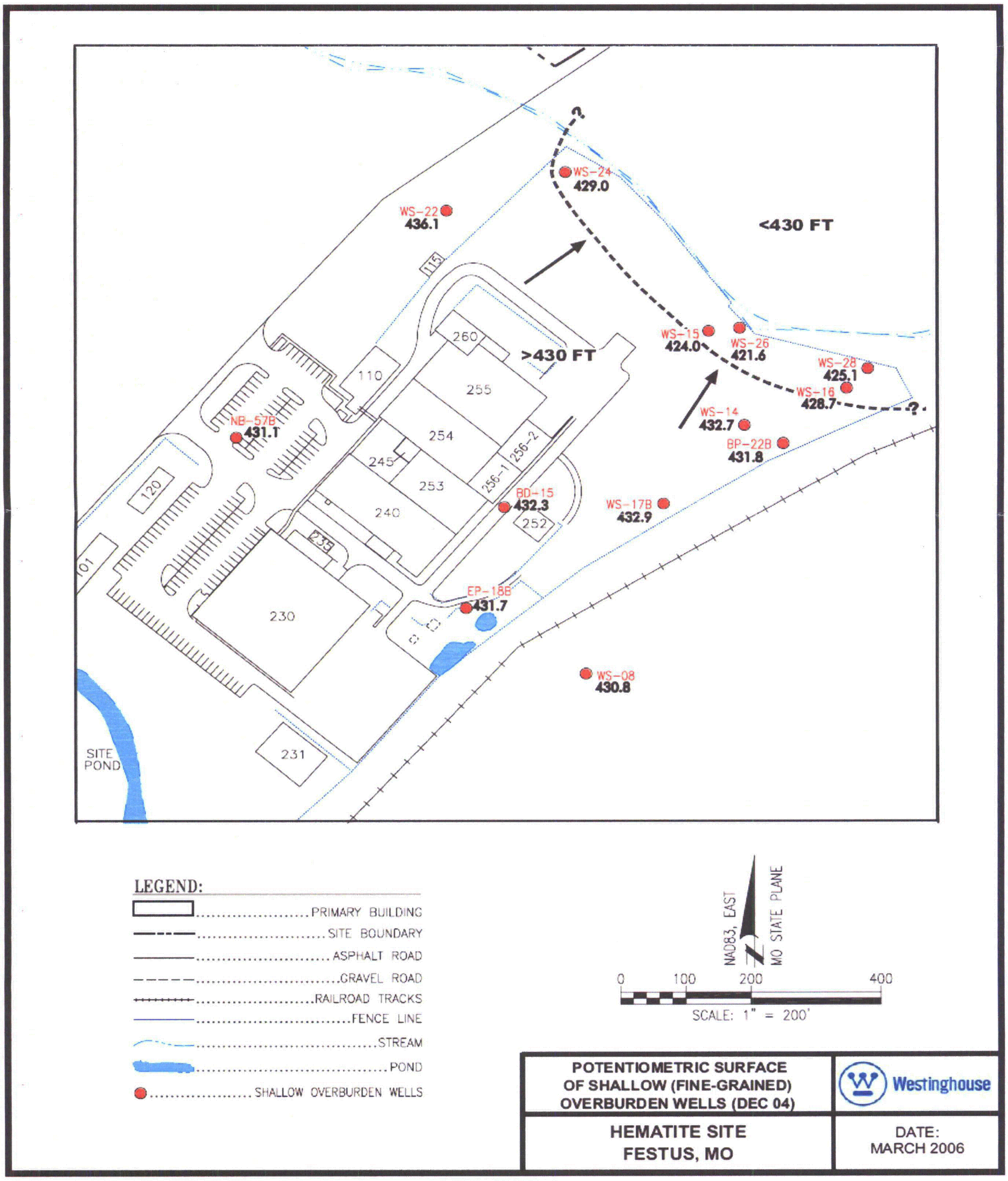


Figure 3-29

Potentiometric Surface Of Deeper Overburden Wells

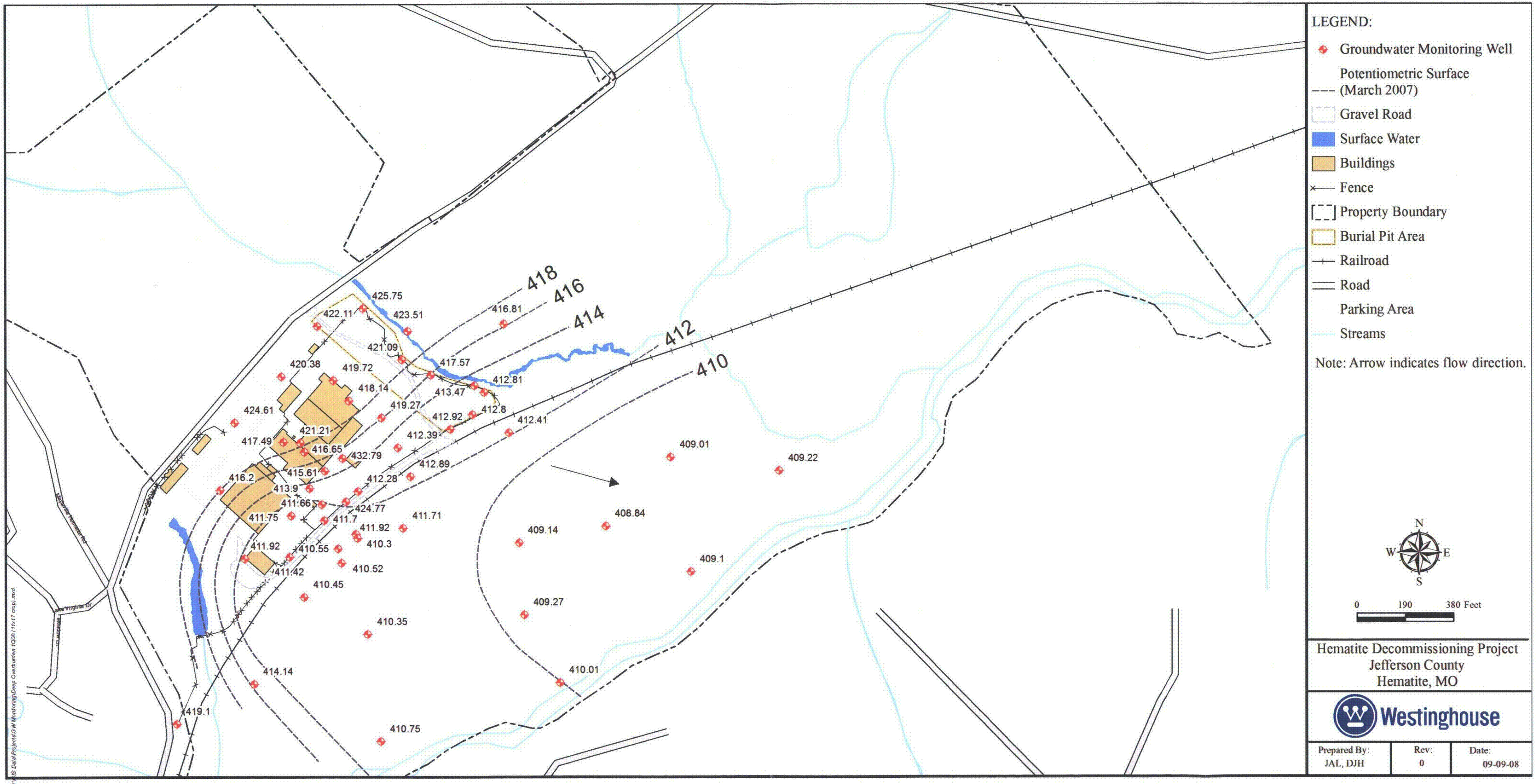


Figure 3-30

Potentiometric Surface Of The Jefferson City-Cotter Wells

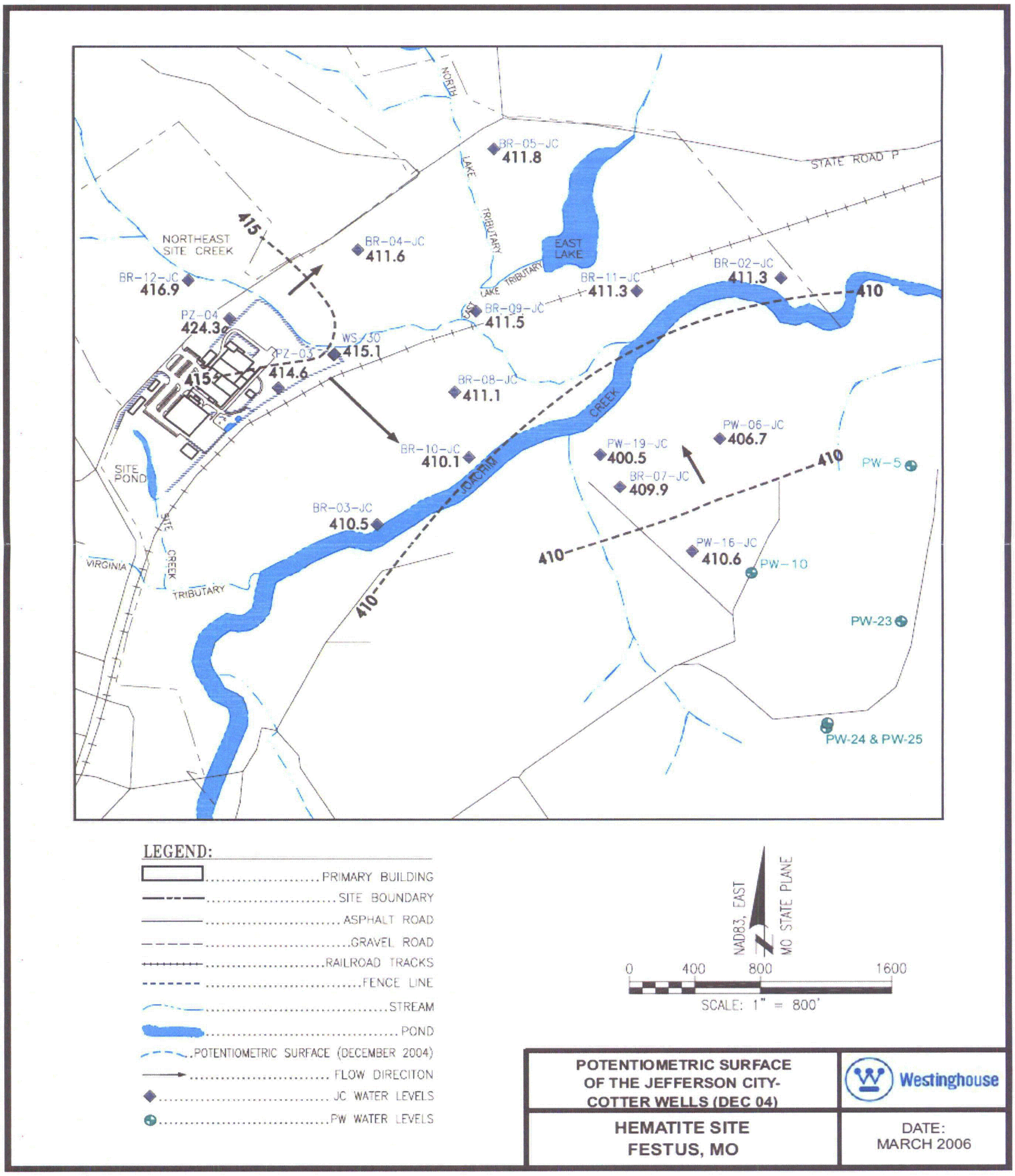


Figure 3-31 **Page 1 of 1**

Potentiometric Surface Of The Jefferson City-Roubidoux Contact Zone Wells

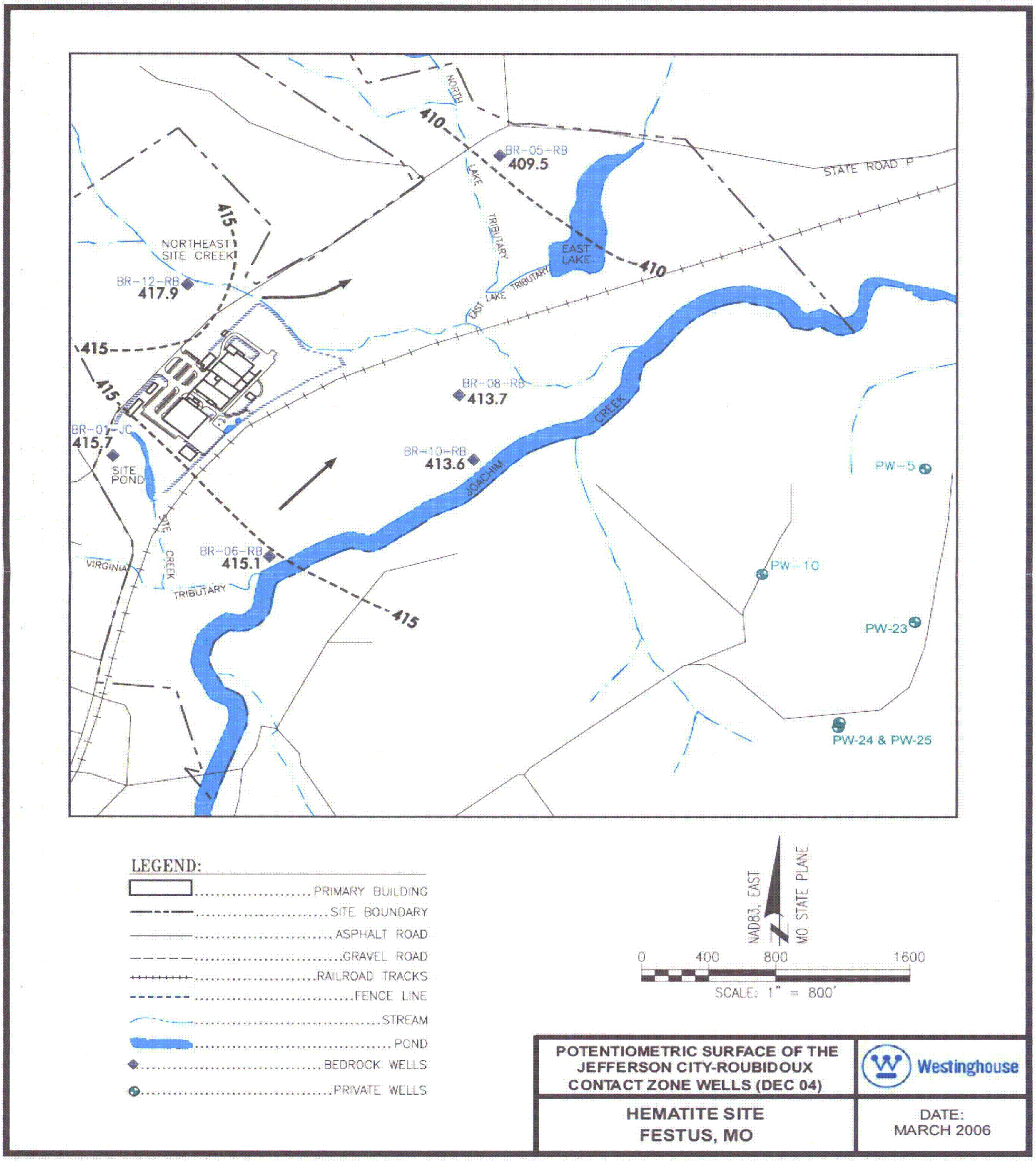
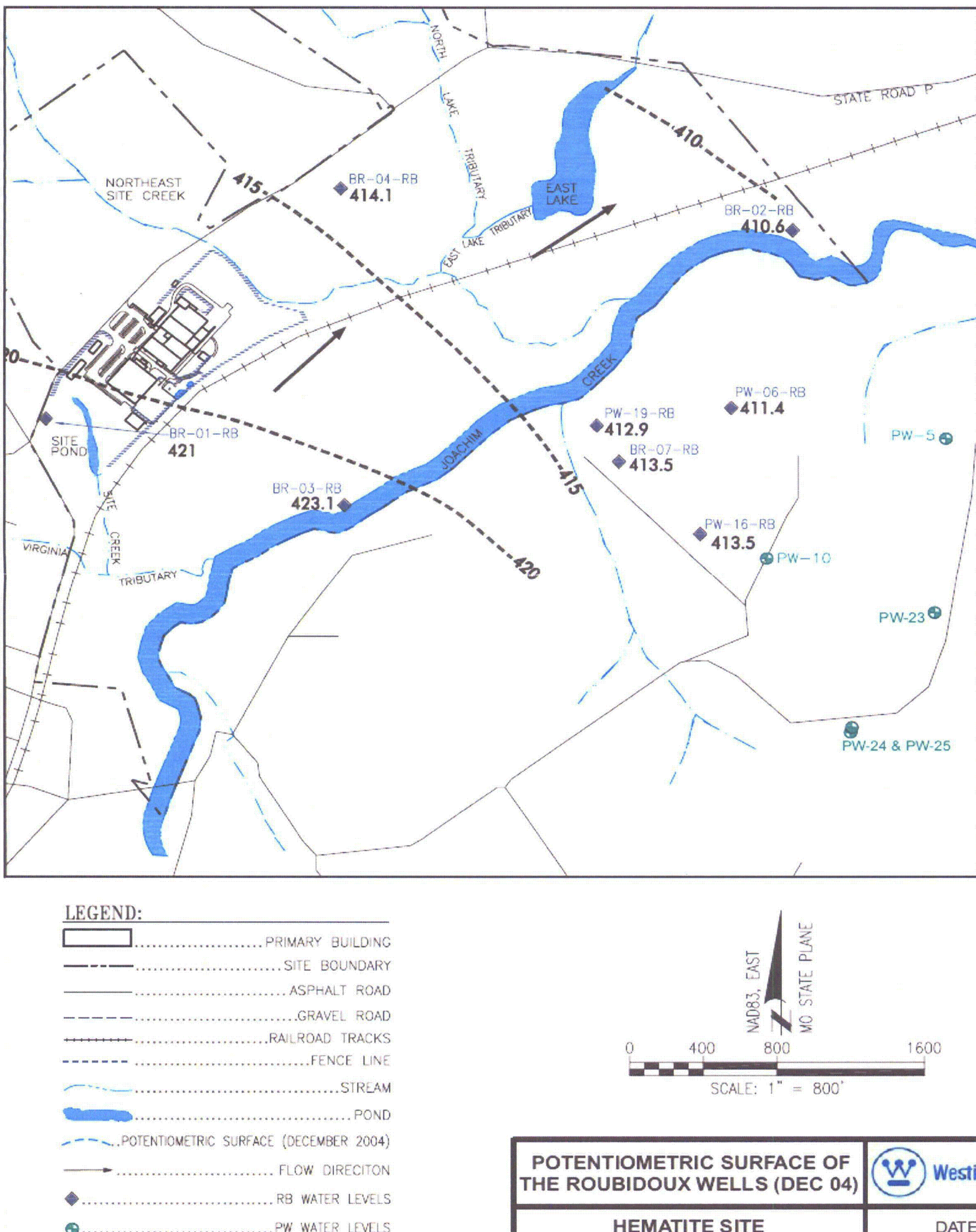


Figure 3-32 **Page 1 of 1**

Potentiometric Surface Of The Roubidoux Wells



POTENTIOMETRIC SURFACE OF THE ROUBIDOUX WELLS (DEC 04)	Westinghouse
HEMATITE SITE FESTUS, MO	DATE: MARCH 2006

Figure 3-33

Hydraulic Gradient Between Shallow And Deep Overburden Wells

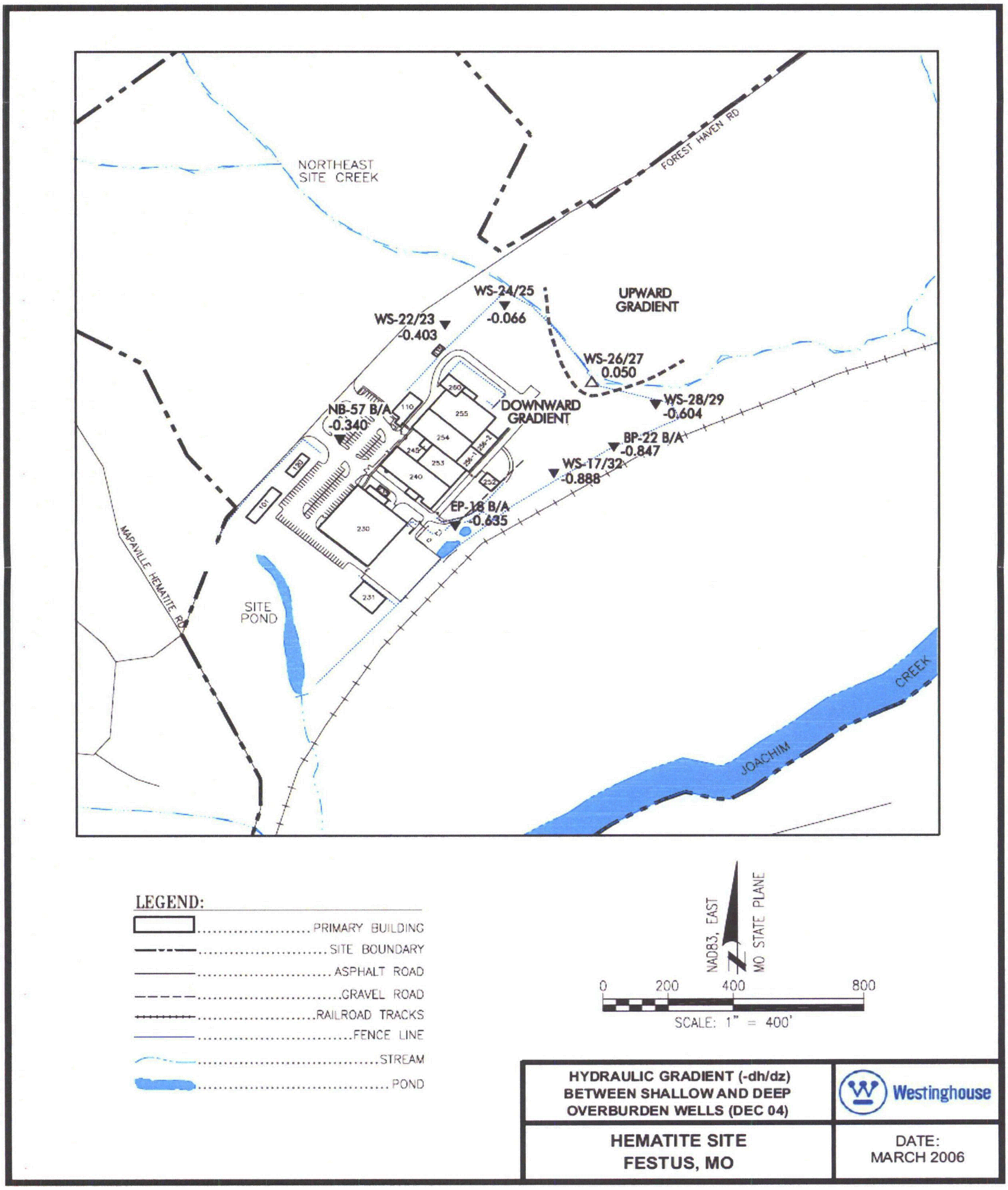


Figure 3-34 **Page 1 of 1**

Hydraulic Gradient Between Deep Overburden Wells And Jefferson City Wells

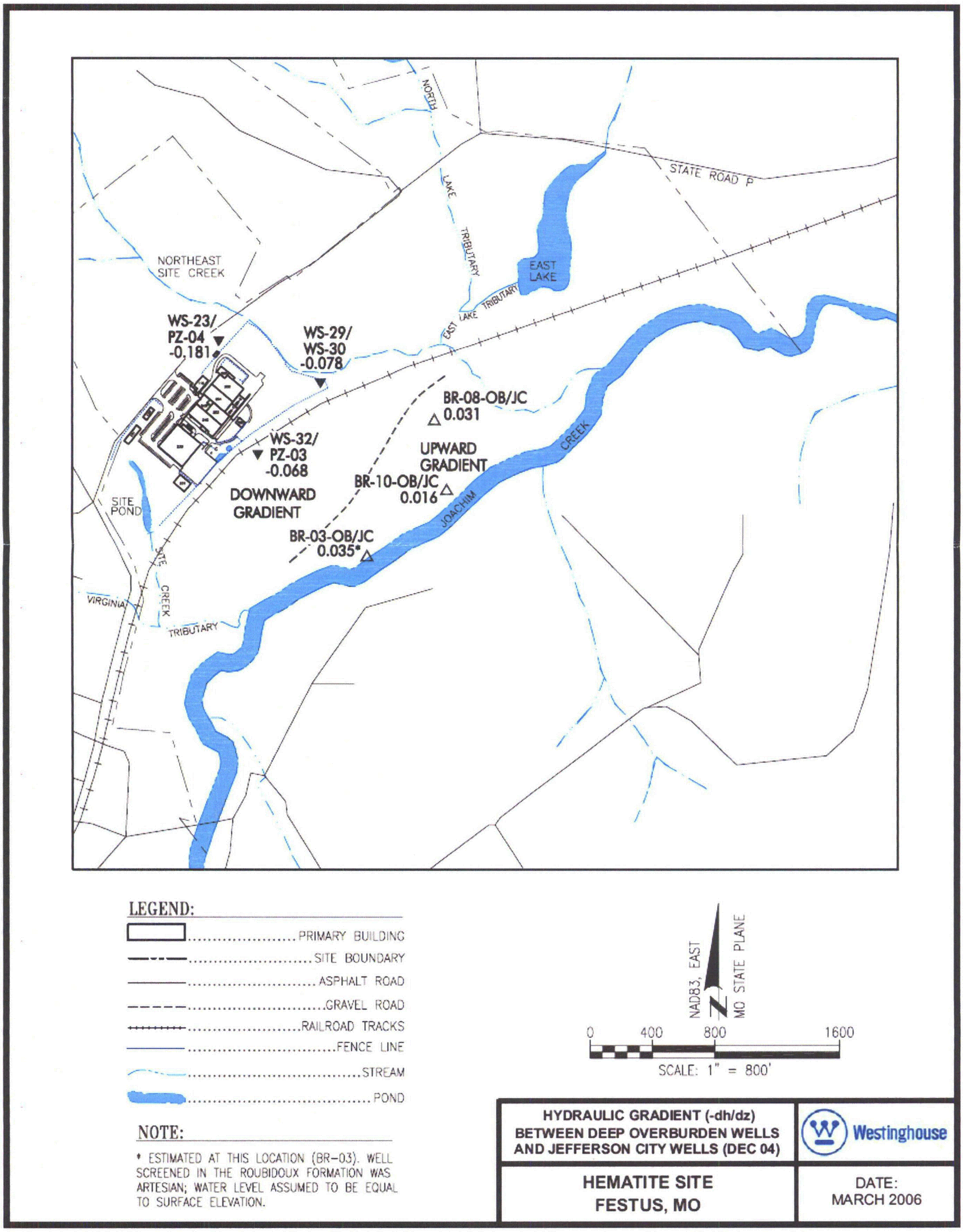


Figure 3-35

Hydraulic Gradient Between Jefferson City Wells And Roubidoux Wells

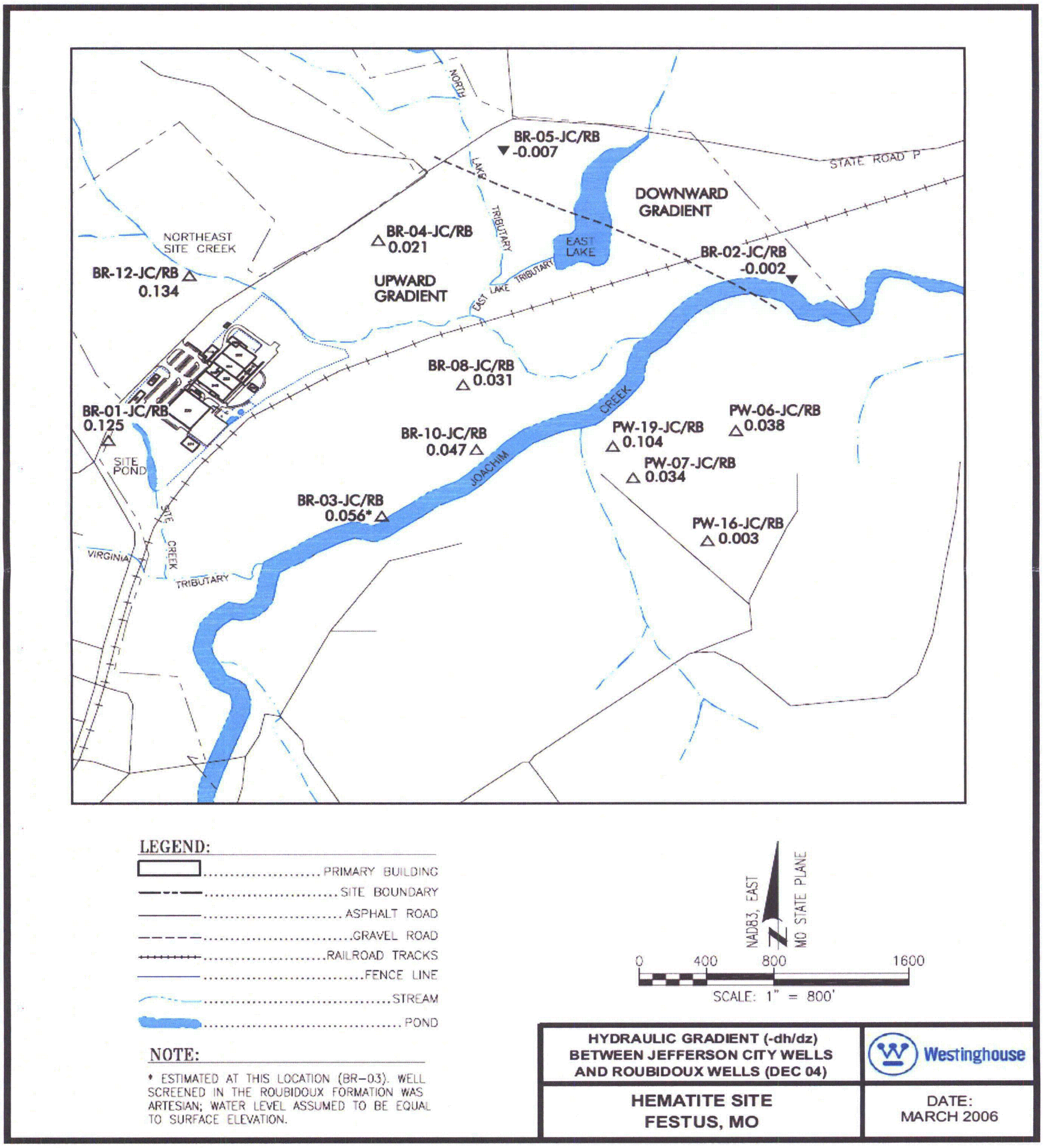
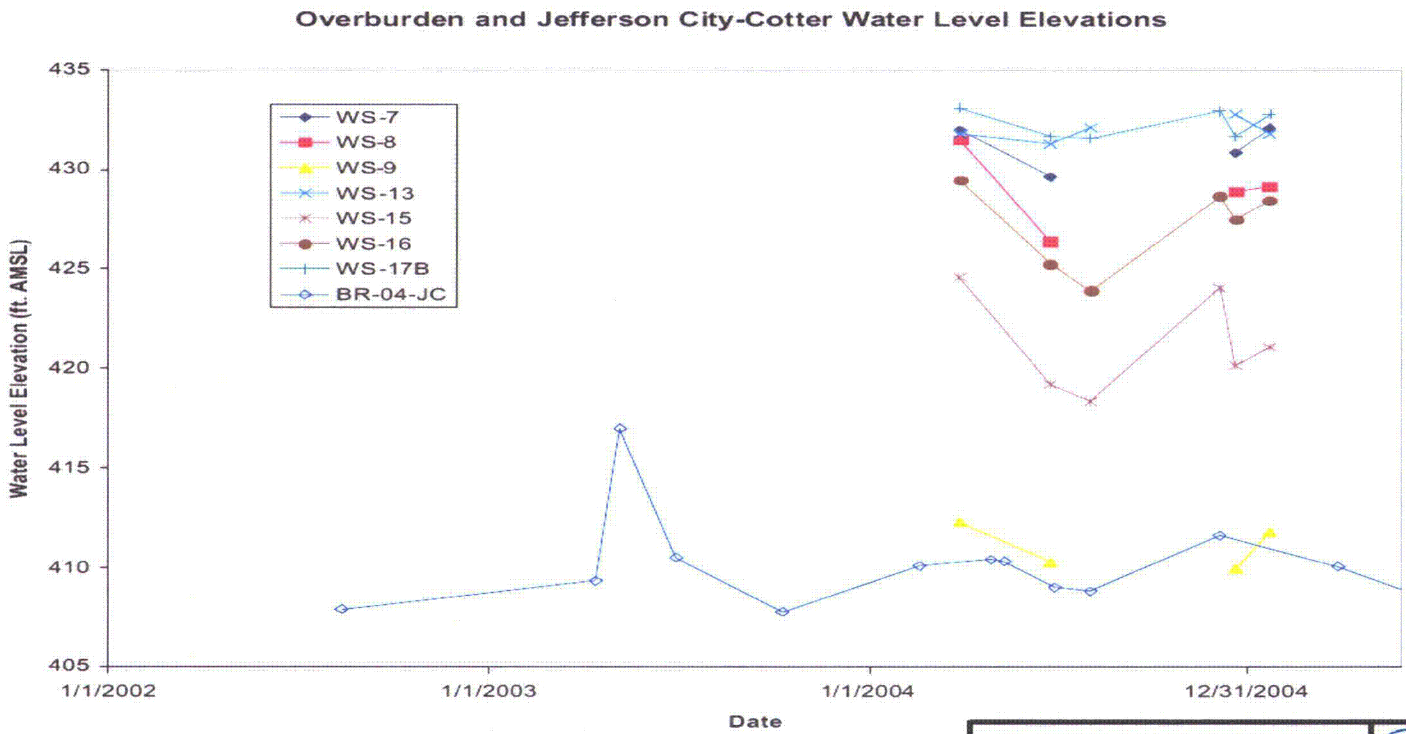


Figure 3-36

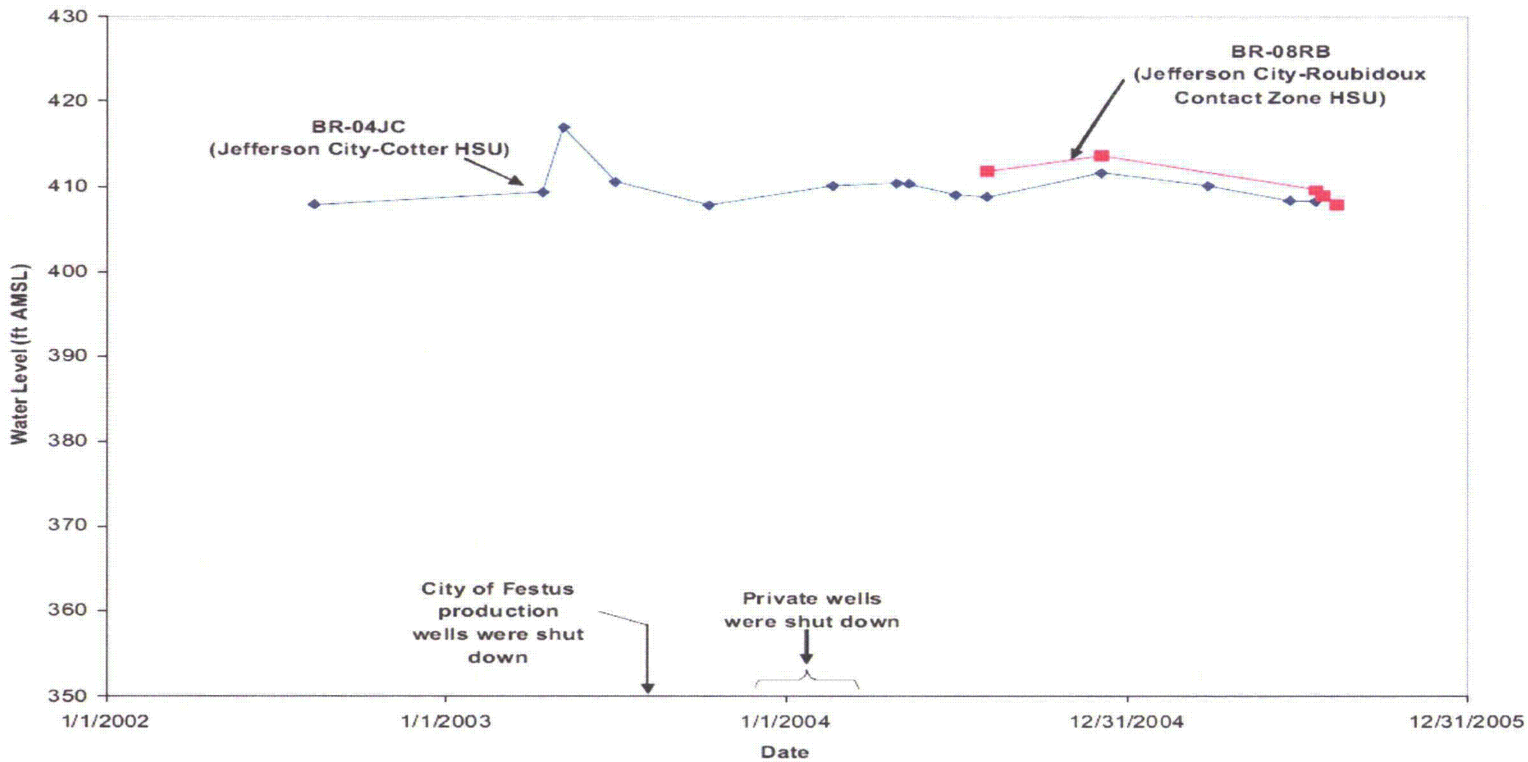
Time Series Plot Of Water Levels In Selected Overburden Wells



TIME SERIES PLOT OF WATER LEVELS IN SELECTED OVERBURDEN WELLS	Westinghouse
HEMATITE SITE FESTUS, MO	DATE: MARCH 2006

Figure 3-37

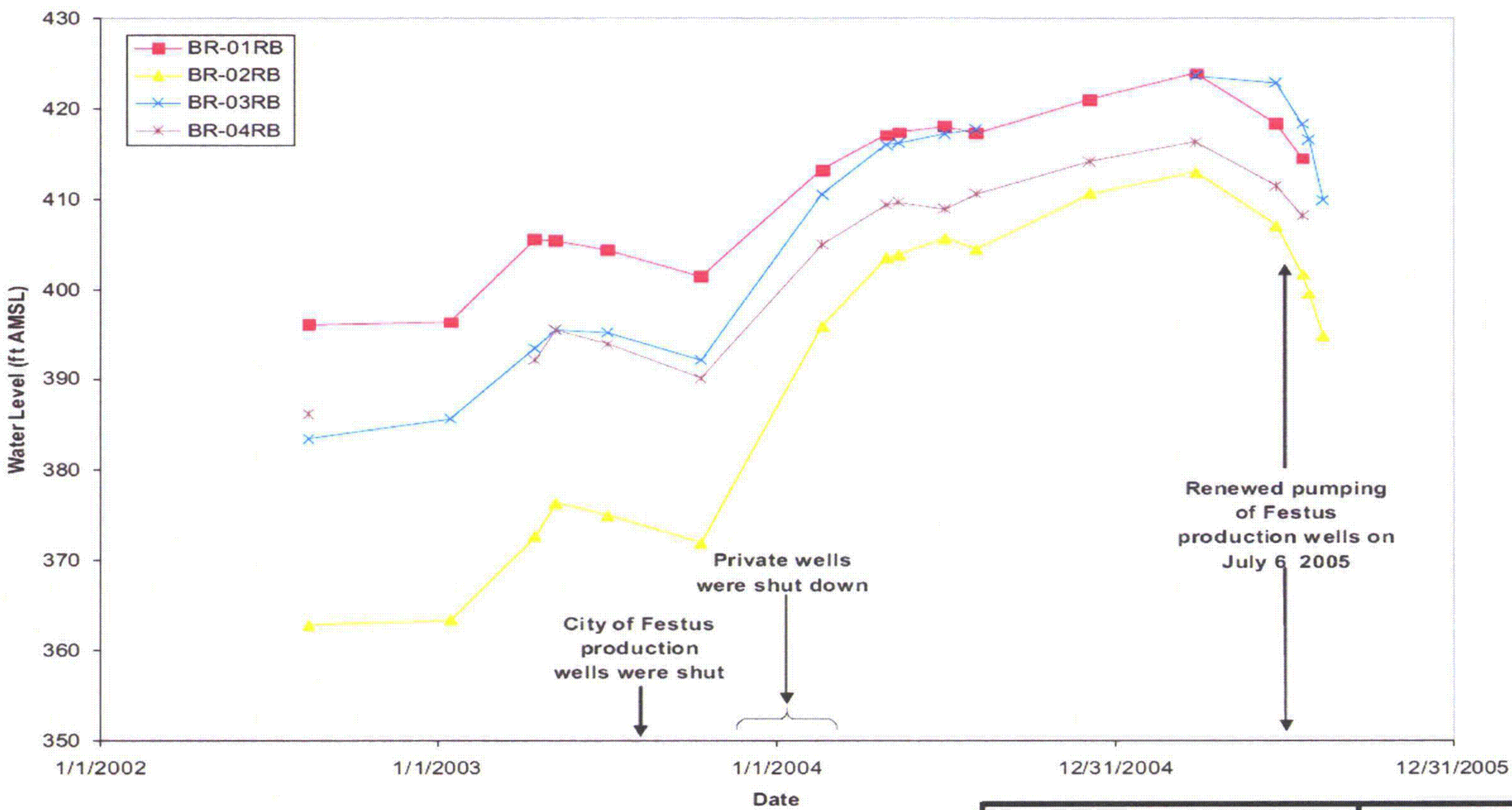
Time Series Plot Of Water Levels In Selected Jefferson City Wells



TIME SERIES PLOT OF WATER LEVELS IN SELECTED JEFFERSON CITY WELLS	Westinghouse
HEMATITE SITE FESTUS, MO	DATE: MARCH 2006

Figure 3-38

Time Series Plot Of Water Levels In Selected Roubidoux Wells



TIME SERIES PLOT OF WATER LEVELS IN SELECTED ROUBIDOUX WELLS	Westinghouse
HEMATITE SITE FESTUS, MO	DATE: MARCH 2006

Figure 3-39

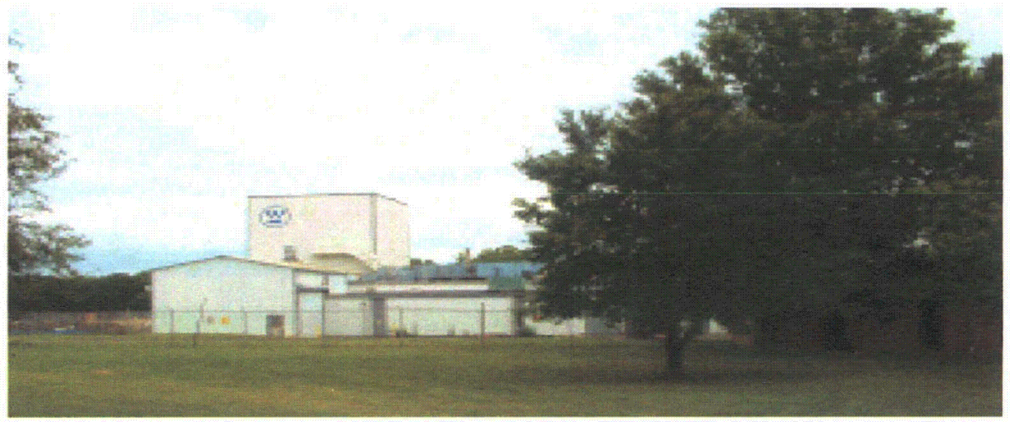
Hematite Property Habitat Map

BASE SOURCE http://www.terraserver.microsoft.com/usgsentry.aspx?T=1&S=11&Z=15&X=1803&Y=10579&W=3&qs=%7cHematite%7cMo%7c

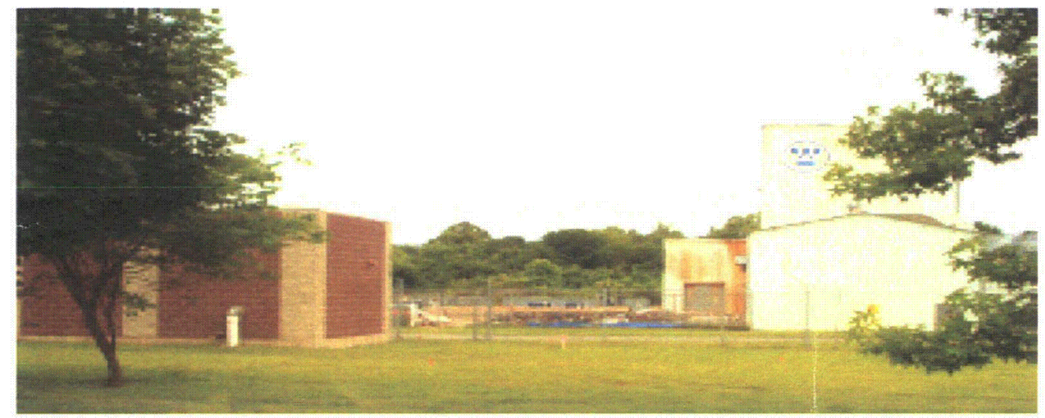
HEMATITE PROPERTY HABITAT MAP	Westinghouse
HEMATITE SITE FESTUS, MO	DATE: MARCH 2006

Figure 3-40

Visual Resources



North side of Main Buildings, facing southeast



Building 115 and north side of 260, facing south

Facilities, facing south

Wood Barn and Sign in front of facilities, facing west

VISUAL RESOURCES	Westinghouse
HEMATITE SITE FESTUS, MO	DATE: MARCH 2006

Figure 3-41

Histogram Of Turbidity

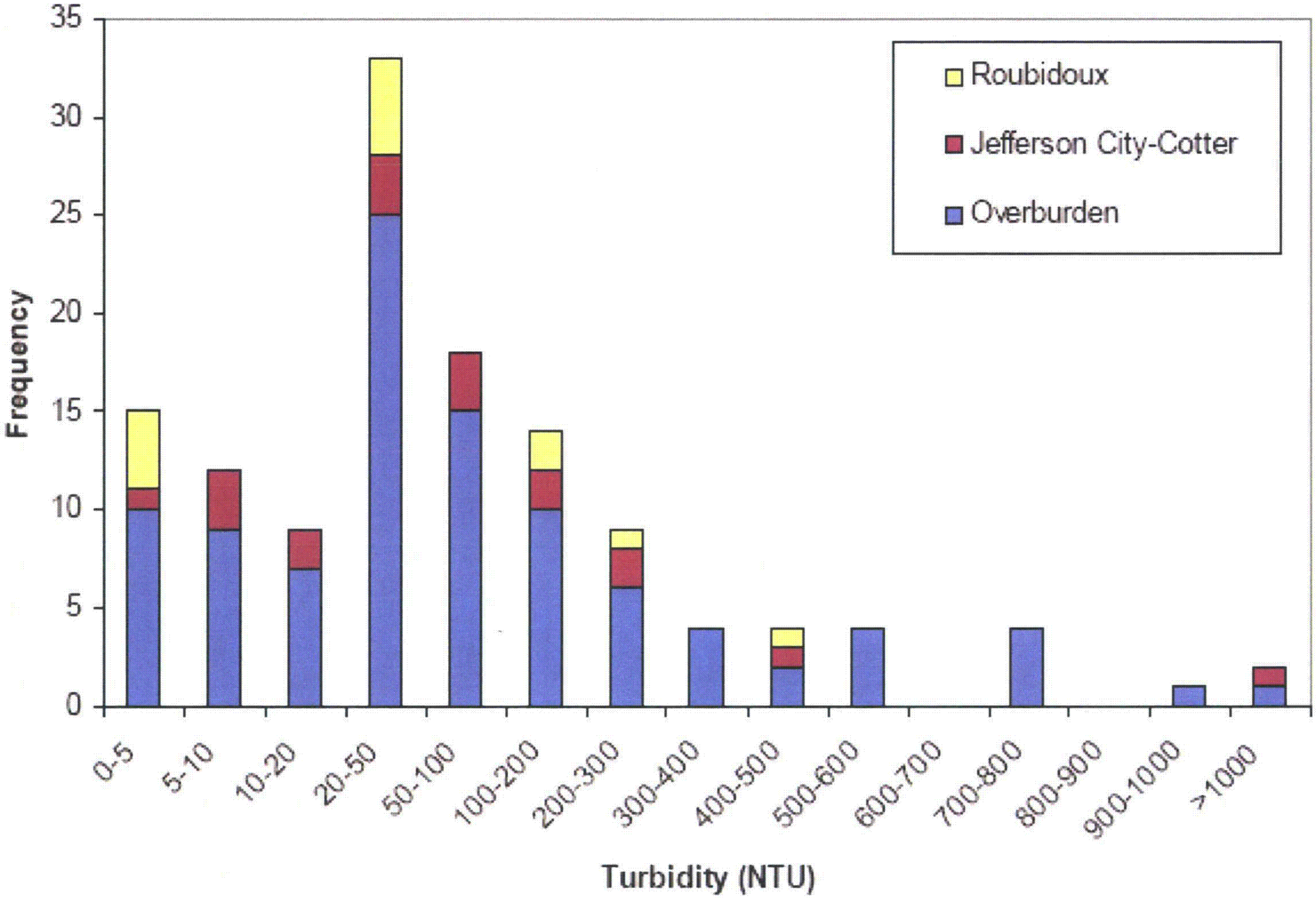


Figure 3-42

Histogram Of Specific Conductance

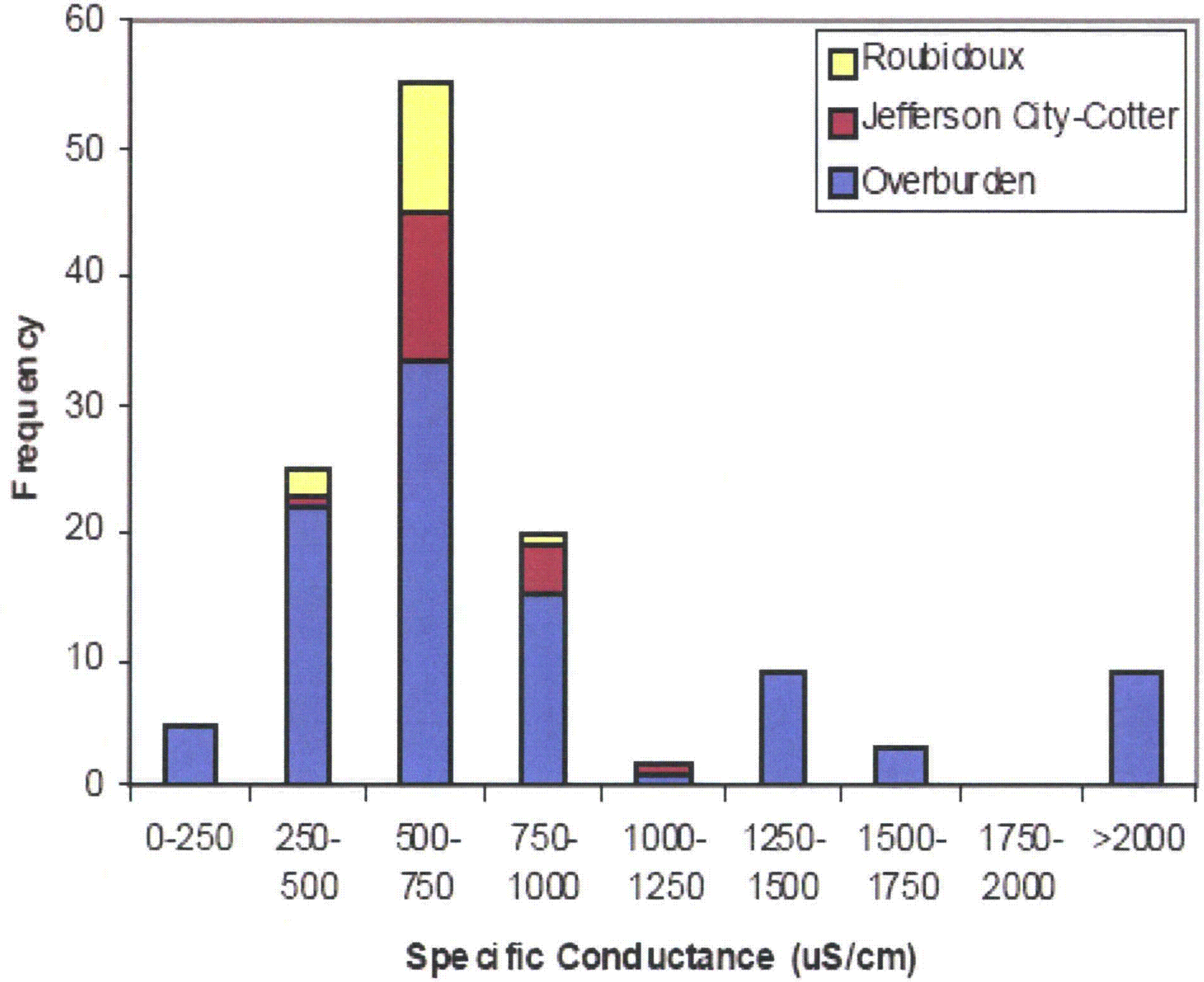


Figure 3-43

Histogram Of Groundwater pH

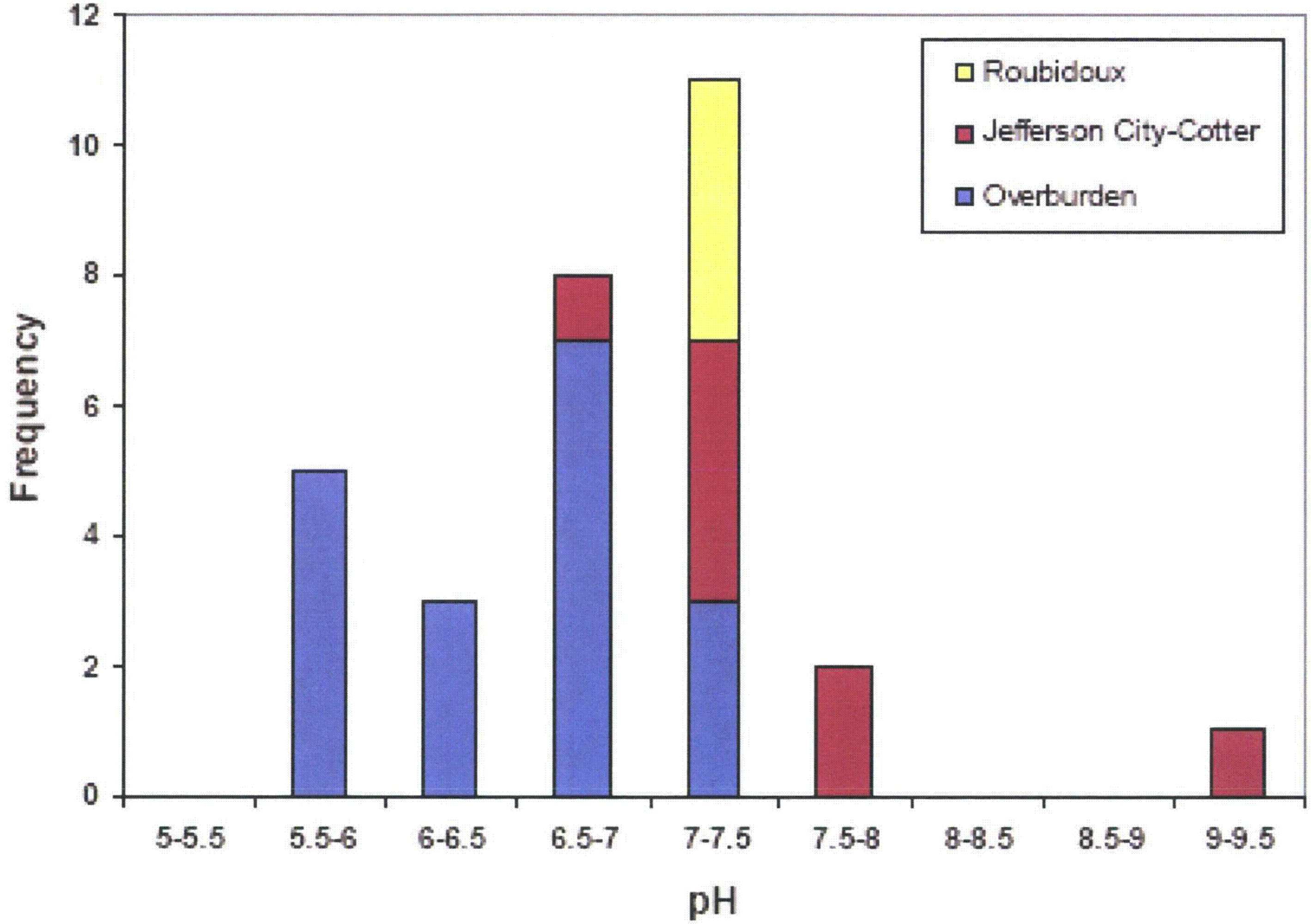


Figure 3-44

Histogram Of Groundwater Oxidation-Reduction Potential

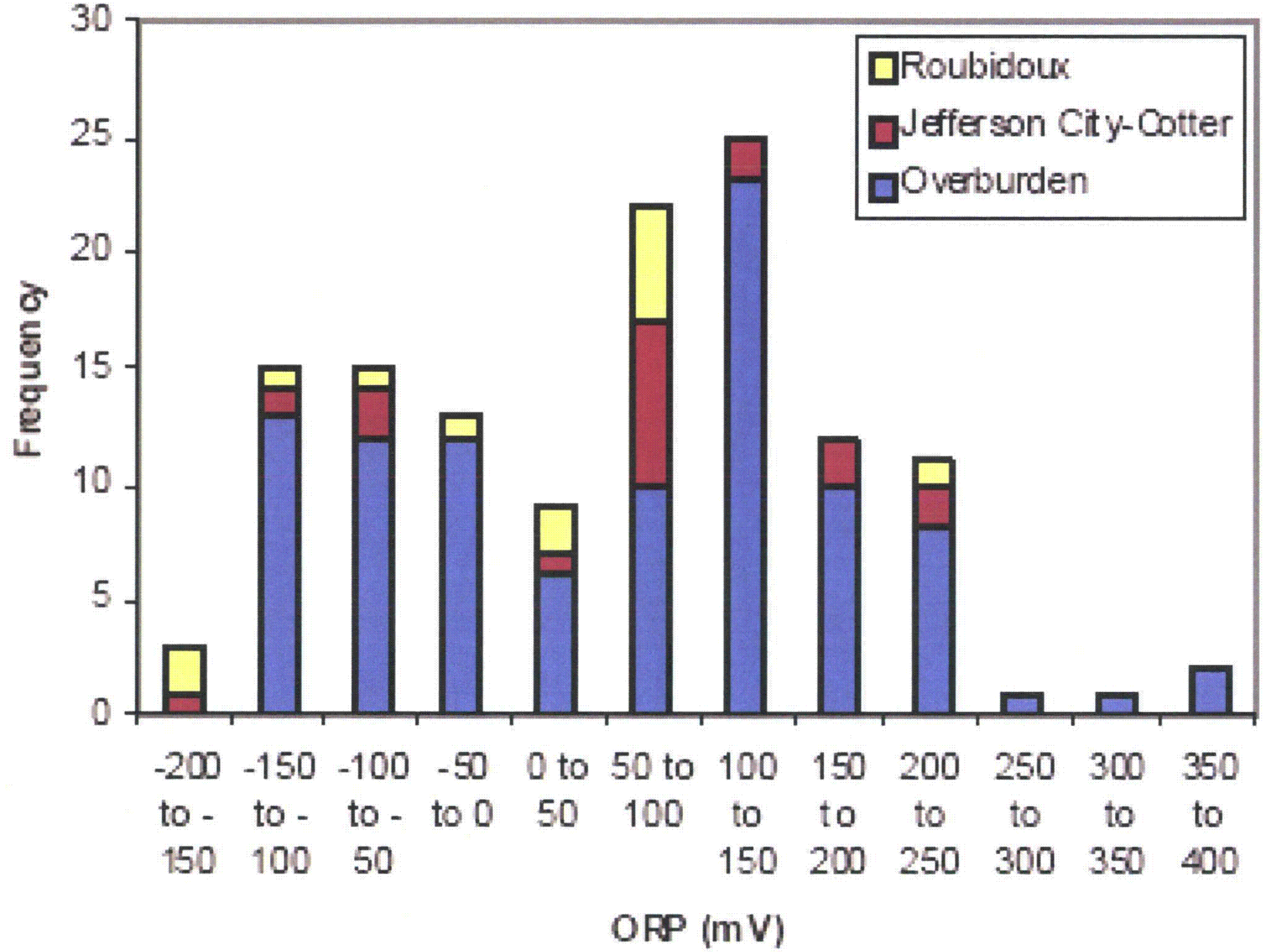
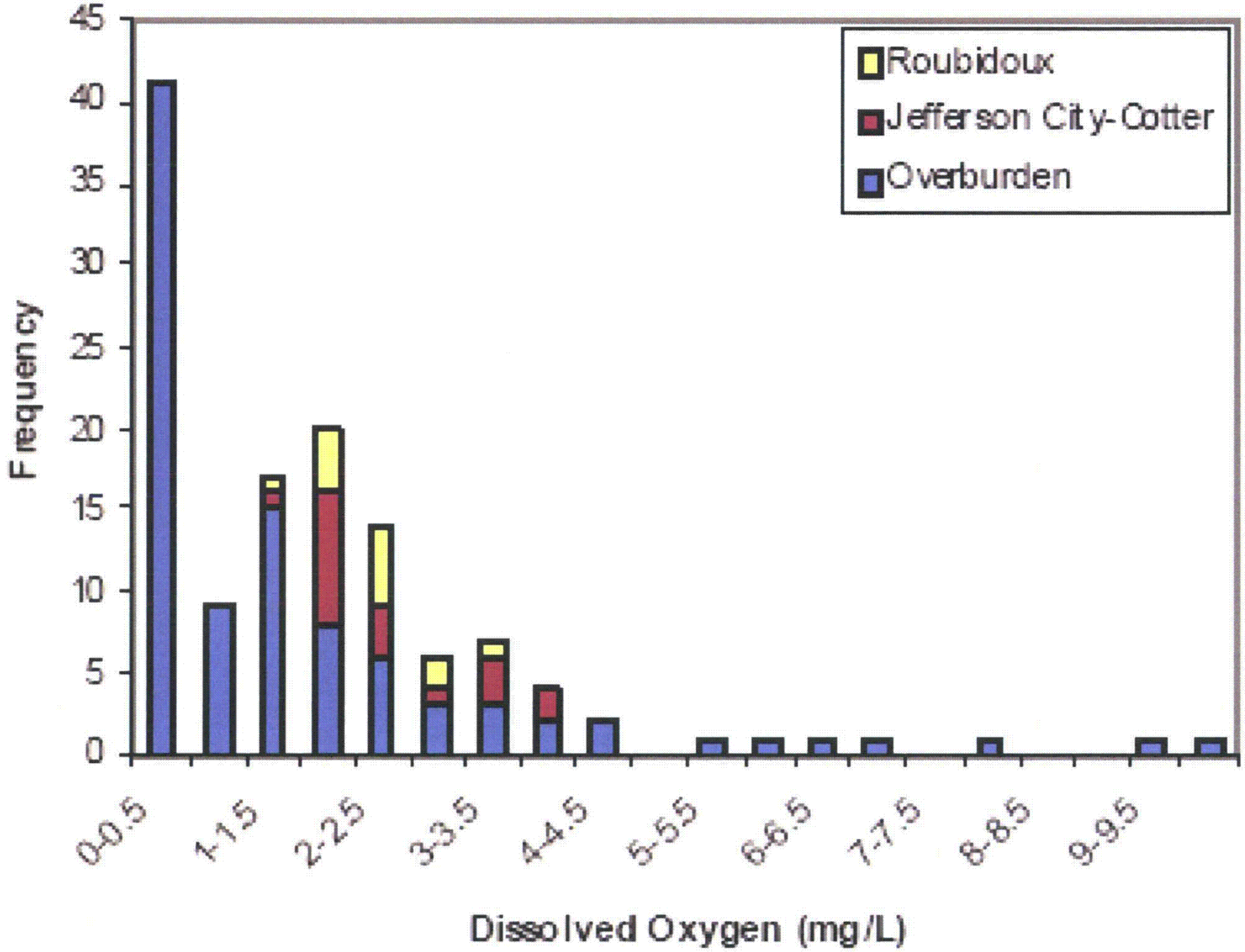


Figure 3-45

Histogram Of Groundwater Dissolved Oxygen



Westinghouse

Figure 3-46

Histogram Of Ferrous Iron Concentrations In Groundwater

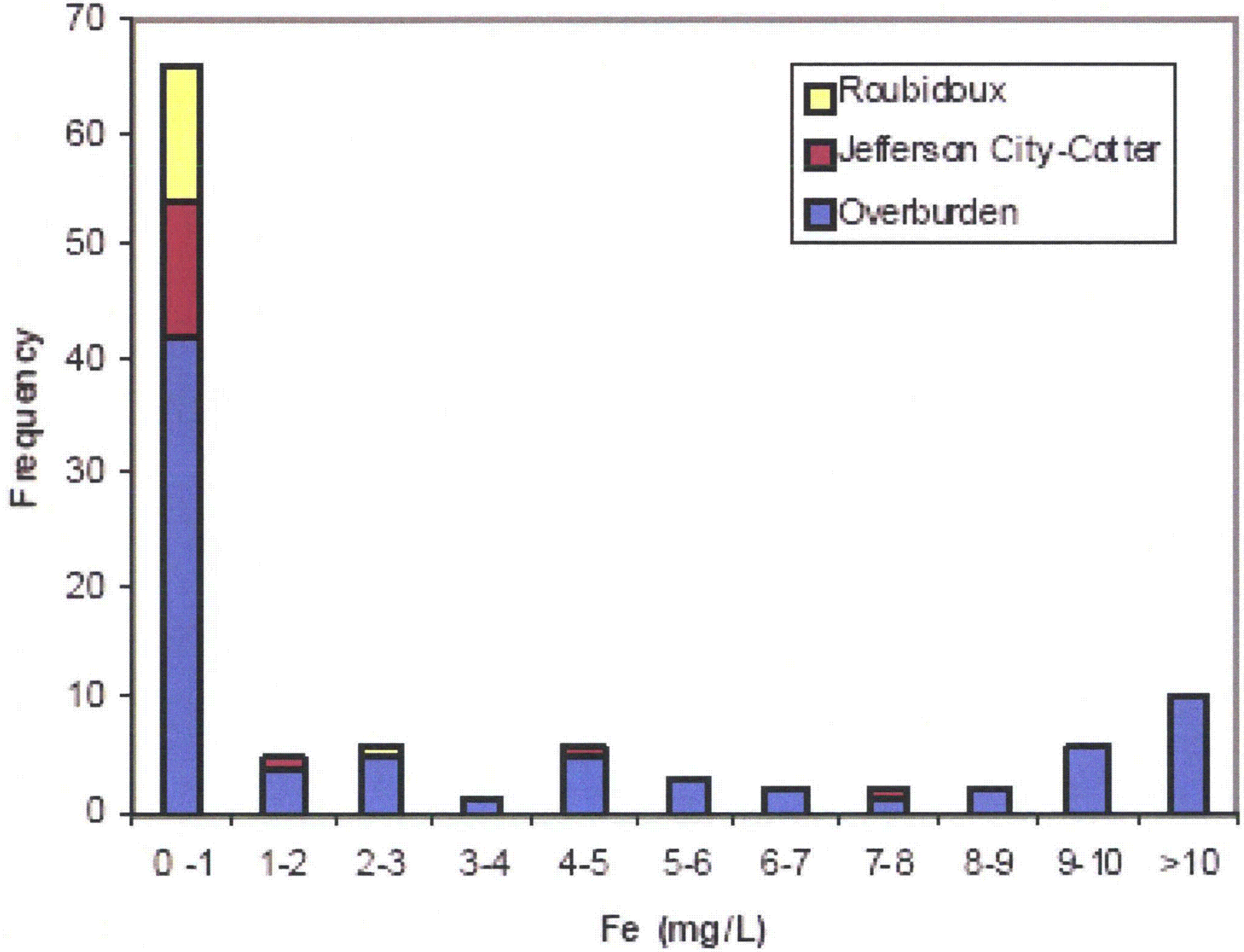


Figure 3-47

Histogram Of Groundwater Alkalinity

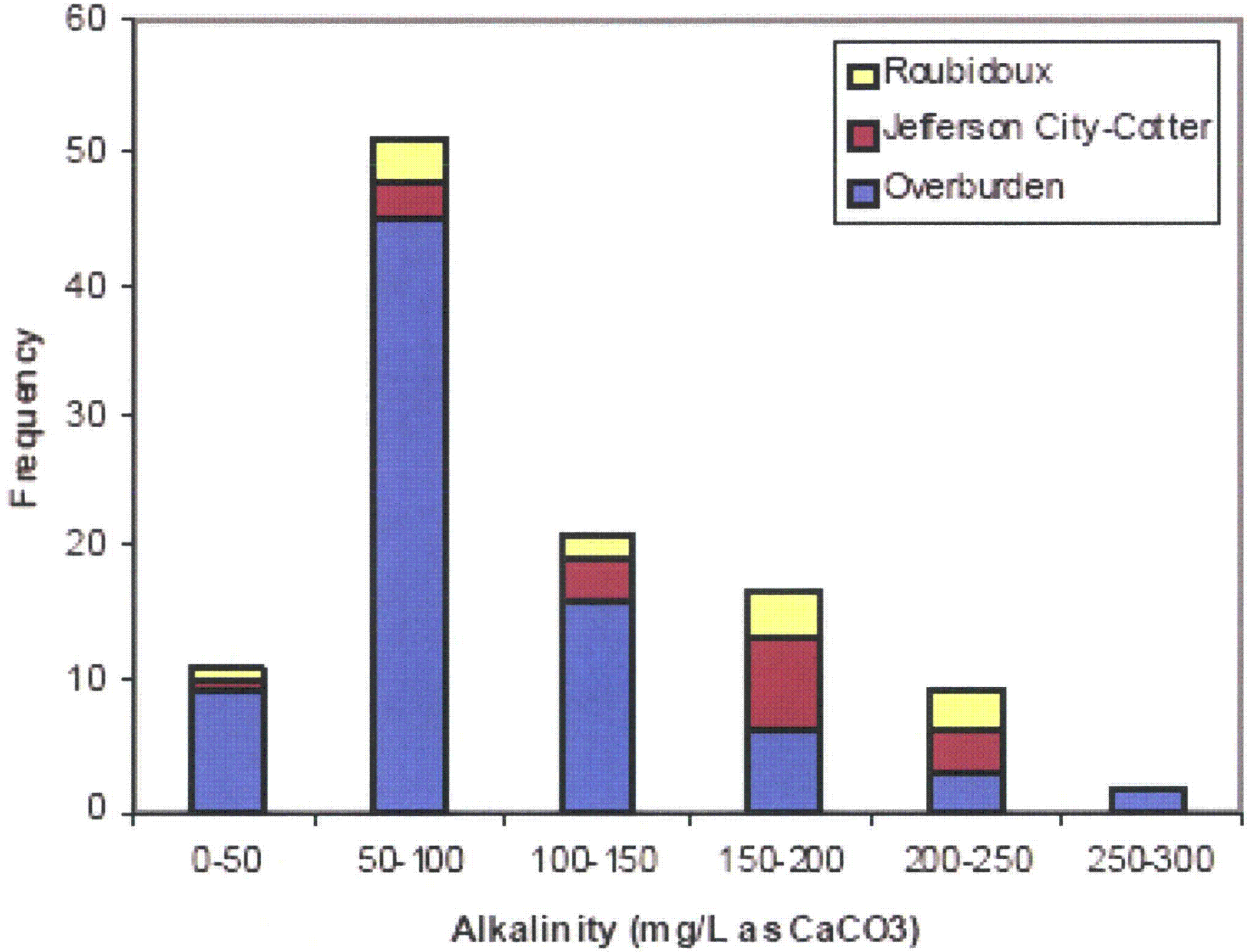


Figure 3-48

Surface Water Sampling Locations

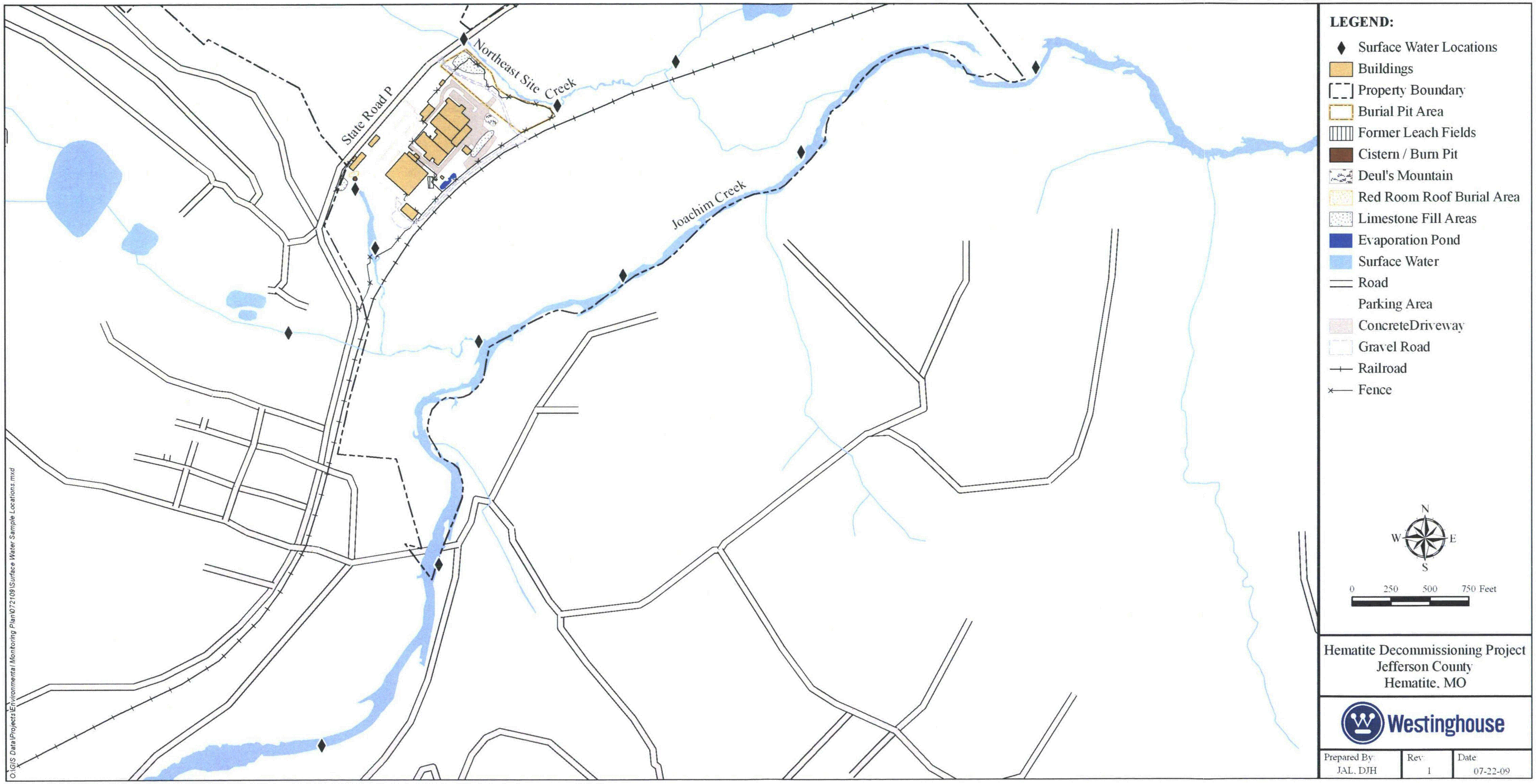


Figure 3-49

Comparison Of Aluminum Concentrations In Filtered And Unfiltered Groundwater Samples

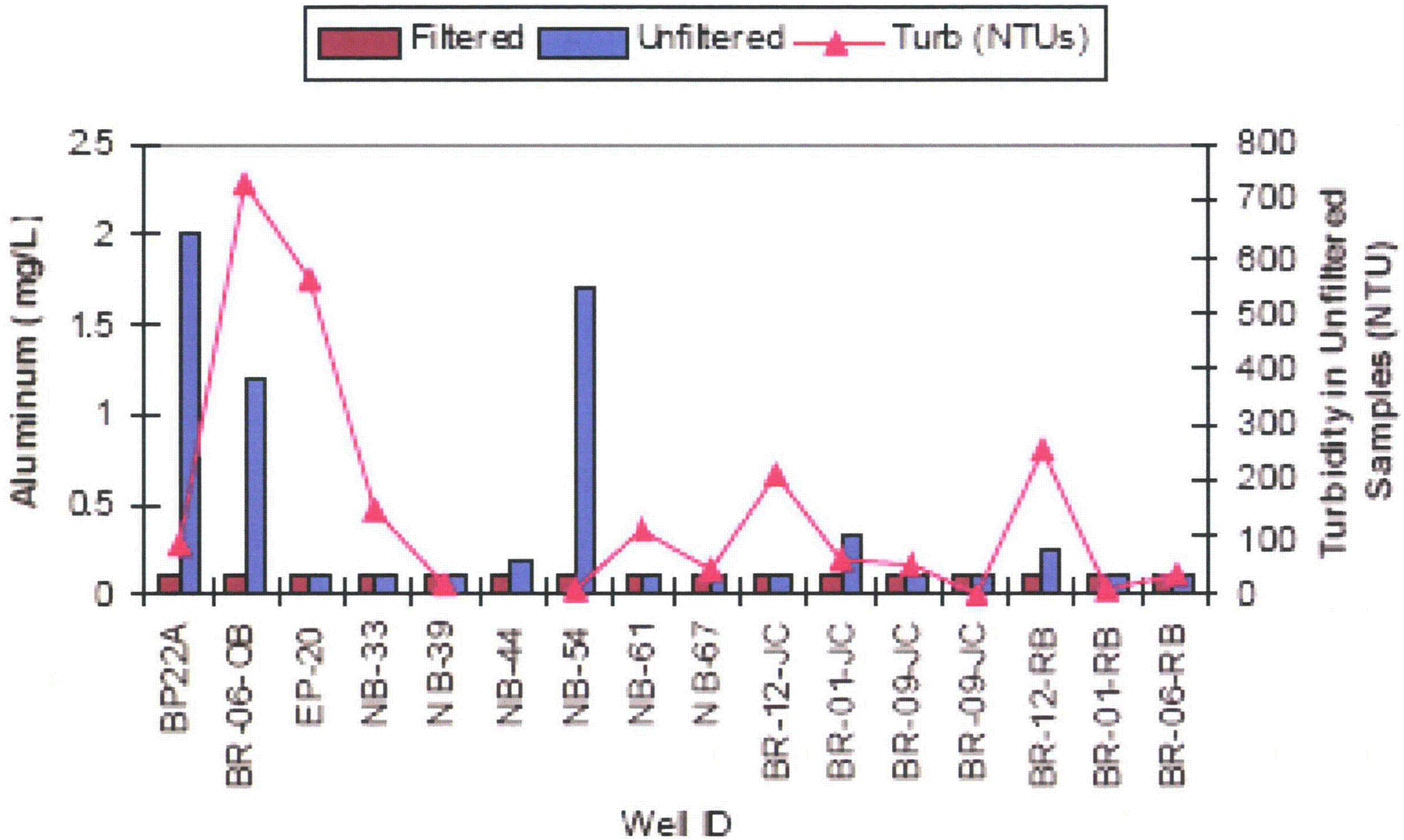


Figure 3-50

Comparison Of Iron Concentrations In Filtered And Unfiltered Groundwater Samples

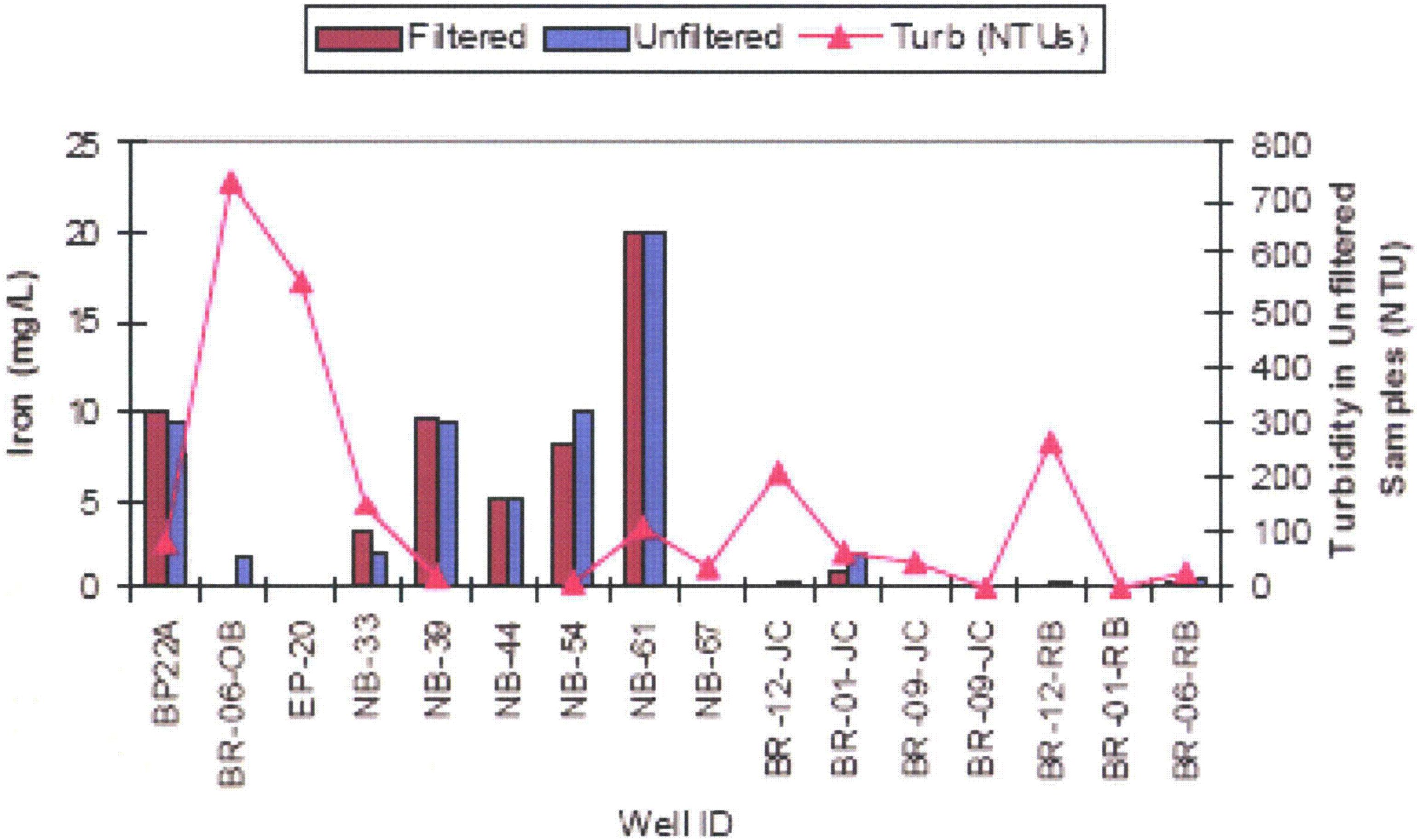


Figure 3-51

Comparison Of Manganese Concentrations In Filtered And Unfiltered Groundwater Samples

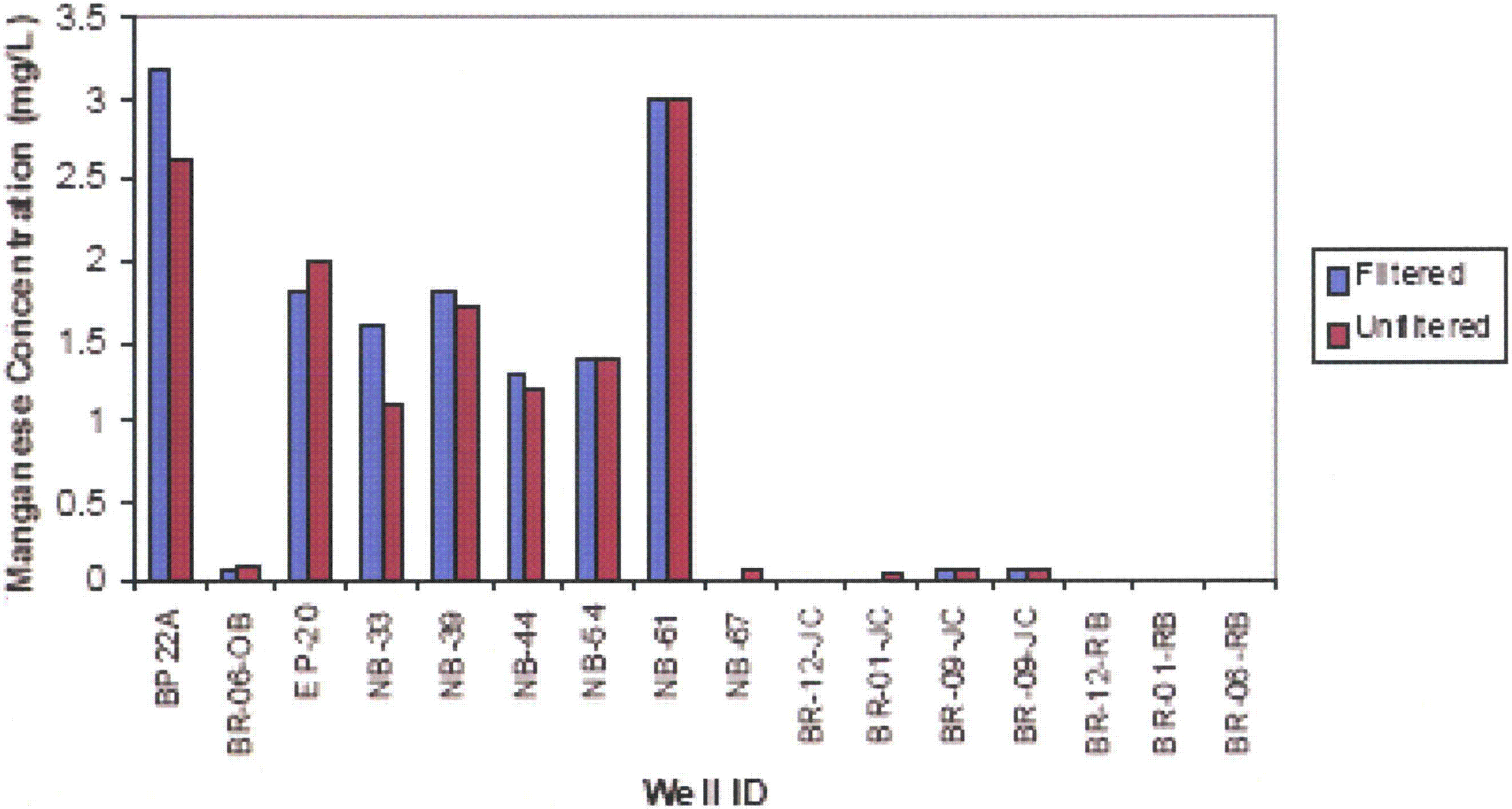


Figure 3-52

Comparison Of Zinc Concentrations In Filtered And Unfiltered Groundwater Samples

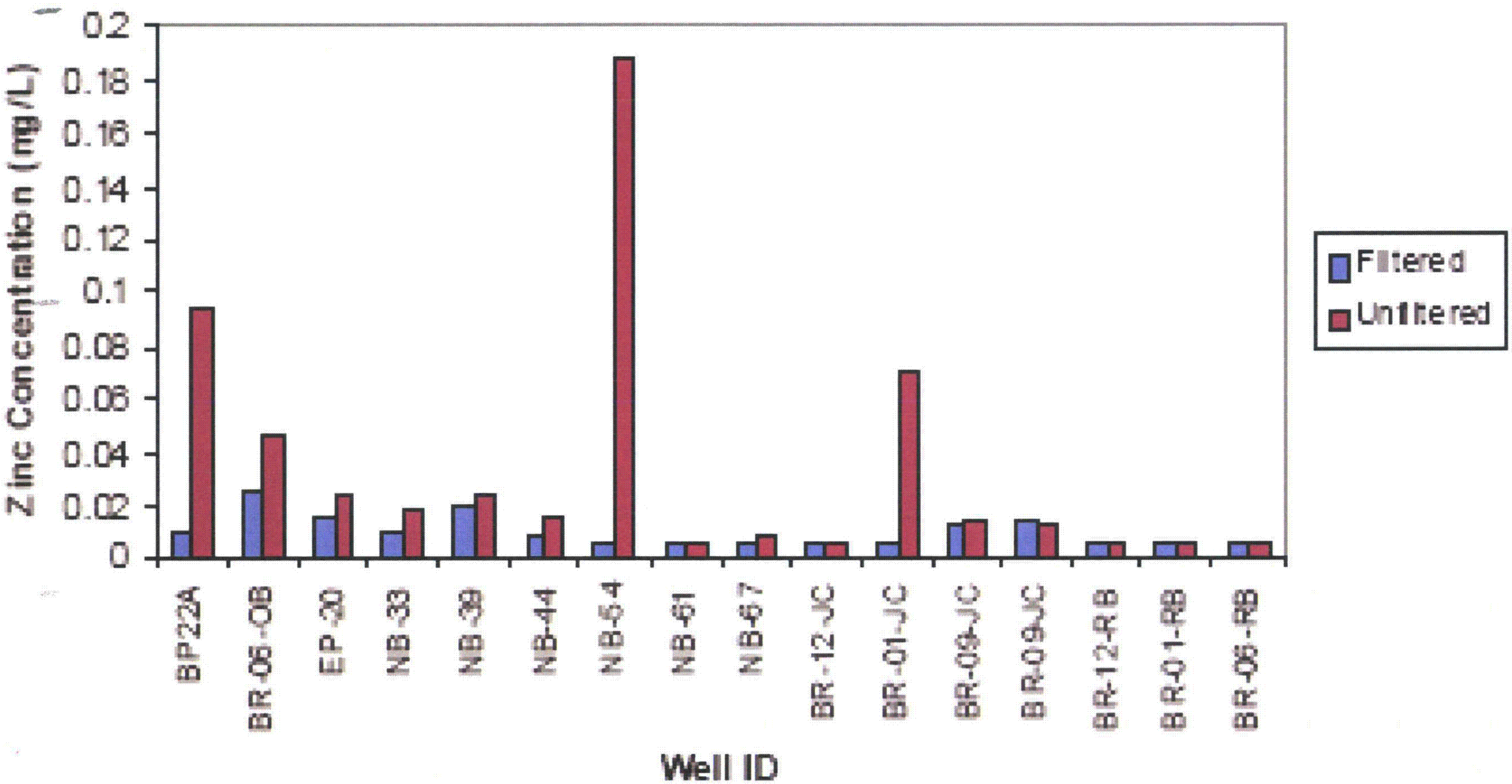


Figure 3-53

Comparison Of Total Iron And Ferrous Iron Concentrations In Filtered And Unfiltered Groundwater Samples

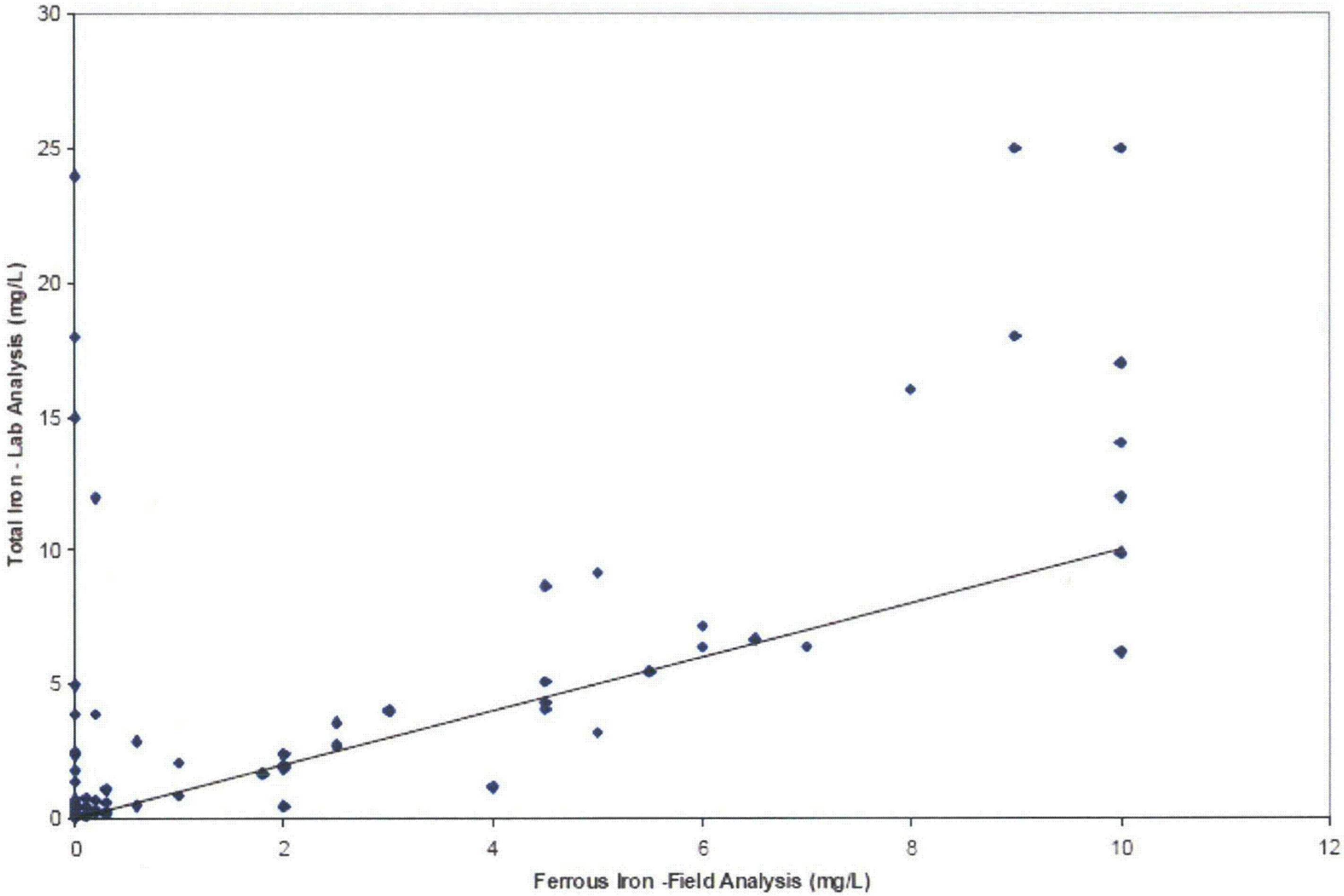


Figure 3-54

Sediment Sampling Locations

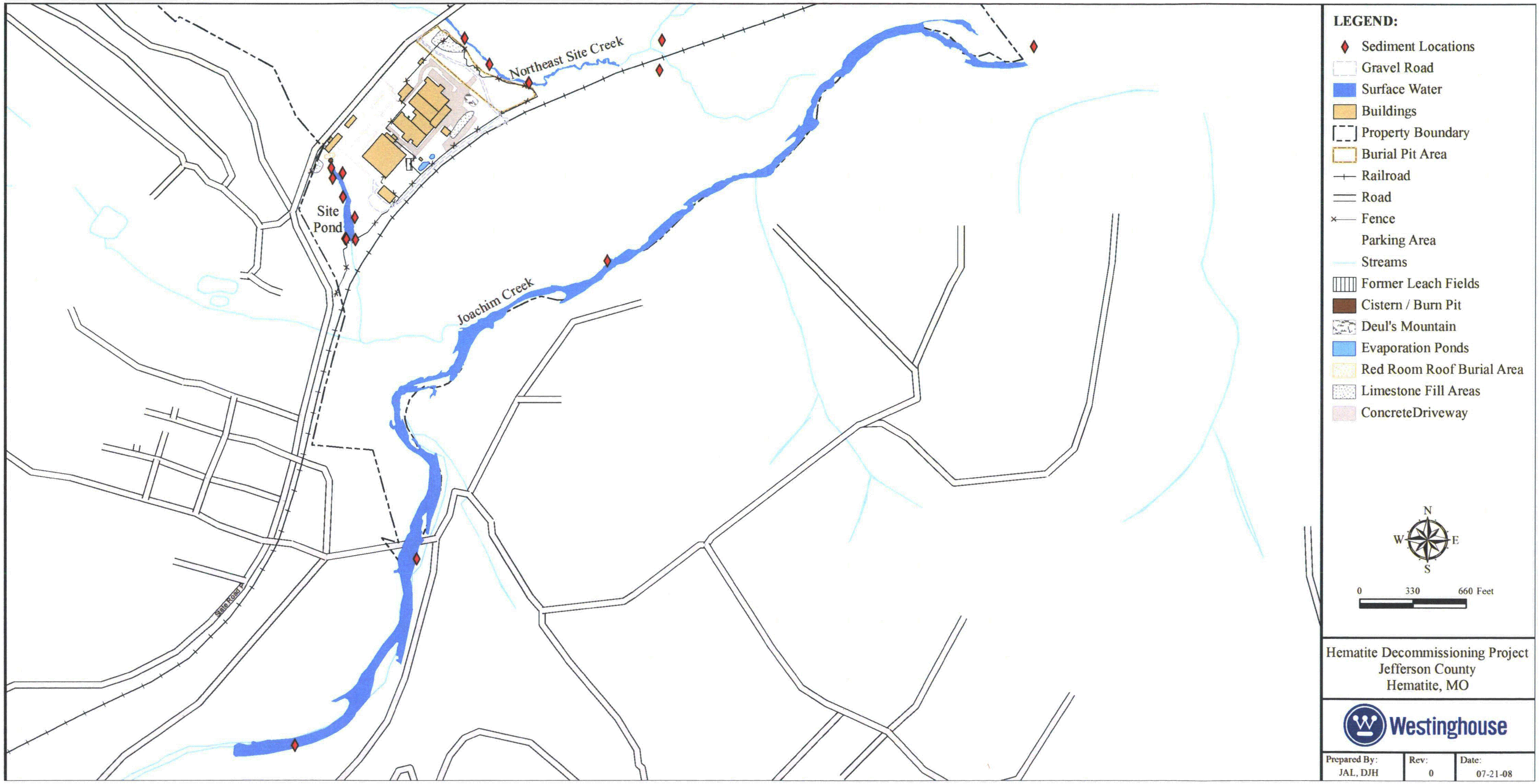


Figure 3-55

Cumulative Frequency Plot For Arsenic In Surface Soils

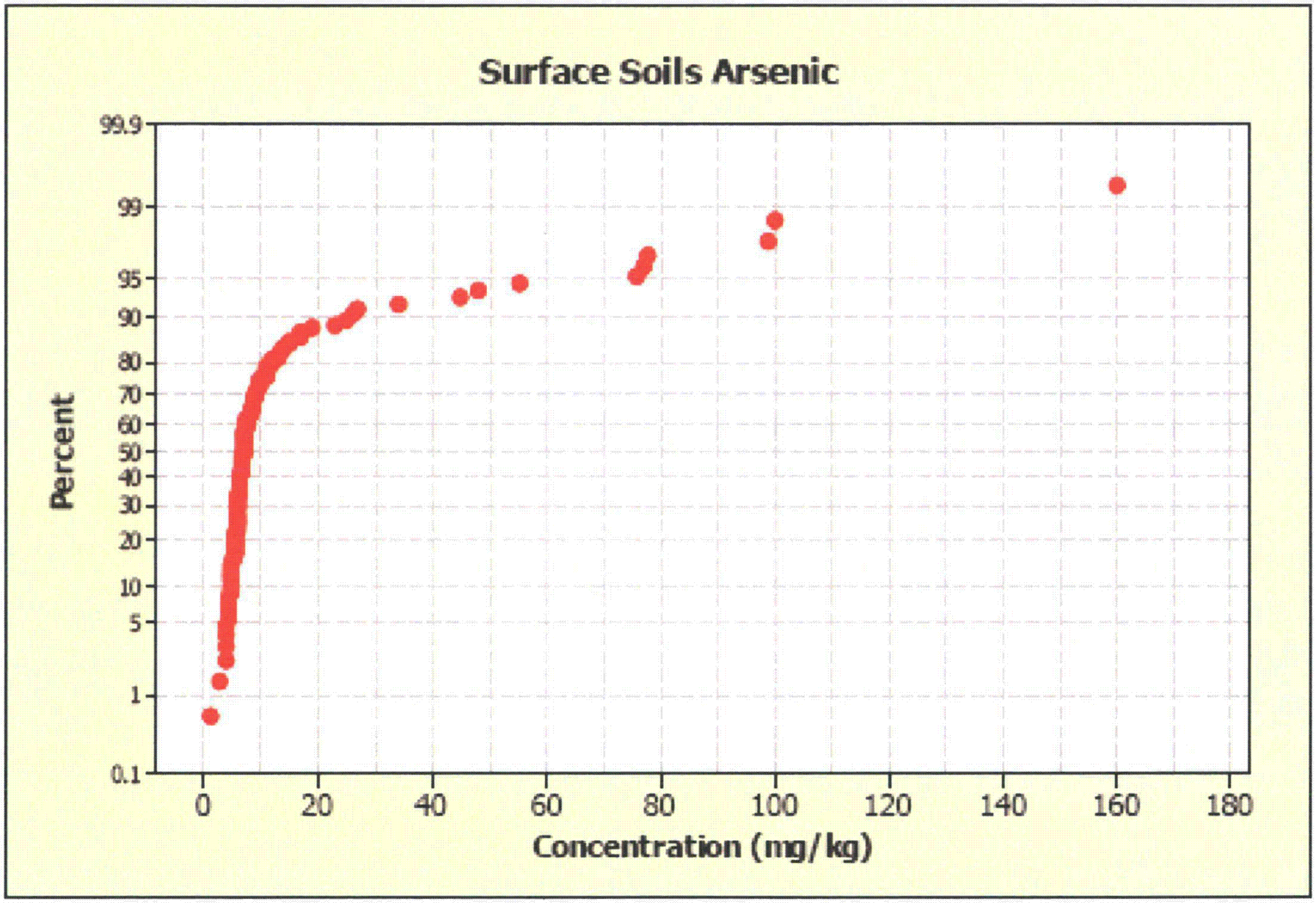


Figure 3-56

Cumulative Frequency Plot For Arsenic In Subsurface Soils

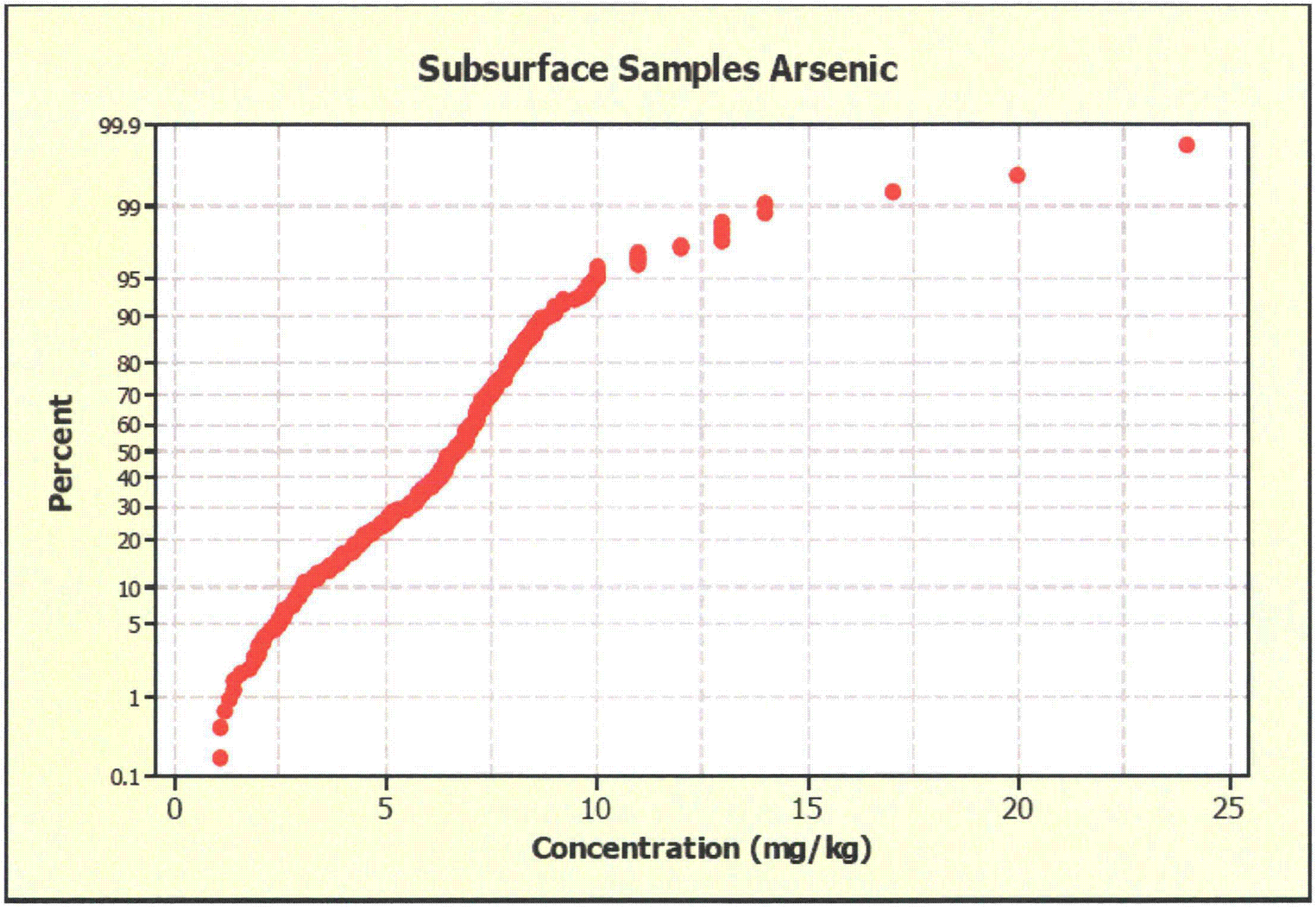


Figure 3-57

Anomalous Trace Inorganic Data For Surface Soils

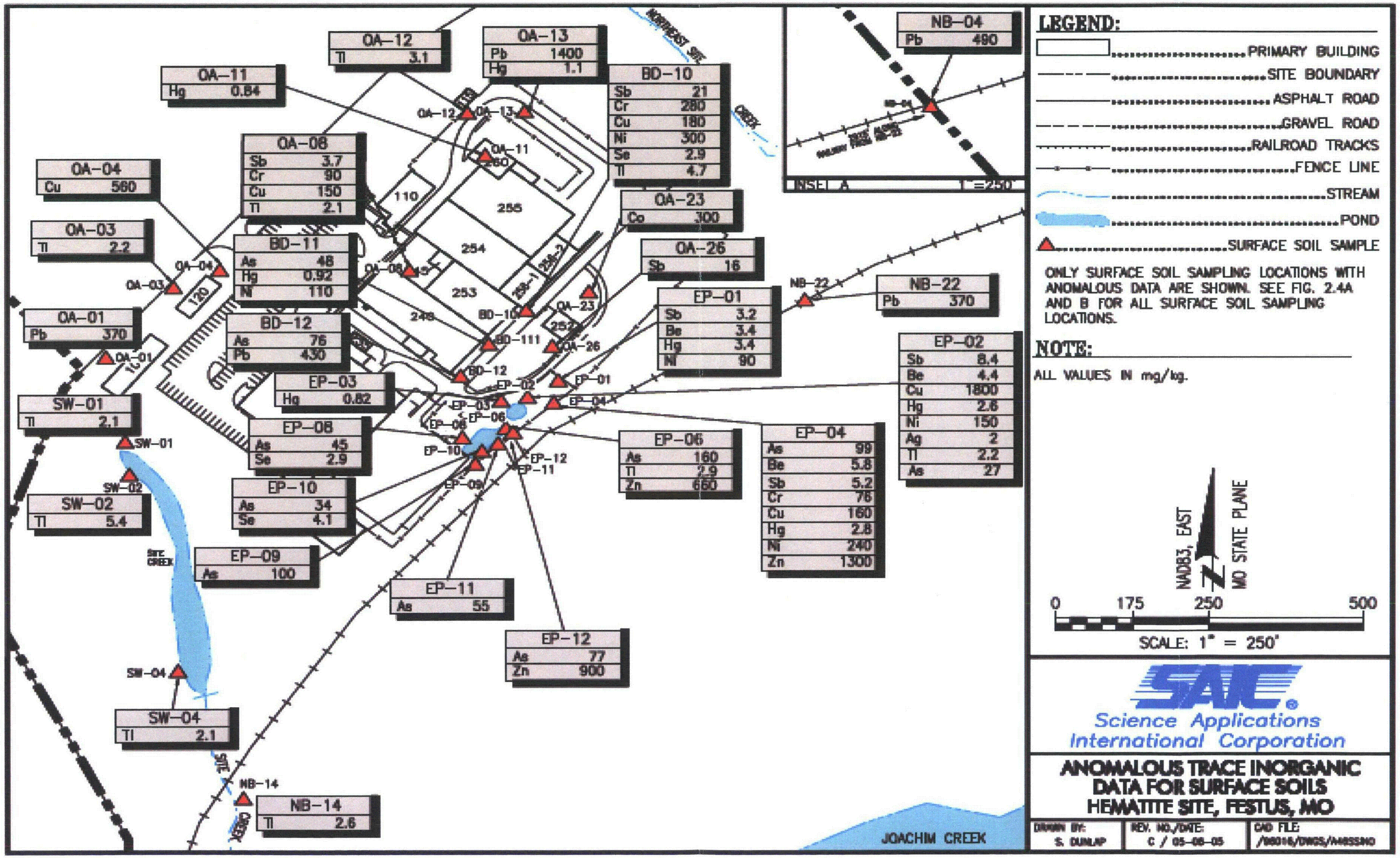


Figure 3-58

Anomalous Trace Inorganic Data For Subsurface Soils

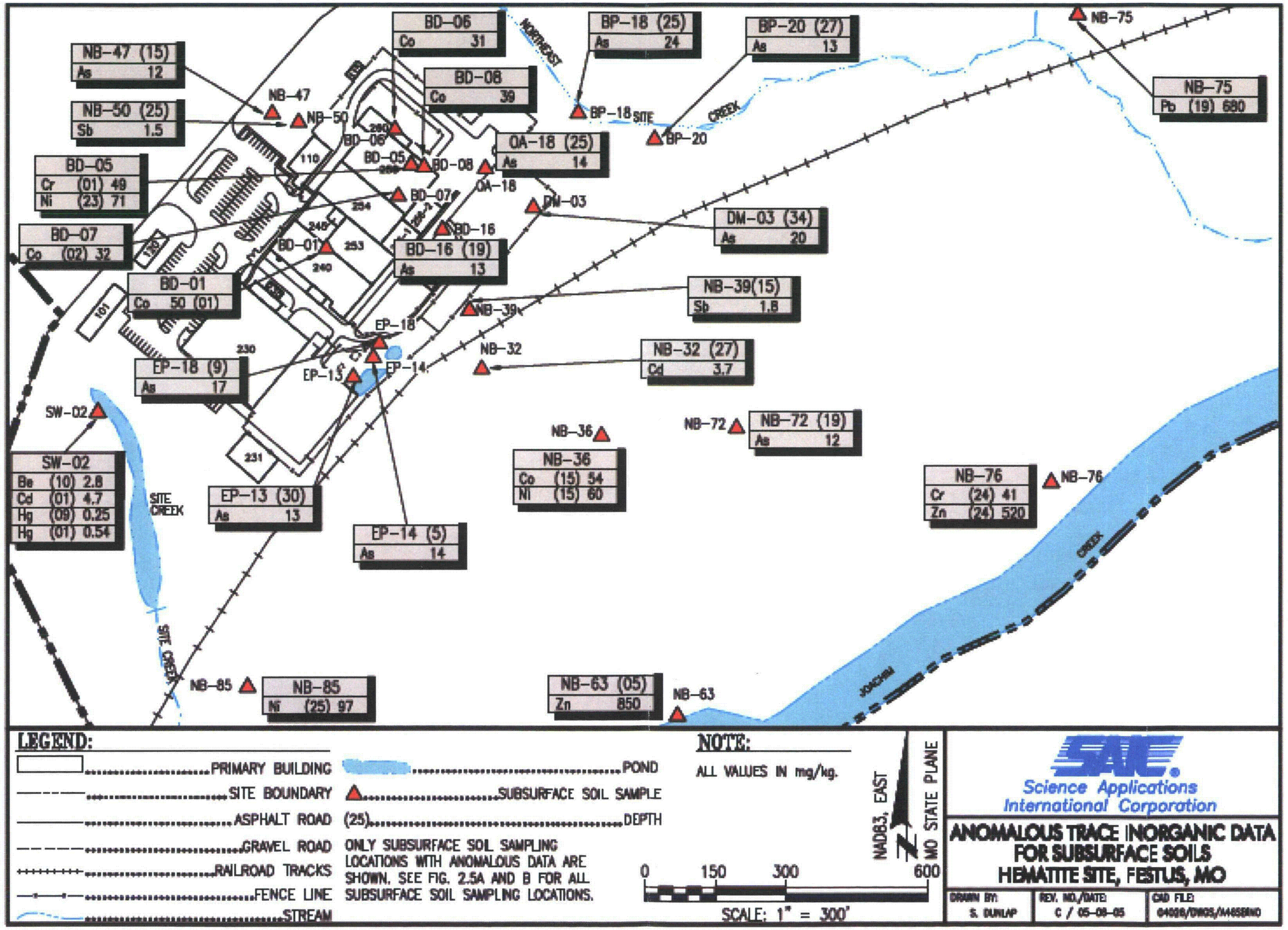


Figure 3-59

PAH In Sediment And Subsurface Soil Locations

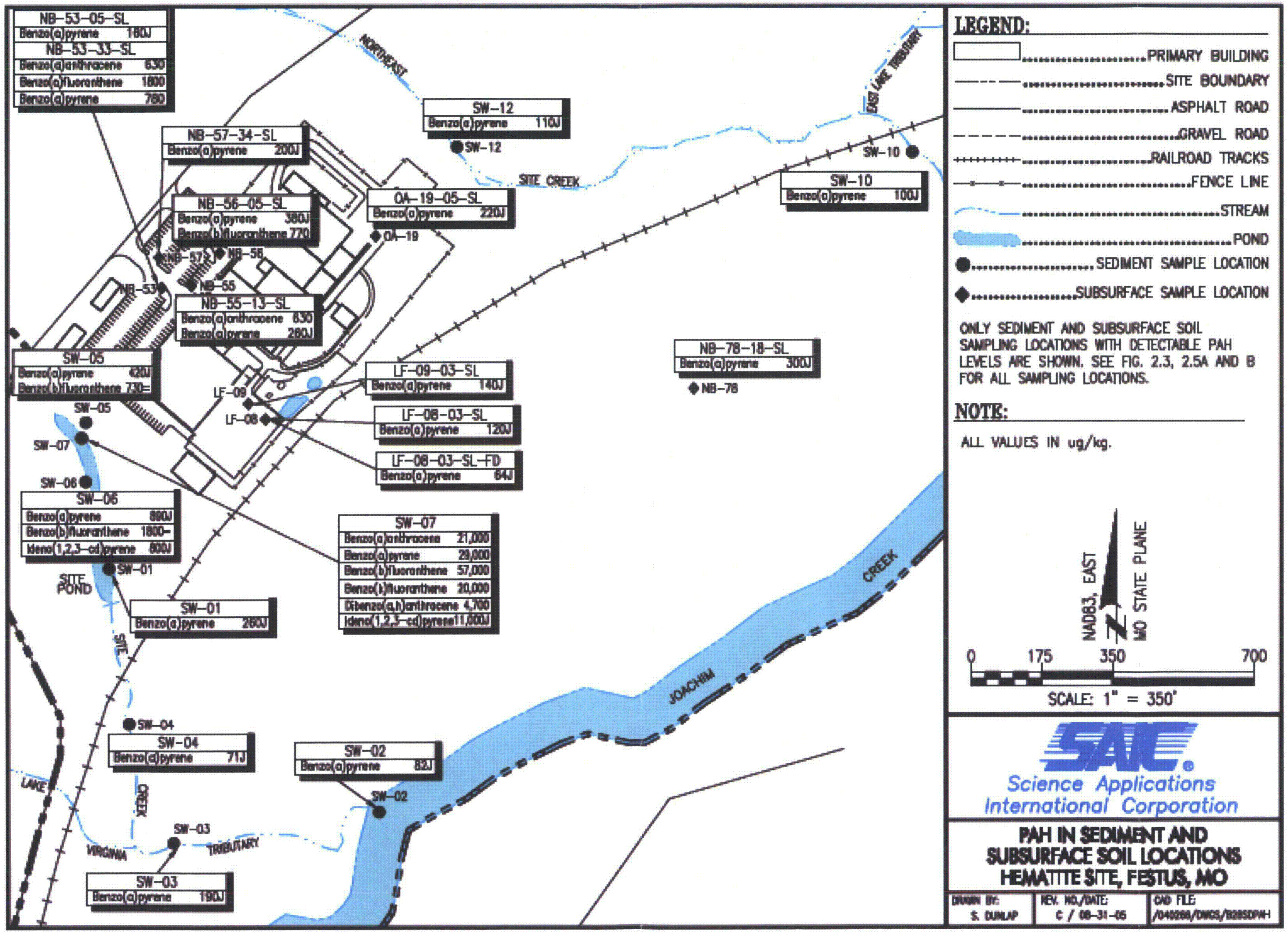


Figure 3-60

Elevated TCE And PCE In Subsurface Soils
(> 40 mg/kg Reference Value)

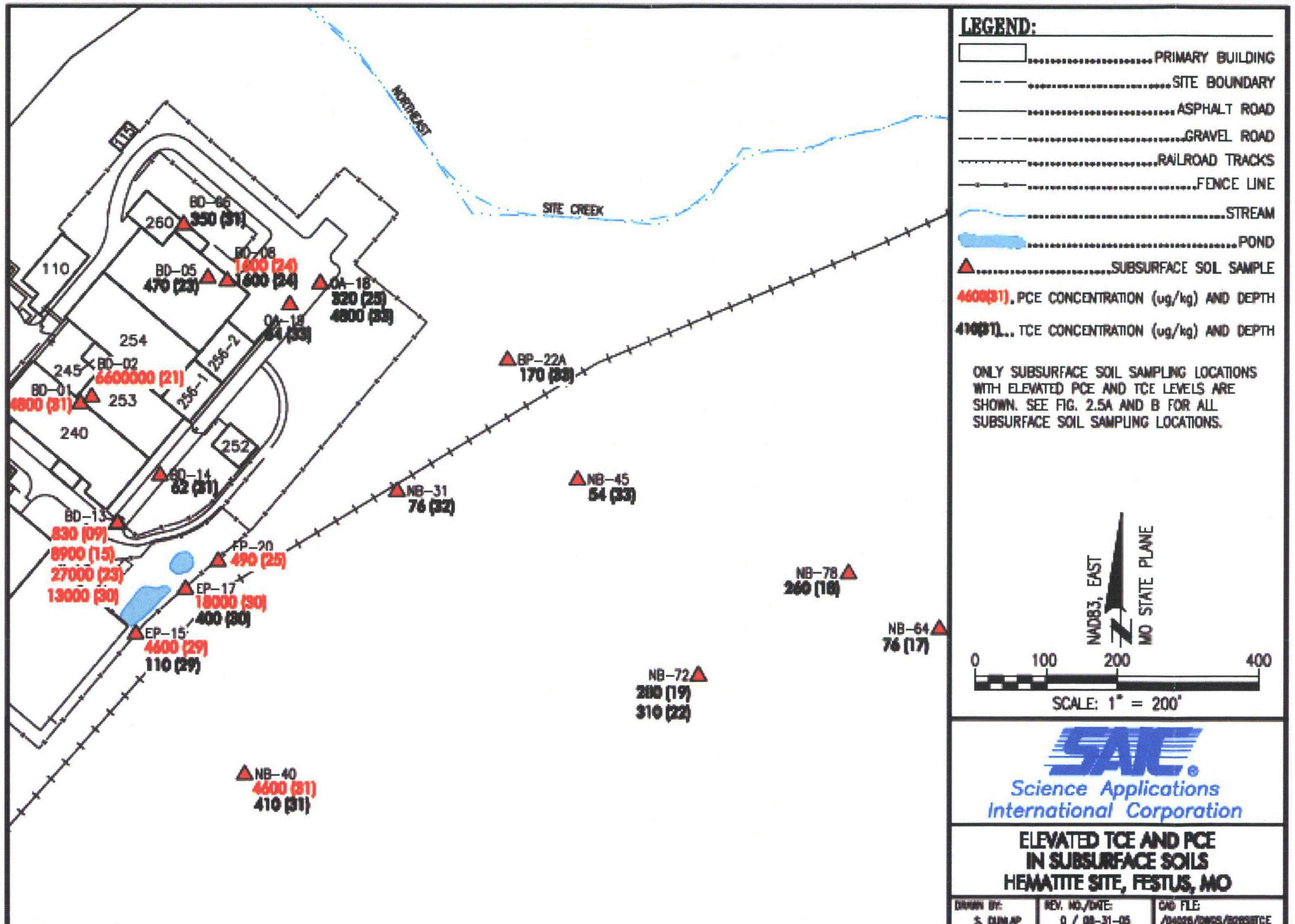


Figure 3-61 **Page 1 of 1**

MIP Detector Response At BD-02

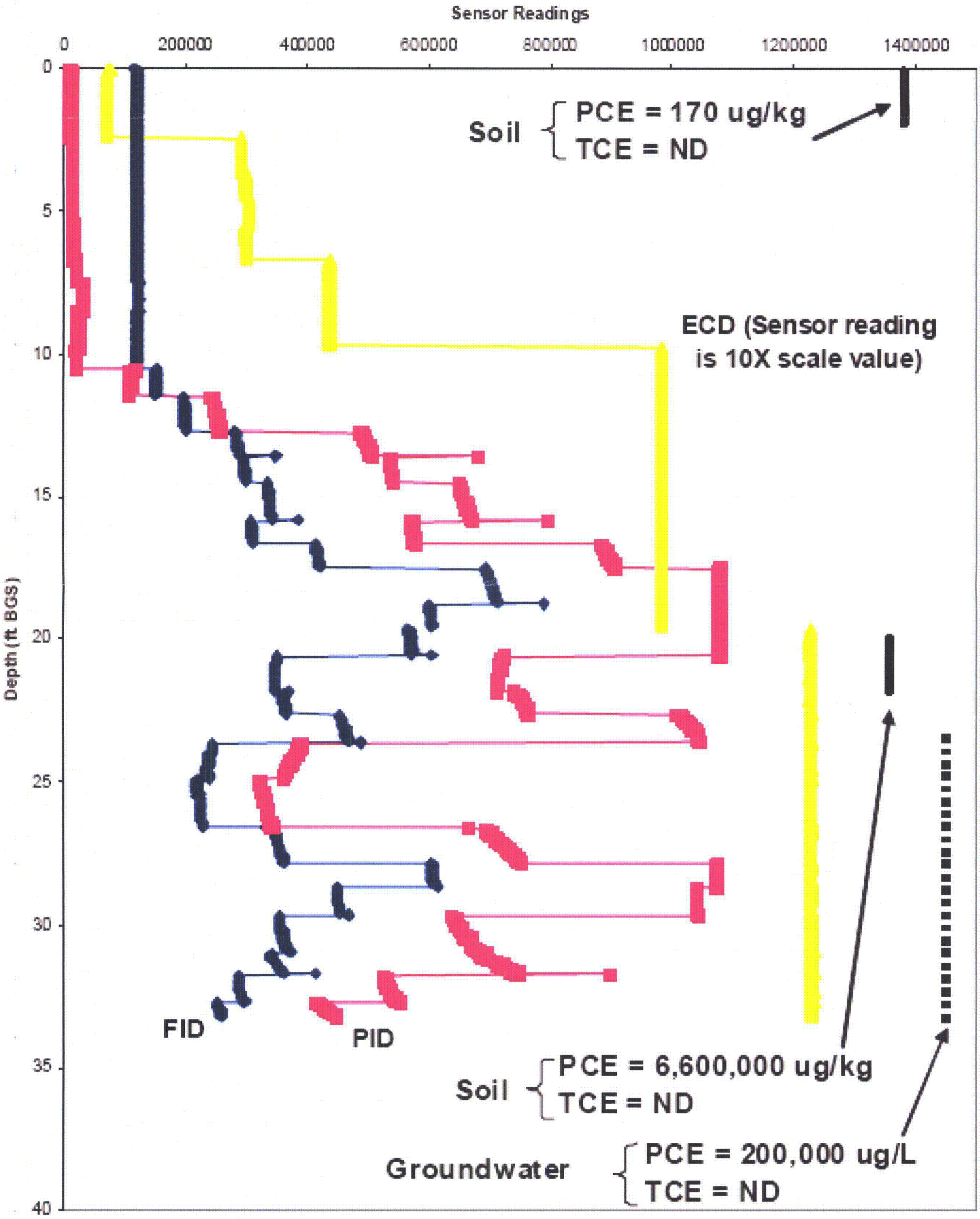


Figure 3-62

MIP Detector Response At OA-18

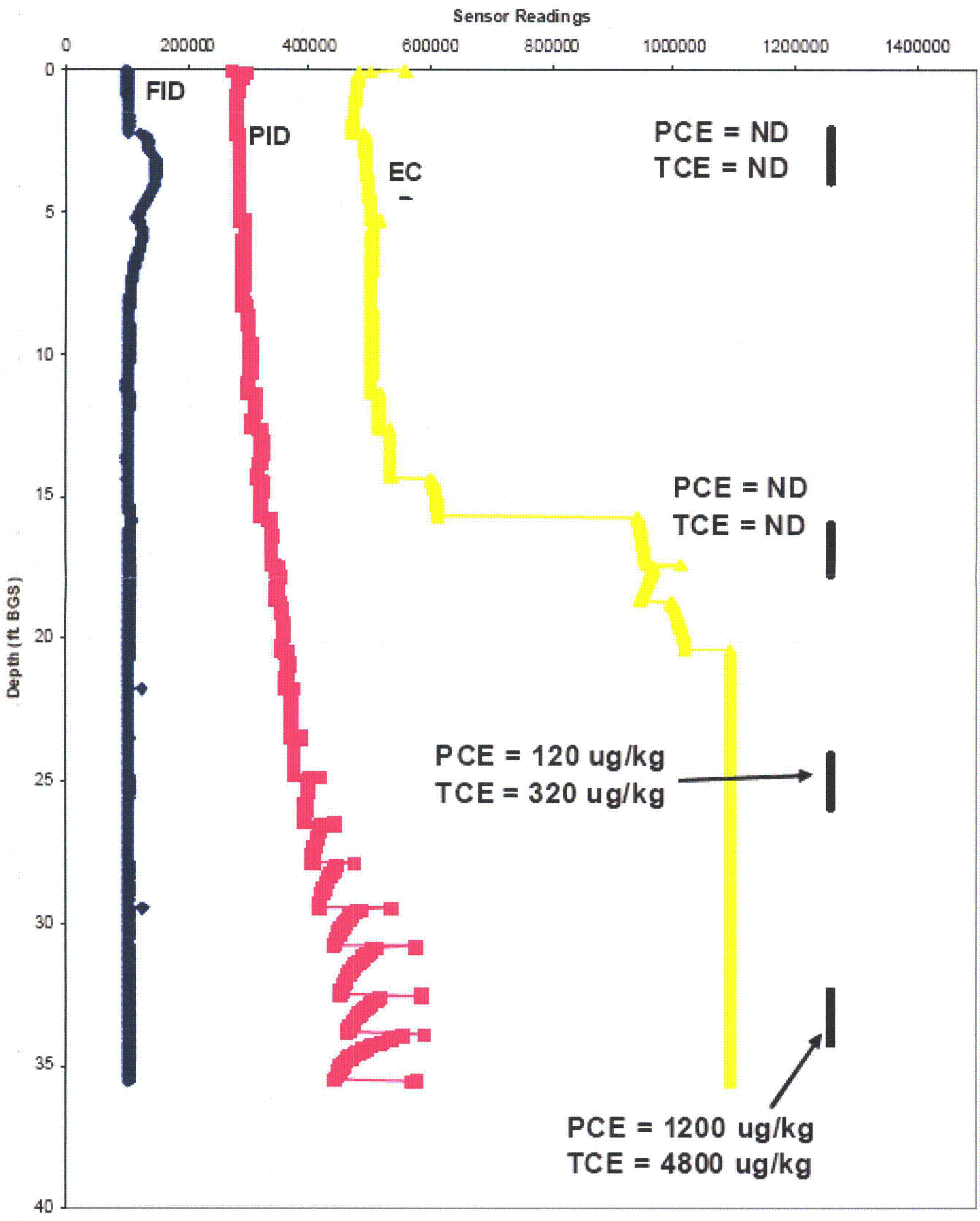
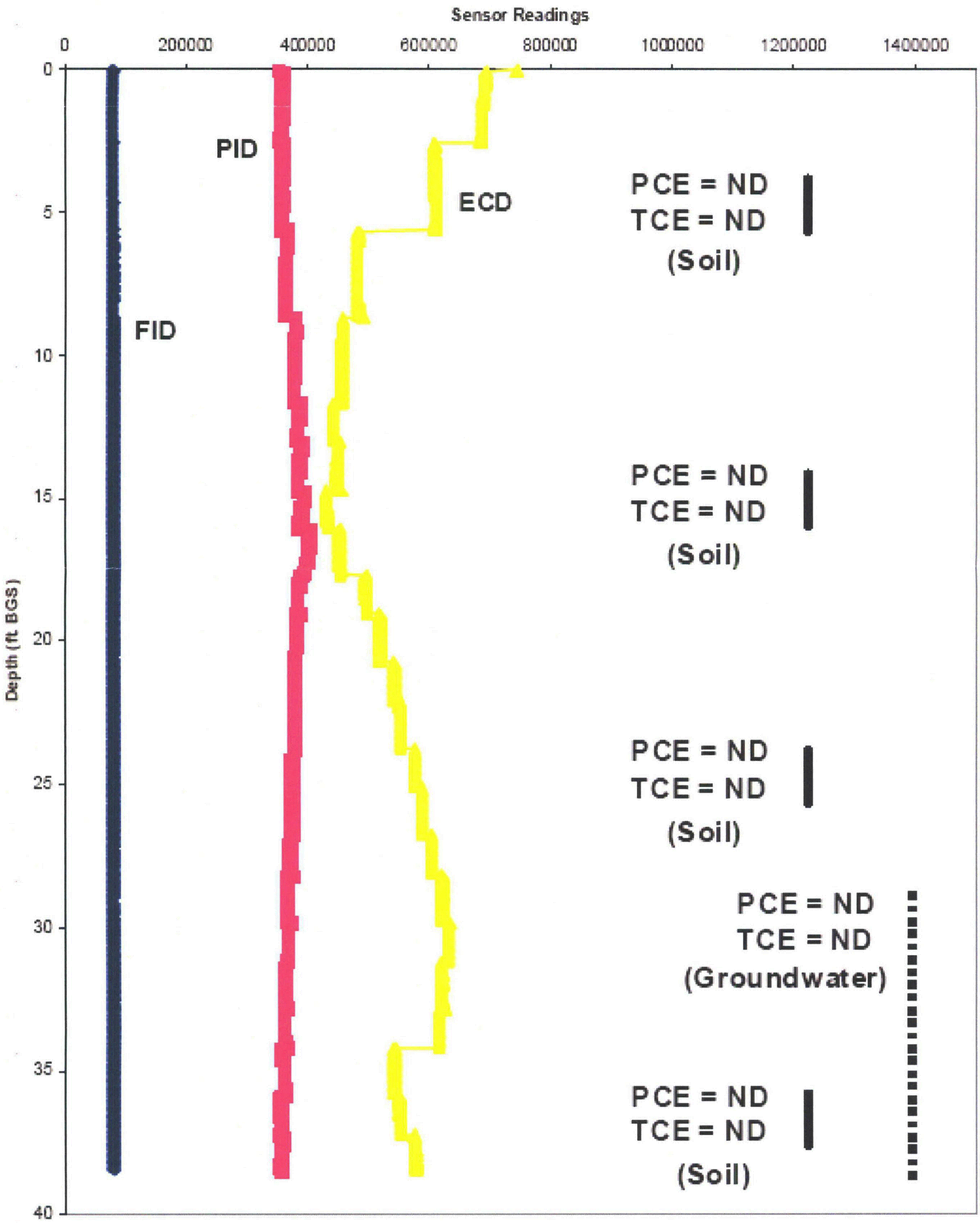


Figure 3-63

MIP Detector Response At NB-50



4.0 ENVIRONMENTAL IMPACTS

This section of the ER provides an analysis of the potential environmental impacts associated with the implementation of the proposed action described in Section 2.0. Figure 1-4 of Section 1.0 provides the facility layout and features located in the central property tract area which is the area of planned remediation activities. The basis for the evaluation of the potential social, economic and environmental impacts was established and defined as the baseline condition in Section 3.0.

4.1 LAND USE IMPACTS

4.1.1 NO-ACTION ALTERNATIVE

The no-action alternative would leave the site in its present state with the continued presence and potential migration of radiological and chemical contamination into soil, surface water, sediment and groundwater in the vicinity of the site. The facility area would remain surrounded by a chain-link fence and continue to be subject to access controls and monitoring requirements. This alternative could prevent the central tract of the site from being developed for any alternative future use, including agriculture. It is possible the present state would have an adverse impact on current agricultural and suburban residential uses of the remainder of the central tract and the land in the vicinity of the site, from both a perceived (indirect) impact and a contamination (direct) impact if the radiological and/or chemical contaminants were to migrate to a broader area.

4.1.2 PROPOSED ACTION

During implementation of decommissioning and remedial activities, the proposed action will not cause significant changes in local land use of the surrounding areas, which is primarily agricultural. Work activities will be concentrated on-site on the ten-acre Central Site Tract, with little or no impact on land use in the outlying areas of the site or surrounding properties. The increased activity, including an increase in traffic on State Road P and the noise due to use of heavy equipment, either in combination or separately (both discussed below), are not likely to affect the continued use of surrounding lands for pasture. The nearby residential areas are likely to be subjected temporarily to a higher noise level, but the increase in traffic should not have an impact on their commutes.

The proposed action will have a direct effect on land use on the ten-acre central tract. A rail spur will be constructed on site, the Burial Pits will be excavated, other contaminated soil will be remediated, selected buildings will be demolished, and the site will undergo extensive decontamination. Contaminated waste will be stored on site while awaiting offsite shipment to licensed disposal facilities, which will be performed as soon as practical.

The long-term impacts on local land use are expected to be highly favorable, as successful completion of the work and attainment of cleanup goals will result in the regulatory release of the site and possible redevelopment of the property for an alternative future use, such as agricultural or recreational use. The local community may also experience growth due to commercial or industrial re-development of the site.

4.2 TRANSPORTATION IMPACTS

4.2.1 NO-ACTION ALTERNATIVE

The no-action alternative would have no impact on current traffic or transportation facilities in the area. No action means no additional or new waste disposal shipments, no significant change in staffing, and no additional or new traffic on State Road P. Transportation would remain unchanged subject to changes from other sources.

4.2.2 PROPOSED ACTION

Implementation of the proposed action would have a direct, short-term effect on transportation on and around the site. Implementation of the proposed action would result in a short-term increase in the use of local, regional and national transportation facilities, not only for the additional workers and equipment required for the decommissioning activities but also for the transport of waste material from the site to licensed processing or disposal facilities. The transportation facilities around the Hematite Site have served well for previous, similar transportation activities and have sufficient capacity to accommodate the additional traffic that would be required temporarily for the decommissioning activities.

Traffic increases due to the increased staffing required to conduct the proposed action are expected to have minimal impact on the local and regional traffic conditions. The staffing levels for the proposed action would likely be less than staffing levels during historical full operation of the facility. The traffic on State Roads A and P is relatively light and the roads are capable of handling the additional vehicles without any problems. Both north and south access to and from Festus/Crystal City is via Interstate Highway 55, which is capable of handling the expected increase in vehicles without notice.

There is a gravel road already in existence along the eastern and southern perimeters of the Hematite Site that has been used in the past for transporting waste from the site to State Road P. This road is planned to be used again during the decommissioning and remediation activities to remove waste from the site. Additionally, temporary on-site gravel roads will need to be constructed to provide access to the Burial Pit Areas and to the on-site Rail Spur system.

Potential off-site routes for transporting contaminated waste from the Hematite Site include roads, highways and railroads (e.g., State Roads A and P, Interstate Highway 55 and existing rail system) with sufficient capacity to handle the transportation of materials from the site to selected disposal or processing facilities. The roads and highways have been used previously for radioactive waste shipments. The designated shippers will be required to have the appropriate State permits and licenses for the transportation of radioactive/hazardous materials and to comply with applicable Department of Transportation (DOT) regulations and directives.

Waste generated by the proposed action will be transported by truck and/or rail to a suitable licensed processing or disposal facility, as appropriate, based on technical feasibility, regulatory requirements and cost-effectiveness. The potential impacts of the waste transportation were analyzed and are discussed below. The route modeled in the analysis is considered to be the bounding scenario route with respect to potential public exposure to radiological hazards. Alternative routes may be used without receiving prior regulatory approval, as long as predicted exposures remain within the bounding scenario, as allowed in Section 9.7 of the DP.

In order to bound the radiological exposure associated with the transportation of waste materials generated during the decommissioning of the Hematite Site, an accident analysis was prepared using the approach presented in NUREG-0170, Final Environmental Statement on the Transportation of Radioactive Material (Reference 9-57). The following discussion provides the assumptions and conclusions that represent upper-bound estimates of potential doses corresponding to the planned waste transportation route.

Normal Conditions of Transportation – The majority of radioactive waste transportation from the site is expected to involve truck transportation on-site to an on-site rail spur, followed by rail transport to the disposal site. Irrespective of this expected mode of waste transportation, the following analysis assumes a 100-mile distance traveled by truck to an off-site rail spur, and a 1,500-mile distance traveled by rail car to the disposal site. This analysis approach is considered a worse-case scenario for personnel exposure resulting from waste transportation.

The truck is assumed to hold 16.7 cubic yards, and each rail car is assumed to hold 85 cubic yards. The principal volume of waste will consist of material from the on-site Burial Pits. This material also contains the highest concentrations of Uranium and is, therefore, used as the basis for a conservative dose analysis. The upper bound estimate of the volume of waste material to be transported is 50,000 cubic yards. This will require approximately 3,000 truck loads and 600 rail car loads. Assuming 10 rail cars per train shipment, 60 train shipments will be required.

To allow the waste materials to be shipped as "Fissile – Exempt" in accordance with both NRC and DOT transportation regulations, the upper bound Uranium concentration is established as 1,070 pCi of Uranium-235 per gram of waste material. Based on the available information regarding the amount of Uranium placed in the Burial Pits, the anticipated average concentration is expected to be less than one-tenth of the definition of fissile exempt materials in the transportation regulations. The source term values used for the analysis of normal conditions of transport are shown in Table 4-1.

The above values assume an average enrichment of 10 percent Uranium-235. A series of MicroShield calculations for different enrichments demonstrates the dose rate above an infinite slab of soil is insensitive to enrichment level. At 10 percent enrichment, the un-shielded dose rate at 1 meter above a slab of soil containing the above concentrations of Uranium is calculated to be 0.035 milliRoentgen per hour (mR/hr).

4.2.2.1 Truck Transport – Driver Exposure

MicroShield calculations of the dose rate at 5 ft. from the side of the trailer, representing exposure in the cab of the truck, result in a dose rate of 0.00185 mrem/hr. Assuming a travel distance of 100 miles at an average speed of 15 mph, and assuming 5 truck drivers share the task of transporting the waste to the rail siding, the radiation to the driver is 0.6 mrem for the entire transport campaign. Each of the 5 drivers transports 70 loads. Thus, the cumulative dose to all the drivers is 3 person-mrem.

4.2.2.2 Rail Transport – Crew Exposure

MicroShield calculations of the dose rate at 152 meters from the end of a rail car, representing the average exposure rate to a train crew, result in a dose rate of 9.28 x 10-8 mrem/hr. Assuming a travel distance of 1,500 miles at an average speed of 25 mph, and a crew of 5 for each train, the radiation dose to a crew member is 5.6 x 10-6 mrem per train trip. Assuming the same crew transports all of the waste, the exposure to an individual crew member would be 3.3 x 10-4 mrem for the entire campaign. The cumulative dose to the entire crew for the entire campaign would be 1.7 x 10-3 person-mrem.

The shipment parameter assumptions used above are conservatively consistent with those used in Table 4.6 (Truck) and Table 4.9 (Rail) in NUREG-0170, Volume 1. Table 4.8 (Truck) and Table 4.10 (Rail) in NUREG-0170 provide information on the cumulative dose for the various population groups exposed during transportation. Using the distribution of exposures in those two tables, it is possible to estimate the exposure to other populations as shown in Table 4-2.

Accident Conditions of Transportation – This analysis is based on a train accident involving 10 rail cars, containing a total of 850 cubic yards of waste, at the expected average concentration of radioactive material in soil in the Burial Pits. Assuming the entire contents of the ten rail cars are released, the source term for the accident is as shown in Table 4-3.

The calculation of the resulting exposure was performed using the HOTSPOT code, based on the above source term and an airborne release fraction of 1 x 10-4. The results are presented in Table 4-4. The maximum calculated dose from a spill of the entire contents of ten rail cars is 93 mrem, at a distance of 62 meters. This calculation is conservative because it assumes a release within a small area, rather than the large area that would normally be associated with ten rail cars.

4.3 GEOLOGY AND SOIL IMPACTS

4.3.1 NO-ACTION ALTERNATIVE

The no-action alternative could have potential long-term impacts on the distribution of contamination in soil, both on-site and off-site. Since contamination would remain on-site (e.g., in the facility structures, soil and Burial Pits), there would continue to exist a long-term potential for contamination to migrate in site soil. The lateral and vertical extent of both radiological and chemical contamination could potentially increase due to the transport effects of storm water runoff and infiltration. In addition, it is likely that contaminants in the Burial Pits waste would seep further into surrounding soil, seeking preferential pathways and eventually impacting groundwater.

4.3.2 PROPOSED ACTION

The most significant impact of the proposed action will be the benefit of permanently removing radiological and chemical contaminants from the site soil and thereby eliminating these same contaminants from migrating to surface water or groundwater. By reducing residual contaminant concentrations in the soil to meet the established cleanup goals, the potential risks to human health and the environment will be minimized, and the site may be reclaimed for alternative future uses.

Other impacts to site soil, such as those associated with remediation activities, will be temporary in nature. Soil in the Central Site Tract will be temporarily disturbed to facilitate the removal of concrete building slabs and asphalt parking lots, as well as the excavation of contaminated soil and buried waste areas (e.g., Burial Pits). Temporary stockpiles of contaminated soil will be stored on selected and treated (e.g., sealed) building slabs, and covered as necessary to prevent contamination runoff during rainfall, while awaiting shipment for off-site disposal. Support areas may be constructed, including equipment staging areas, waste handling and loading areas, and craft support facilities; however, existing structures will be used whenever possible.

To minimize the short-term impacts of soil disturbance, erosion controls will be implemented during earthwork activities in accordance with the Storm Water Pollution and Prevention Plan (SWPPP), as discussed in Section 5.1. These controls will be removed, as appropriate, upon the completion of site remediation and restoration. The site will be restored by grading the remaining soil and establishing vegetation in a manner that blends with the surrounding topography.

Soil remediation activities involving licensed material will be conducted in accordance with approved, written procedures as required by NRC License SNM-33.

4.4 WATER RESOURCES IMPACTS

4.4.1 NO-ACTION ALTERNATIVE

The no-action alternative could result in the continued migration of radiological and chemical contamination from soil and/or buildings into surface water or groundwater in the vicinity of the site. Because the sources of contamination would remain onsite and contaminant migration would be unabated, the extent of groundwater contamination could increase over time, both vertically and laterally.

Continued monitoring of surface water and groundwater would be required, which contributes to the costs of maintaining the facility shutdown and safe. If contamination in either water resource was observed to increase, mitigative actions would have to be taken, involving additional resources, materials, time and expense.

4.4.2 PROPOSED ACTION

Potential temporary impacts to water resources at the site may occur due to remediation activities and storm water runoff during the decommissioning process. During soil remediation activities, storm water running onto areas of exposed potentially contaminated surface soil may potentially transport contaminants down gradient, eventually impacting surface water bodies. To minimize this effect, appropriate mitigation measures will be implemented in accordance with the Storm Water Pollution and Prevention Plan (SWPPP), as described in Section 5.1.3. Storm water from exposed areas will be diverted through the use of diversion berms, silt fences, dikes, temporary basins, or swales; then, contained and treated as necessary, to meet effluent water discharge standards prior to discharge.

Similar temporary impacts to water resources may occur due to the generation of potentially contaminated wastewater, during the dewatering associated with Burial Pit activities and equipment decontamination activities. To minimize these impacts, potentially contaminated wastewater will be contained and treated by a Wastewater Treatment System (WWTS) as described in Section 5.1.3 of this ER.

The Site Creek/Pond may require remediation to remove contamination in sediment and nearby soil. If it becomes necessary to remove contaminated sediment from an extended section of a stream bed, the stream will be temporarily diverted upstream of the contamination so the contaminated stream section can be dried prior to remediation. Stream diversion, in accordance with any required State permits, may be accomplished by installing a temporary dam to create a holding area, from which the water will be pumped to a location further downstream. Diversion ditches or piping may also be used to re-route flow around a section of the stream. For small hot spots in or near the stream bed, a small dike may be used to divert the water around the hot spot to allow remediation.

The selected diversion method will depend on the State permits required and the extent of sediment contamination in various sections of the streams. In all cases, care will be taken not to disturb contaminated sediment before the stream is diverted. Surface water remediation activities involving licensed material will be conducted in accordance with approved, written procedures, as required by NRC License No. SNM-33.

A review of FEMA flood maps and an on-site wetlands survey indicates no flood plains are present within the ten-acre Central Site Tract. One wetland was identified and is discussed in Section 3.4.1. The wetland is south of the facility structures and has no direct flow input from the central tract, but was determined to be the result of precipitation forming a pond between the railroad berm and a gravel road on the opposite side of the railroad tracks from, and south of, the site buildings. Remediation activities on the central tract will have no impact on the wetland. Consequently, the implementation of the proposed action will have no impacts on these resources.

Removal of concrete building floor slabs and asphalt parking areas could have a localized impact on the rate of rainwater infiltration, and the resultant transport of soluble contaminants in groundwater away from the Central Site Tract. This potential transport mechanism will be addressed in the design of soil and groundwater remediation systems and the timing of these remedial activities. For example, it may be necessary to implement soil removal activities in certain sub-slab areas immediately following slab removal. In localized areas of particular concern, diversion dikes may be used, and/or a containment structure erected over contaminated areas to minimize the potential impacts of rainwater infiltration or surface water run-on.

4.5 ECOLOGICAL RESOURCES IMPACTS

4.5.1 NO-ACTION ALTERNATIVE

The no-action alternative could have potential long-term impacts on ecological resources in the vicinity of the Hematite Site. Allowing contamination to remain in place could result in the continued migration of radiological and chemical contamination into nearby ponds and lakes, creeks, forests, grasslands, soil and groundwater, adversely affecting ecological resources at and near the site. Eventually such migration could affect wildlife in the general area. Continued monitoring of the ecological resources would be required, and any increase in contamination levels in unwanted areas would require additional resources for mitigation and clean-up.

4.5.2 PROPOSED ACTION

Ecological impacts of the proposed action will be confined to the 10-acre Central Site Tract (see Figure 1-4), which is the area of planned remediation activities. Mitigation of the effects of the proposed action will reduce these potential impacts, and are described in more detail in Section 5.0. In any case, these impacts will be temporary, occurring only during decommissioning and remediation activities. To the extent possible, it is planned to restore the site to the original state of the natural ecological conditions prior to construction of the Hematite facility. It is estimated that decommissioning and remediation activities could take approximately five years to complete.

As stated in Section 3.5, there is minimal wildlife habitat in the 10-acre-central-tract-area, and there are no anticipated significant adverse impacts to the wildlife habitat from implementation of the proposed action. There may be some minor temporary impacts during implementation, such as the natural displacement of wildlife living in close proximity to the Central Site Tract or other parts of the property or beyond to avoid equipment operations, noise and vehicle traffic in the work zones. However, there are sufficient ecological resources in the area to support this temporary relocation, and it is not expected to have detrimental long-term impacts.

Other areas of the property that may be impacted during remediation include the existing gravel road along the southwest, south, and east perimeter of the Central Site Tract, and surface water habitats. The gravel road will be used to transport waste from the facility to State Road P, as done during facility operations, and is expected to be suitable for remediation activities without additional disturbance of the habitat. Additionally, temporary on-site gravel roads will used to provide access to the Burial Pit Areas and the on-site Rail Spur system. The planned on-site Rail Spur system will be used for loading decommissioning waste to rail cars and transportation of the waste to off-site licensed processing or disposal sites.

Surface water habitats, where sediment remediation may be required, will be temporarily disrupted while remedial activities are being conducted. After remediation is complete, surface water resources will return to their previous natural configuration and wildlife is expected to return.

In the long-term, there will be an overall improvement in the quality of wildlife habitat as contaminated structures and environmental media are removed and the site is restored to its natural condition. In addition, upon confirmation that cleanup goals have been achieved, the fence currently enclosing the facility may be removed, allowing deer and other animals access to the newly-restored areas. Native vegetation will be re-established where contaminated media now exist, providing additional habitat for small animals and food resources for larger animals.

4.6 AIR QUALITY IMPACTS

4.6.1 NO-ACTION ALTERNATIVE

The no-action alternative would not have any effect on air quality at the Hematite Site or in the general area of the site. The no-action alternative would not cause any changes in air emissions from the facility. Because wind erosion is not a significant source of airborne emissions at the facility, allowing contaminated media to remain in place would have no net effect on air quality in this region.

4.6.2 PROPOSED ACTION

Emissions resulting from implementation of the proposed action most likely will have a minor temporary impact on local air quality. However, these emissions are not expected to approach the emission levels observed during manufacturing operations at the facility, which were regulated under the site license. Under certain meteorological conditions during decommissioning and remediation activities, there may be slightly higher concentrations of fugitive dust in the vicinity of concrete and soil handling operations. To minimize the impacts of the proposed action on air quality, measures will be implemented to mitigate the generation and dispersion of these pollutants, as described in Section 5.3.

The current program for monitoring air quality will be expanded, as necessary, during decommissioning activities, as discussed in Section 6.1. This monitoring program will be conducted in accordance with the site license and the Hematite Radiation Protection Plan (Reference 9-58). During site decommissioning, regulatory compliance demonstrations will rely on data collected from air monitoring devices located around the facility. Currently there are three air monitors located outside site buildings. The number of these devices will be adjusted, as required, based on the dust-generating potential of the task at hand and on local meteorological conditions. Monitor locations will be selected to provide measurements at downwind locations considered to be representative of anticipated release pathways, and upwind locations for background comparison. The air monitoring approach will address particulates, as well as gross alpha and gross beta radioactivity.

4.7 NOISE IMPACTS

4.7.1 NO-ACTION ALTERNATIVE

The no-action alternative would have no impact on existing noise levels in the area of the site. Since there would be no changes to the functions and activities currently being carried out on site (e.g., monitoring the facility and maintaining the land), there would be no changes to the noise levels currently being generated, which are minimal.

4.7.2 PROPOSED ACTION

Implementation of the proposed action is not expected to significantly impact the ambient noise levels to which the surrounding areas and general public are exposed. However, operation of equipment during decommissioning activities, such as heavy machinery, jackhammers and air compressors, will cause some temporary increases in noise levels at the site. To address noise impacts, appropriate mitigation measures will be applied, as described in Section 5.4.

With respect to sensitive populations, there are no hospitals or schools close enough to the site to be impacted by potential increased noise levels associated with remediation activities. There are two occupied private residences located on the site property, and other residences are located within one-quarter mile of the site. Noise levels expected to be produced during decommissioning activities will be somewhat louder than the noise levels produced when the facility was in routine operations, due to the use of heavy machinery outside. However, any noise level increases at the site will be minimal compared to those produced by trains that pass the site several times a day, and comparable to farm equipment used in the general area.

4.8 HISTORIC AND CULTURAL RESOURCES IMPACTS

4.8.1 NO-ACTION ALTERNATIVE

As discussed in Section 3.8, there are no historic or cultural issues or aspects associated with the Hematite Site. Therefore, the no-action alternative would have no impacts on historical or cultural resources.

4.8.2 PROPOSED ACTION

Similarly, with no historic or cultural issues or aspects associated with the site, no impacts to potential historical or cultural resources are anticipated from remediation activities in the Central Site Tract.

4.9 VISUAL/SCENIC RESOURCES IMPACTS

4.9.1 NO-ACTION ALTERNATIVE

Under the no-action alternative, the existing visual/scenic quality of the plant facility would not be impacted. The exposed concrete floor slabs and asphalt parking lots which would be left following completion of selected building demolition, would remain in place. In addition, the fence surrounding the facility, along with warning signs identifying the site as being radiologically and chemically contaminated, would remain in place in accordance with site access control requirements. These conditions would be visible to passing traffic on State Road P and might be considered to detract from the view to a different extent than the current facility.

4.9.2 PROPOSED ACTION

Visual impacts are determined by the degree of visual change introduced by project components, the degree to which those changes could be visible to surrounding viewers, and the general sensitivity of individual viewers to landscape alterations. Visual change is determined by the amount of visual contrast that a particular project component might create (e.g., changes to form, line, color, texture and scale in the landscape); the amount of obstruction (e.g., loss of view); and degradation of specific scenic resources (e.g., construction of a facility that blocks views of a scenic landscape).

During decommissioning activities, views of the facility would be temporarily degraded while contaminated soil and debris are being excavated and shipped from the site. The degraded views would be transitory, however, and would not be expected to have a significant impact on the surrounding viewers.

Implementation of the proposed action would have beneficial long-term impacts to visual/scenic resources. The long-term visual character of the Hematite Site would be improved by restoration of the Central Site Tract following soil remediation. The cumulative effects of remediating the site, removing the fencing and warning signs, and re-grading and establishing vegetation would restore the site to a more natural condition, and enable it to blend in with the surrounding environment.

4.10 SOCIOECONOMIC IMPACTS

4.10.1 NO-ACTION ALTERNATIVE

The no-action alternative could have a potentially detrimental long-term impact on the current socioeconomic conditions in the area. This alternative would prevent the site from being remediated and returned to productive use for the local economy. The site may be perceived as a property that would deter potential developers from constructing new homes or businesses in the immediate area, particularly if existing contamination migrated further into groundwater. Thus, the area could experience either no growth or an overall decline in socioeconomic conditions.

4.10.2 PROPOSED ACTION

Implementation of the proposed action is not expected to have adverse temporary impacts on the socioeconomic conditions in the Hematite area. Although two residences are located on the eastern portion of the site, no residences or businesses would be displaced and/or adversely impacted by implementation of the proposed action. The decommissioning project would, however, create the opportunity for construction and equipment operator jobs, which would result in a short-term positive impact to the local socioeconomic environment. However, the short-term influx of additional workforce would not have a significant impact on the local infrastructure.

The proposed action would move the site closer to the ultimate goal of making it available for productive use for the local economy. Future uses of the site could include agricultural, commercial, or industrial, and any of these uses would contribute to the local economy and an improvement in socioeconomic conditions. Therefore, site decommissioning could have a long-term positive impact to the local economy.

4.11 ENVIRONMENTAL JUSTICE

4.11.1 NO-ACTION ALTERNATIVE

The no-action alternative would leave the facility in its present condition, i.e., make no changes, and as a result have no environmental impacts on low-income or minority populations in the area.

4.11.2 PROPOSED ACTION

Considering the work and activities involved in the decommissioning and remediation activities, as discussed in Section 1.3, neither minority nor low-income populations are expected to be impacted by implementation of the proposed action.

4.12 PUBLIC AND OCCUPATIONAL HEALTH IMPACTS

4.12.1 NO-ACTION ALTERNATIVE

The no-action alternative would allow the continued presence and potential migration of radiological and chemical contamination in soil, surface water and groundwater in the vicinity of the site. This could result in a possible increase in risks associated with public exposure to chemical and radiological contaminants in these media. Occupational health impacts would remain unchanged for individuals that have access to the contaminated areas. In the long-term, however, collective occupational health impacts would decrease because the number of workers on-site would be limited to a few individuals involved with periodic monitoring or site inspection activities. Monitoring of the environment would continue as long as contaminated material remained on site.

4.12.2 PROPOSED ACTION

During site decommissioning activities, there is a potential for a temporary increase in the risks associated with exposure to non-radiological and radiological contaminants directly from the on-site activities and transportation of contaminated waste, and indirectly from the possible migration of contaminants offsite. Potentially impacted groups include site workers, site visitors, members of the public adjacent to waste transportation routes and drivers transporting the waste. By implementing appropriate procedures and controls, as described in Section 5.6, the potential for adverse public and occupational health impacts will be minimized.

4.12.2.1 Non-Radiological Impacts

Excavation of the waste Burial Pits during soil remediation could expose site workers to a variety of hazardous chemicals. As described in Section 3.3.5, the Burial Pits may contain various solid wastes such as trash, empty bottles, floor tile, rags, drums, bottles, glass wool, lab glassware, acid insolubles and filters. Chemical wastes including hydrochloric acid, hydrofluoric acid, potassium hydroxide, TCE, PCE, alcohols, oils and wastewater may also be present. By implementing appropriate waste management procedures and controls, as described in Section 5.6, the potential for non-radiological impacts will be minimized. In addition, appropriate mitigation measures, as described in Section 5.0, will be implemented to reduce public and occupational health risks during remediation activities. The effective use of engineering and administrative controls, dust controls, respiratory protection (as applicable) and protective clothing (as applicable), will ensure that non-radiological exposures due to inhalation and ingestion of airborne contamination are maintained below the respective administrative limits.

Asbestos or hazardous waste materials (e.g., lead pipe gaskets) could potentially be encountered during removal of below-grade utilities remaining from building demolition. Occupational safety and health issues associated with asbestos and hazardous waste handling and removal are subject to OSHA regulations at 29 CFR 1910 and 1926 (Reference 9-59 and Reference 9-60).

The work will be conducted in accordance with all applicable OSHA requirements therefore potential risk will be minimized. EPA regulations govern the handling of asbestos-containing materials [40 CFR 61, Subpart M (Reference 9-61)], and the generation, storage and transportation of hazardous waste will comply with 40 CFR 260 through 272 of the Resource Conservation and Recovery Act (RCRA; Reference 9-62) to the extent they are applicable.

In addition, site workers will be exposed to hazards associated with heavy industrial equipment, such as backhoes, bulldozers, front-end loaders, trucks, etc. Efforts will be taken to minimize the risks from these hazards.

4.12.2.2 Radiological Impacts

As discussed in Section 3.11, there are radiological contaminants in the soil that may present potential occupational and public health risks during the site decommissioning. Dust generated during soil excavation and backfill operations, and during demolition of concrete pads remaining after building removal, may contain radioactivity that could present a health risk to individuals in contact with it. External radiological exposure hazards will be insignificant, because of the low concentrations of radioactive contaminants at the site and the absence of strong gamma emitters. Internal exposure, by inhalation, ingestion, or injection through open wounds, will be the primary hazard associated with radioactive contaminants.

Appropriate mitigation measures, as described in Section 5.0, will be implemented to reduce public and occupational health risks during remediation activities. The effective use of engineering and administrative controls, dust controls, respiratory protection (as applicable), and protective clothing (as applicable) will ensure that radiation exposures due to inhalation and ingestion of airborne radioactive contamination are maintained below the respective administrative limits. Work involving ionizing radiation will be performed in compliance with the site's Radiation Protection Plan and applicable health physics procedures. The guiding philosophy will be to keep exposures as low as reasonably achievable (ALARA).

For the purposes of calculating the bounding estimate of radiation exposure to the neighboring public, the source term shown in Table 4-5 was applied. These concentrations are based on the anticipated average concentrations for material in the Burial Pits, which provides a conservatively bounding estimate of the concentration of radionuclides in other site soil. The mass concentration in air that represents heavy dust conditions is 15 milligrams per cubic meter (mg/m^3). Using Equation 1, and Figures 1 and 2 of Regulatory Guide 1.145 "Atmospheric Dispersion Models for Potential Accident Consequence Assessments at Nuclear Power Plants" (Reference 9-63), the downwind concentrations of radioactive material associated with soil remediation activities can be calculated.

The calculations are based on a breathing rate of 8.4×10^3 cubic meters per year (m^3/yr) and the dose conversion factors provided in Table 2.1 of Federal Guidance Report No.11 "Limiting Values of Radionuclide Intake and Air Concentration and Dose Conversion Factors for

Inhalation, Submersion, and Ingestion" (Reference 9-64). The calculation results for monthly exposure rates, relative to distance from the source, are presented in Figure 4-1.

The nearest resident is approximately 300 meters from the site central tract, and the bounding estimate for radiation exposure due to soil remediation activities is 0.15 mrem/month, assuming 40 hours per week and 4.5 weeks per month as the exposure duration. This low radiation exposure estimate is a conservative bounding estimate for a number of reasons. Conservatism is provided in the assumptions that: no mitigation measures are implemented to limit heavy dust conditions; the exposed individual remains outdoors for the entire period of remediation; the wind blows continuously in one direction for the entire period; and, there are no obstructions between the soil remediation location and the residential location. Even with these conservative assumptions, the radiation exposure to nearby residents due to soil remediation activities are calculated to be a small fraction of the regulatory limits.

As noted in Section 4.3.2, disturbing the soil increases the potential to spread contamination to nearby soil areas and streams due to storm water run-off. To alleviate this potential, soil areas to be excavated will be isolated from potential storm water run-on and run-off, using such measures as berms and diversion structures/ditches. Other erosion and sediment controls as described in Section 5.1, will be used as necessary to prevent the spread of contamination through storm water run-off.

Excavation of the Burial Pits may expose radioactive waste that exhibits the characteristic of a hazardous waste as defined under EPA, RCRA and corresponding MDNR regulations. If present, the mixed waste is expected to be radiologically-impacted material containing chlorinated VOCs or, to a lesser degree, inorganic acids. Westinghouse plans to manage these materials in accordance with NRC and MDNR hazardous waste regulations, to protect public health and safety and the environment. Mixed waste will either be treated on-site in accordance with applicable regulations as needed to remove the hazardous waste characteristic, followed by disposal of the remaining residual radioactive waste to off-site licensed disposal facilities, or transported to a permitted mixed waste disposal facility for treatment and disposal.

The waste Burial Pits are also known to contain quantities of enriched Uranium. Based on available records, it is estimated that the average concentration of fissile material in the Burial Pits is approximately 1/10 of the concentration defined as "fissile exempt" material in the transportation regulations. It is anticipated that during excavation of materials from the Burial Pits, specific items could be identified that have higher Uranium-235 concentrations. However, such items would be limited in mass because the total Uranium quantity in each pit was limited to approximately 800 grams of Uranium of any enrichment. Operational surveys will be conducted during excavation operations to identify discrete items, and soil volumes that have high Uranium-235 concentrations. Procedures will provide instructions and guidance for identifying materials that exceed a conservative fraction of the definition of "fissile exempt" material, including provisions for handling such materials to ensure nuclear criticality safety in accordance with License Application Chapter 4 of the Materials License SNM-033 (Ref 2).

A review of decommissioning activities has been conducted to develop a list of reasonably foreseeable (e.g., credible) accidents with a potential for releases to the environment, and to analyze the dose consequences from such accidents. These offsite dose consequences were then compared to the current license-basis requirement of complying with the provisions of 10 CFR 70.22(i)(1)(i). Decommissioning credible accident analyses information is provided in Appendix A to this report.

4.13 WASTE MANAGEMENT IMPACTS

4.13.1 NO-ACTION ALTERNATIVE

The no-action alternative would have no waste management impacts since no additional contaminated or hazardous waste would be generated under the no-action alternative.

4.13.2 PROPOSED ACTION

Implementation of the proposed action will result in the creation of solid wastes, in the form of soil and debris wastes, and liquid wastes. The wastes which might be generated during decommissioning include, but would not be limited to: RCRA or Toxic Substances Control Act (TSCA; Reference 9-65) wastes; low-level radioactive waste (LLRW); mixed waste; sanitary waste; and, non-contaminated demolition and construction debris.

An active commitment will be made to minimize the amount of radioactive and hazardous waste generated during decommissioning activities. Wherever possible, efforts will be made to decontaminate and re-use materials. Materials that have not been exposed to hazardous constituents will be removed or protected to avoid cross-contamination or co-mingling. Waste mitigation techniques are described in Section 5.6.

Metal items, such as below-grade piping, will be removed and surveyed for radioactive contamination and disposed of accordingly.

Based on characterization data, waste will be segregated and analyzed as required by the disposal facility's Waste Acceptance Criteria (WAC). The waste streams that could result from decommissioning efforts are listed as follows:

4.13.2.1 Sanitary Waste

Non-contaminated waste generated in office spaces is categorized as sanitary waste. The amount of sanitary waste generated during decommissioning and remediation activities is expected to increase due to the higher numbers of workers involved in this work.

4.13.2.2 Clean Debris

Material that is released and free of hazardous contamination is defined as clean debris and will be re-used whenever possible. Clean debris might include such material as brick, concrete, asphalt, paper, wood, glass, metal, plastics, mineral material, soil, wire and pipe. Clean debris will be re-used or containerized, transported and disposed of at an appropriate facility.

4.13.2.3 LLRW Asbestos-Containing Material

Asbestos-containing material (ACM) found to be contaminated with radiological constituents will be handled as radioactive waste. The LLRW-ACM will be double-wrapped, labeled with both ASBESTOS and RADIOLOGICAL warnings in accordance with regulatory guidance, containerized, transported and disposed of at a permitted facility.

4.13.2.4 LLRW Solids

Soil remediation will generate three general categories of solid LLRW: soil, demolition debris and Burial Pit material. Soil might also include spent limestone that was used as on-site landfill. Demolition debris will consist mostly of concrete floor slabs and foundations, asphalt pavement and below-grade utilities (piping and conduit). Burial Pit material could include a wide variety of waste materials. It is anticipated that floor slabs and foundations, piping, foundation material and other non-soil materials will exhibit surface contamination only. Burial pit material might contain both volumetric and surface contamination; and, efforts will be made to segregate contaminated material from non-contaminated material. If decontamination is practical, Burial Pit material will be decontaminated and disposed of accordingly.

4.13.2.5 LLRW Liquids

Soil remediation operations could result in the generation of LLRW liquids from contaminated groundwater removed to facilitate soil excavations, contaminated storm water from active remediation areas, and wastewater generated from vehicle and equipment decontamination.

4.13.2.6 Polychlorinated Biphenyl Waste

Polychlorinated biphenyl (PCB) waste, if any, will be containerized, labeled, transported and disposed of at a permitted disposal facility. PCB waste will be stored/staged in an appropriate container depending on the volume and type of waste.

4.13.2.7 Hazardous Waste

Hazardous waste will be identified on the basis of process knowledge, characterization and volumetric sampling. Analytical data will delineate the specific hazardous material and the levels of contamination. Identified hazardous wastes will be segregated and containerized.

4.13.2.8 Mixed Waste

Mixed waste meets the EPA definition of hazardous waste and is radiologically contaminated. Mixed waste will be identified through characterization and volumetric sampling. Analytical data will delineate the specific hazardous material, the levels of contamination and the radioactive isotopes.

4.13.2.9 Investigation Derived Waste

Investigation derived waste (IDW) will be handled, containerized, labeled and dispositioned in accordance with the Hematite Site Waste Management and Transportation Plan (Reference 9-66).

Table 4-1

Source Term For Normal Conditions Of Transport

Nuclide	Volume Concentration (µCi/cm³)	Activity Distribution Percent (%)	Mass Concentration (pCi/g)
U-234	2.11E-03	88.7%	1,758
U-235	1.11E-04	4.7%	93
U-238	1.58E-04	6.6%	132
Total:	**2.38E-03**	**100%**	**1,983**

Table 4-2 **Page 1 of 1**

Cumulative Exposure To Various Groups During Normal Transport Of Hematite Waste

Exposed Population	**Rail Transport (person-mrem)**	**Truck Transport (person-mrem)**
Crew/Driver	1.70E-03	3.0
Surrounding Population		
On-link	2.27E-05	0.2
Off-link	4.34E-02	0.4
While Stopped	1.70E-03	1.2
Storage	1.32E-03	0.3
Total:	**4.82E-02**	**5.1**

Table 4-3

Source Term For Accident Condition Of Transport

Nuclide	Activity Distribution Percent (%)	Total Activity (Curies)
U-234	88.7%	1.52
U-235	4.7%	0.0826
U-238	6.6%	0.115
Total:	**100%**	**1.72**

Table 4-4

Hotspot Version 2.05 – Output Report - General Plume
(August 18, 2005, 09:16 PM)

Source term	Hematite Accident Analysis Mix (Mixture Scale Factor = 1.0000)
Hematite Transportation Accident Analysis	
Effective release height	0.00 m
Wind speed (h = 10 m)	1.0 m/s
Distance coordinates	All Distances Are On The Plume Centerline
Stability class	G
Sigma theta	20.0 deg
Receptor height	1.5 m
Inversion layer height	None
Sample time	10.000 min.
Breathing rate	3.33E-04 m3/sec.
Maximum dose distance	0.062 km
Maximum CEDE	0.093 rem

Table 4-4 (continued)

Hotspot Version 2.05 – Output Report - General Plume
(August 18, 2005, 09:16 PM)

Distance (km)	CEDE (rem)	Time-integrated Air Concentration (Ci-sec)/m3	Ground Surface Deposition (µCi/m2)	Ground Shine Dose Rate (rem/hr)	Arrival Time (hour : min)
0.030	1.2E-02	2.7E-07	1.1E-01	1.2E-08	00:01
0.100	6.3E-02	1.4E-06	6.9E-03	7.1E-10	00:04
0.200	1.8E-02	4.1E-07	1.4E-03	1.4E-10	00:08
0.300	7.5E-03	1.7E-07	5.5E-04	5.7E-11	00:12
0.400	4.0E-03	9.1E-08	2.8E-04	2.9E-11	00:16
0.500	2.4E-03	5.5E-08	1.7E-04	1.8E-11	00:20
0.600	1.6E-03	3.7E-08	1.1E-04	1.2E-11	00:24

Table 4-4 (continued)

Hotspot Version 2.05 – Output Report - General Plume
(August 18, 2005, 09:16 PM)

Distance (km)	CEDE (rem)	Time-integrated Air Concentration (Ci-sec)/m3	Ground Surface Deposition (μCi/m2)	Ground Shine Dose Rate (rem/hr)	Arrival Time (hour : min)
0.700	1.1E-03	2.6E-08	8.0E-05	8.3E-12	00:28
0.800	8.5E-04	2.0E-08	5.9E-05	6.2E-12	00:32
0.900	6.6E-04	1.5E-08	4.6E-05	4.8E-12	00:36
1.000	5.3E-04	1.2E-08	3.6E-05	3.8E-12	00:40
2.000	1.2E-04	2.6E-09	7.9E-06	8.3E-13	01:20
4.000	2.6E-05	6.1E-10	1.8E-06	1.9E-13	02:41
6.000	1.1E-05	2.6E-10	7.7E-07	8.0E-14	04:02

Table 4-4 (continued)

Hotspot Version 2.05 – Output Report - General Plume
(August 18, 2005, 09:16 PM)

Distance (km)	CEDE (rem)	Time-integrated Air Concentration (Ci-sec)/m3	Ground Surface Deposition (µCi/m2)	Ground Shine Dose Rate (rem/hr)	Arrival Time (hour : min)
8.000	6.3E-06	1.4E-10	4.3E-07	4.5E-14	05:23
10.000	4.1E-06	9.4E-11	2.8E-07	2.9E-14	06:43
20.000	4.4E-07	1.0E-11	3.0E-08	3.2E-15	13:27
40.000	1.7E-08	3.9E-13	1.2E-09	1.2E-16	>24:00
60.000	1.0E-09	2.3E-14	6.9E-11	7.2E-18	>24:00
80.000	1.4E-10	3.1E-15	9.3E-12	0.0E+00	>24:00

CEDE = committed effective dose equivalent; µCi/m3 = microcuries per cubic meter; km = kilometer; Ci-sec/m3 = curie-second per cubic meter
rem = Roentgen equivalent man; hr = hour

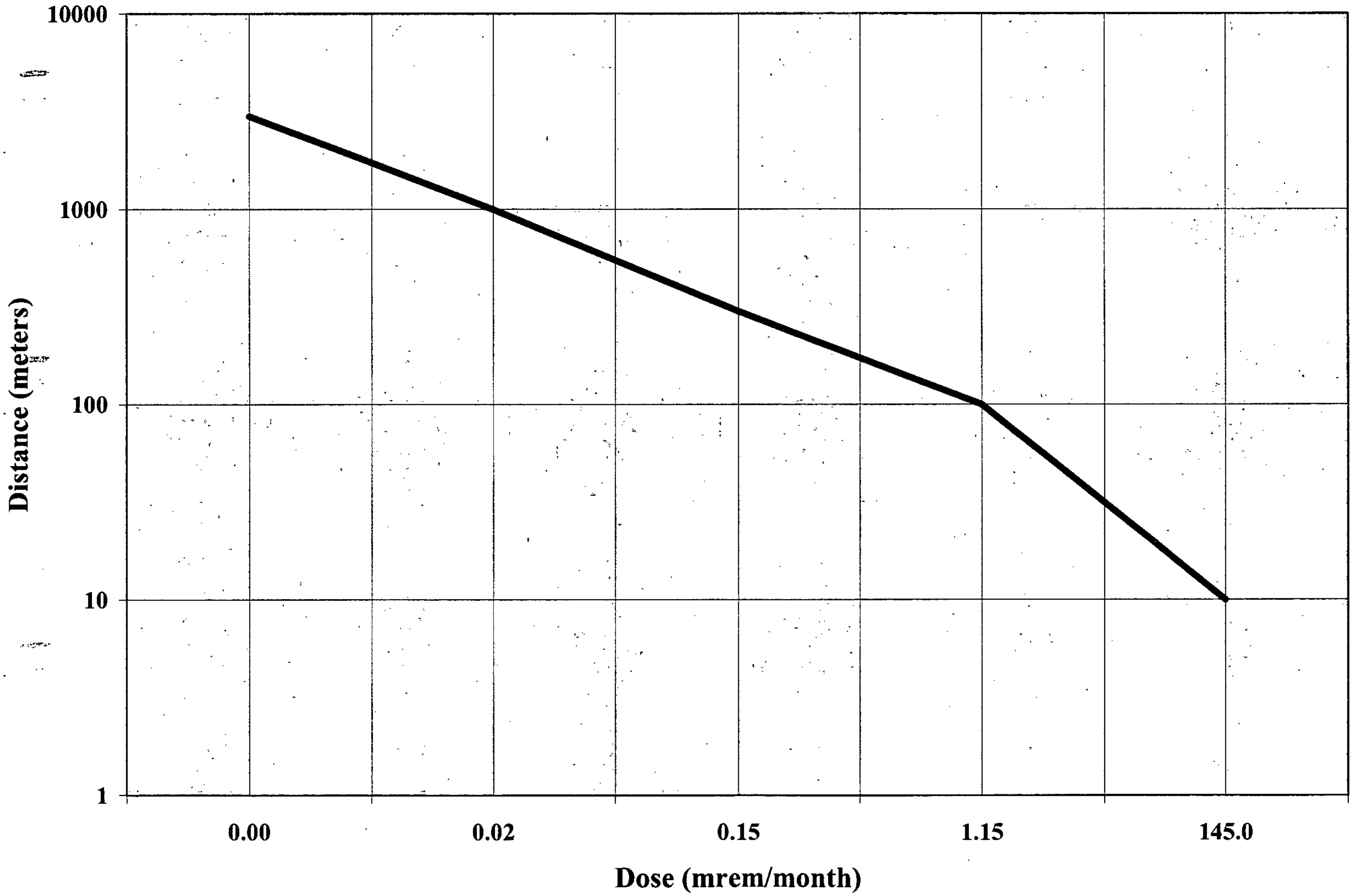
Table 4-5

Source Term For Soil Remediation Activities

Nuclide	Activity Distribution Percent (%)	Mass Concentration (pCi/g)
U-234	88.7%	1,758
U-235	4.7%	93
U-238	6.6%	132
Total:	**100%**	**1,983**

Figure 4-1

Monthly Exposure Vs. Downwind Distance Due To Soil Remediation



5.0 MITIGATION MEASURES

This section provides a summary of mitigation measures that may be used during the proposed action to minimize the potential adverse impacts associated with the proposed action. Decommissioning activities will be planned and implemented in a manner that protects the environment, and the health and safety of the public and employees. Areas in which mitigation measures will be taken to attempt to minimize potential impacts include: erosion and soil control; water quality, including storm water abatement; air quality; public and occupational health; waste management; and noise, both public and occupational.

5.1 EROSION AND SEDIMENT CONTROL

Prior to implementation of the proposed action, an engineering evaluation will be performed to develop a Storm Water Pollution and Prevention Plan (SWPPP). This plan will include both procedural and engineering controls to reduce storm water run-on to work area, an estimate of expected quantities of potentially contaminated storm water runoff, and predicted levels of total suspended solids (TSS) and radiological contamination in the runoff. Best management practices will be specified in the plan to prevent erosion and sediment transport into adjacent creeks and tributaries.

Prior to excavation work, the soil erosion and sediment controls measures specified in the SWPPP will be implemented. These controls will restrict the transport of sediment within the project area and protect nearby surface waters. Soil erosion and sediment control methods that will be considered for use during the proposed action include the techniques described below.

5.1.1 STABILIZATION MEASURES

Stabilization measures that may be used to control erosion and sedimentation include:

- Minimize the size of the area being disturbed;
- Minimize and control dust generation through the use of wetting agents;
- Stabilize surfaces after final grading; and,
- Re-establish permanent vegetative cover on disturbed areas as soon as practicable, following excavation.

5.1.2 STRUCTURAL FEATURES

Structural measures that may be used to control erosion and sedimentation include:

- Prevent or reduce run-on storm water from entering excavated areas by maintaining or improving existing grade surrounding excavations;

- Install diversionary berms and dikes around the areas of the excavation;
- Install physical barriers, such as, silt fences or hay bales to isolate areas of erosion and minimize sediment transport;
- Construct temporary barriers to slow run-on storm and surface water flow velocity;
- Install check dams in swale areas to minimize sediment transport;
- Use erosion control blankets to minimize erosion due to concentrated flow pattern formation;
- Build stabilized construction entrances to minimize the transport of sediment from project areas;
- Surround soil stockpiles with sediment barriers, e.g., silt fencing; and,
- Cover soil stockpiles with tarp covers.

Physical controls such as berms, dikes, sandbags and temporary liners will be used to prevent run-on water from contacting potentially contaminated soil or water. The soil and sediments generated from this process will be removed, screened and deposited according to the waste management plan.

Groundwater or perched water systems may be encountered during the excavation of the Burial Pit Area. Construction wastewater from these sources will be managed as an aspect of the excavation process. As the Burial Pit trench areas are opened, low points and sumps will be excavated into the open Pit to create a single collection point for this wastewater. Once the wastewater begins to sufficiently accrue in the excavation sump, the water will be pumped to influent weir tanks and ultimately to a Water Treatment System (WTS).

The Water Treatment System (WTS) will be provided to reduce wastewater turbidity and contamination resulting from the decommissioning activities to levels that allow the discharge of the wastewater to the Site Pond outfall in accordance with the site State issued wastewater discharge permit.

5.1.3 STORM WATER MANAGEMENT PRACTICES

Surface water normally crossing the facility may also be diverted around the site through a series of earthen berms. These berms will be evaluated for control during heavy precipitation/flooding events. Only soil with no radiological or chemical contamination will be used to construct or improve physical controls.

Storm water management practices that may be used to control erosion and sedimentation include the following:

- Maintain run-off flow patterns and discharge locations similar to existing conditions;
- Maximize overland flow through vegetated areas;
- Install active pumping, containment and treatment system (e.g., the Water Treatment System) for excavation pit water prior to discharge; and,
- Cover stockpiles of contaminated material to prevent contaminant exposure to storm water.

Effluents will be monitored at the existing outfalls in accordance with the site NPDES permit (see Section 6.2). Additional engineering controls will be implemented, as necessary, if water quality measurements indicate that site action levels are being approached or exceeded.

5.2 WATER QUALITY CONTROL

Potential adverse impacts to water quality will be mitigated by implementation of both procedural and engineering controls. A Storm Water Pollution and Prevention Plan (SWPPP) will be developed, as described above, to minimize the effects of storm water. Any potentially contaminated wastewater generated during site activities (e.g., Burial Pit excavation dewatering, equipment decontamination, etc.) will be contained and treated to acceptable standards prior to discharge. Water treatment process plans will be developed based on the nature and concentrations of contaminants expected in the waste stream. The Water Treatment System (WTS) will be in place to process the water created from remediation of the Burial Pits. Any necessary modifications to the site NPDES permit (see Section 6.2) will be in place prior to wastewater discharge.

5.3 AIR QUALITY CONTROL

Potential adverse impacts to air quality will be mitigated by implementation of both procedural and engineering controls. Procedural controls will include practices such as sequencing work activities in a manner that minimizes the surface area of soil exposed at any one time, designing excavation and loading operations in a manner that minimizes handling and drop distances, and planning vehicle traffic patterns in a manner that minimizes travel distance, vehicle speeds and directional changes.

The following engineering controls will be applied, as necessary, to limit the generation of airborne emissions during work activities:

- Air Samples will be collected prior to work area remediation to determine chemical and radiological background concentrations and potential air-borne sources of contamination. Appropriate engineering controls will be implemented at the work area to control and monitor the potential air borne contaminants;

- To prevent the generation of contaminated airborne particulates during structure demolition, surfaces may be decontaminated and/or wetting agents, fixatives or coverings may be applied prior to demolition;

- During soil excavation and backfill activities, and during demolition of concrete pads, potential generation of dust and airborne activity will be controlled by spraying work areas with water. If necessary, during concrete slab removal, foaming agents may be applied;

- In localized areas of particular concern, a containment tent with HEPA filters may be constructed over contaminated areas to control airborne releases; and,

- To ensure equipment exhaust emissions are controlled, equipment will be required to have the manufacturers' recommended emission control systems in place prior to use.

Air monitoring will be conducted to document levels of airborne particulates and radioactive contaminants during decommissioning activities. Additional controls will be implemented, as necessary, if air quality measurements indicate site action levels are being approached or exceeded.

5.4 NOISE LEVEL CONTROL

During site decommissioning activities, standard noise abatement measures will be implemented, as necessary, based on the type of work being performed and the level of noise generated. Noise abatement measures may include:

- Schedule work activities to minimize cumulative noise impacts and to avoid times when most residents are home;
- Locate stationary noise sources, such as electrical generators or air compressors, as far as possible from noise-sensitive areas; and,
- Use electrically or hydraulically powered impact tools when feasible.

Activities that generate excessive noise will be identified and monitored. Contractors will be required to ensure that noisy equipment retains the original manufacturer's noise attenuation controls. Decommissioning activities likely to generate significant noise levels will generally be performed during normal working hours (e.g., 7 am to 5 pm), so that evening and nighttime noise levels will not be affected. Workers will be protected through proper work planning and scheduling and the use of personal protective equipment such as hearing protection.

5.5 PUBLIC AND OCCUPATIONAL HEALTH CONTROLS

The Hematite Health and Safety Plan (Reference 9-67) will be used to establish safe work practices for site workers and ensure work is conducted in accordance with applicable OSHA requirements. The Radiation Protection Plan will be used to establish safe practices and operations involving ionizing radiation and ensure compliance with NRC requirements. The Health and Safety Plan and Radiation Protection Plan also establish practices for protecting the public and the immediate environment from hazards posed by decommissioning activities. These documents will be modified, as necessary, to address specific remediation activities such as Burial Pit excavation.

Task-specific Radiation Work Permits will be prepared to specify radiological work controls and ensure workers observe proper precautions in areas where hazards exist due to radiation, contamination or airborne radioactivity. Health and Safety Checklists will be prepared to specify work controls for tasks involving chemical hazards. Both Radiation Work Permits and Health and Safety Checklists will specify monitoring requirements to ensure the adequacy and effectiveness of the prescribed work controls.

Hazardous Waste encountered during the decommissioning and remediation activities will be handled in accordance with the applicable requirements of 40 CFR 260 through 272 of the Resource and Recovery Act (RCRA; Reference 9-62).

5.6 WASTE MANAGEMENT

Efforts will be taken to minimize the amount of radioactive and hazardous waste generated during decommissioning. Wherever possible, efforts will be made to decontaminate and re-use materials. Materials that have not been exposed to hazardous constituents will be removed or protected to avoid cross-contamination or co-mingling. Waste minimization techniques may include taking only tools needed into a contaminated area, re-using tools, decontaminating and free releasing, and providing a containment toolbox which can be moved to different radiological areas as needed.

Field analytical methods will be used, to the extent possible, to obtain near real-time data so that the extent of excavation necessary to meet clean-up criteria can be minimized. Materials will be segregated into contaminated and non-contaminated wastes. Contaminated wastes will be further segregated into radioactive, chemical or mixed wastes. Efforts will be taken to eliminate contamination, e.g., if VOC's are found in the waste, they will be removed and the materials will be surveyed and possibly re-used, or as a minimum re-classified for disposal.

Co-mingling will be controlled through containerization and segregation, and to the extent possible, prevented through the use of tarps, discrete barriers and containerization. Staging areas will be established to control waste packages that are ready for treatment and re-use (if possible), or for transportation and disposal.

Metal items removed during soil remediation, such as below-grade piping, will be surveyed for radioactive contamination and disposed of accordingly. Concrete and asphalt slabs will be broken to manageable size pieces and appropriately disposed. Demolition debris will be sized as necessary, characterized, containerized and disposed of or re-used (if possible).

Waste streams generated as a result of decommissioning will be characterized by sampling and analysis to establish profile, packaging and disposal criteria. Characterization may encompass a combination of process knowledge, radiological survey, volumetric sampling and direct sampling. Direct sampling may be performed utilizing direct radiological and hazardous-constituent reading instruments to survey material before and after removal. Characterization data will provide information to support health and safety operations, as well as waste packaging and transportation requirements. The sampling protocol will be adequate to meet the Waste Acceptance Criteria (WAC) of the approved disposal facility.

Based on characterization data, waste will be segregated and analyzed as required by the disposal facility's WAC. If analyses show an out-of-compliance result, additional decontamination efforts will be taken or an alternate disposal facility will be used. Each waste stream is unique and will require specific handling, containerization, labeling, transportation and disposal procedures. Actions taken for waste streams that could be generated as a result of decommissioning activities, include:

5.6.1 SANITARY WASTE

Non-contaminated sanitary waste (i.e., office trash) will be prevented from co-mingling with contaminated waste, containerized in roll-offs or sanitary dumpsters and transported to a sanitary landfill for disposal. This waste stream will be disposed of in accordance with facility requirements and will not contain hazardous constituents that cannot be accepted at a sanitary landfill.

5.6.2 CLEAN DEBRIS

Material that is released and free of hazardous chemical and/or radiological contamination is defined as clean debris, and will be re-used whenever possible. Clean debris might include such material as brick, concrete, asphalt, paper, wood, glass, metal, plastics, mineral material, soil, wire and pipe. Clean debris will be characterized and certified to meet radiological and chemical free-release criteria for radiological and hazardous contamination. Clean debris will be re-used or containerized, transported and disposed at permitted facilities.

5.6.3 LLRW ASBESTOS-CONTAINING MATERIAL

Asbestos-containing material (ACM) found to be contaminated with radiological constituents will be handled as radioactive waste. The LLRW-ACM will be double wrapped, labeled with both ASBESTOS and RADIOLOGICAL warnings in accordance with regulatory guidance, containerized, transported and disposed at a permitted facility. LLRW-ACM that is bagged will be stored/staged in the appropriate container, depending on the volume of waste. Metal boxes and drums may be utilized for small volumes, while roll-offs or inter-modal containers may be utilized for large volumes.

5.6.4 LLRW SOLIDS

Soil remediation will generate three general categories of solid LLRW: soil, demolition debris and Burial Pit material. Soil might also include spent limestone that was used as on-site landfill. Demolition debris will consist mostly of concrete floor slabs and foundations, asphalt pavement and below-grade utilities (piping and conduit). Burial Pit material could include a wide variety of waste materials.

Soil is assumed to be volumetrically contaminated. However, efforts will be made to segregate contaminated soil from non-contaminated soil and re-use the latter. It is anticipated that most floor slabs and foundations, piping, foundation material and other non-soil materials will exhibit surface contamination only. Burial pit material might contain both volumetric and surface contamination, and efforts will be made to segregate the contaminated material from the non-contaminated material. If decontamination is practical, material will be decontaminated and disposed of accordingly.

Debris that is radiologically contaminated above the Waste Acceptance Criteria (WAC) for volumetric release as construction debris, will be disposed of as LLRW. Solid LLRW will be sized, characterized, stored/staged in the appropriate containers, transported and disposed of at a permitted disposal facility as described in the waste profile.

5.6.5 LLRW LIQUIDS

Soil remediation operations could result in the generation of LLRW liquids from contaminated groundwater removed to facilitate soil excavations, contaminated storm water from active remediation areas and wastewater generated from vehicle and equipment decontamination.

Depending on the volume generated, LLRW liquids will be treated on-site and discharged under an amended NPDES permit or containerized for off-site disposal. LLRW liquids destined for off-site disposal will be sampled, characterized, containerized, labeled, transported and disposed at a permitted disposal or process facility. LLRW liquids will be stored/staged in an appropriate container, depending on the volume and type of waste. The containers will be filled so that the weight does not exceed the maximum weight specified by the manufacturer.

A Water Treatment System (WTS) will be used to process waste water created and accumulated from remediation of the Burial Pits and other selected remediation activities. The WTS will discharge via the normal site outfall in accordance with the NPDES permit.

5.6.6 POLYCHLORINATED BIPHENYL WASTE

Polychlorinated biphenyl (PCB) waste, if any, will be containerized, labeled, transported and disposed at a permitted disposal facility. PCB waste will be stored/staged in the appropriate container depending on the volume and type of waste.

5.6.7 HAZARDOUS WASTE

Hazardous waste will be identified on the basis of process knowledge, as well as characterization and volumetric sampling. Analytical data will delineate the specific hazardous material and the levels of contamination. Identified hazardous wastes will be segregated, treated and/or containerized, as appropriate.

Numerous chemical contaminants of concern (COC) exist at the site and within the Burial Pits. For the most part, the COC's found include characteristic Volatile Organic Compounds (VOC's), which include Trichloroethylene (TCE) and characteristic heavy metals such as lead. There may be the possibility of Mercury or Asbestos containing material. To the extent possible, these characteristic contaminates will be treated on-site prior to shipping for offsite disposal or for re-use on site as backfill. Hazardous waste that is not radiologically impacted will be managed in accordance with applicable Environmental Protection Agency (EPA) and Missouri Department of Natural Resources (MDNR) hazardous waste regulations.

Soil that exhibit VOC contamination above Preliminary Remedial Goals (PRGs) will be placed in the treatment system. Once VOC and the associated characteristic properties have been stripped from the soil, the soil will be stockpiled for use as backfill. VOC-contaminated soil that have been successfully treated, but contain radiological constituents, will be stabilized and disposed of off site as LLRW soil. Non-radioactive soil that contain metals that exceed the remediation goals will be treated and disposed on-site as described below, or shipped to a suitably licensed/permitted disposal facility. Hazardous waste that has been unsuccessfully treated and is radioactive, will be treated as mixed waste and controlled as described below.

Volatile Organic Compounds (VOC) and Poly Aromatic Hydrocarbons (PAHs) treatment will be performed <u>ex-situ</u> or <u>in-situ</u>, depending on schedule allowance and regulatory requirements. Either approach will be performed to reduce or remove the amount of contaminates within the soil to meet the requirements of MDNR.

VOCs of concern (TCE and PCE) could be treated <u>ex-situ</u> by a combination of chemical oxidation and soil vapor extraction. Chemical oxidation is a chemical process that converts hazardous contaminants to non-hazardous or less toxic compounds, that are more stable, less mobile and/or inert. The oxidizing agents most commonly used are ozone, hydrogen peroxide, hypochlorites, chlorine and chlorine dioxide. Soil vapor extraction will be performed using a technology called TEVE or Thermally Enhanced Soil Vapor Extraction. The TEVE system is an on-site technique for removal and destruction of volatile organic compounds (VOCs) and semi-organic compounds (SVOCs) from excavated soil. The TEVE process consists of a soil pile constructed with excavated soil, air distribution piping and an impermeable membrane cover. The major components of the system are a vapor blower, an air-recovery blower, a burn chamber, water separator, carbon vessels and a catalytic reactor bank as required. The entire unit is custom built into an enclosed trailer.

In addition, two <u>in-situ</u> treatments are available for removal of VOCs and PAHs from soil, prior to the radiological removal action. The first method would involve soil vapor extraction as described for <u>ex-situ</u> treatment, except injection and extraction wells would be used in place of piping within a stockpile. The alternate system would be multi-point low-pressure, high-volume injection of a chemical oxidant within the contaminated zone.

Multi-point injection involves directly injecting a liquid solution of an oxidizer directly into contaminated soil, utilizing a multi-point machine. The oxidizer is pumped in solution through the injectors and saturates the subsurface soil under low pressure conditions. The treatment time required for this technology is based on direct chemical reaction; therefore, treatment can be obtained in less than a week. If areas exhibit elevated concentrations after the initial treatment, these hot spots can be injected during a second pass. Although not anticipated, a reagent may be blended with excavated material that may still exhibit elevated concentrations. Subsurface samples would be collected to determine treatment effectiveness. If elevated concentrations still existed, those areas could be re-injected to ensure treatment.

In the unlikely condition that some VOC-contaminated soil exist during excavation, these soil will be placed in a designated storage area and treated ex-situ by mixing reagent with the soil.

Soil or materials containing metals that exceed the remediation goals will be stabilized or solidified on-site or at a subcontractor, and shipped to a suitably licensed/permitted disposal facility. Soil or soil-like materials that meet the remediation goals will be used for backfill. Treatment will be completed using solidification/stabilization (S/S) to reduce the mobility of the hazardous substances in the media matrix, through both physical and chemical means. The ultimate goal of treatment is not the removal of contaminates, but rather to lock or immobilize contaminates in order to pass TCLP testing, and ultimately to prevent leaching of the substance at the final burial location. S/S is a proven and accepted method suitable for land disposal or for beneficial use.

If treatment is required, a treatability test will be performed to identify the metals and other inorganic contaminates of concern, and to develop the most appropriate reagent mix to S/S the material. Key to the mix design will be to minimize the volume of reagent required for treatment, to ensure no by-products are added or generated as part of a chemical reaction, and to ensure the final matrix meets the strength requirements suitable for disposal or reuse.

5.6.8 MIXED WASTE

Mixed waste meets the EPA definition of hazardous waste and is also radiologically contaminated. Mixed waste will be identified through characterization and volumetric sampling. Analytical data will delineate the specific hazardous material, the levels of contamination and the radioactive isotopes.

Mixed waste will be managed in accordance with NRC and applicable EPA and MDNR hazardous waste regulations, to protect public health and safety and the environment. In general, the approach will be to treat hazardous waste on-site, as needed to remove the hazardous waste characteristic, and then dispose of the residual radioactive waste off-site at licensed facilities.

Mixed wastes (radioactive and non-radioactive hazardous waste) will be managed in an area that meets the requirements for LLRW and non-radioactive hazardous waste staging, according to the waste characterization. Mixed waste will be stored/staged in appropriate containers depending on the volume and type of waste.

5.6.9 INVESTIGATION DERIVED WASTE

Investigation derived waste (IDW) will be handled, containerized, labeled and dispositioned in accordance with the Hematite Site Waste Management and Transportation Plan (Reference 9-66). Conservative field sampling techniques, such as low-flow groundwater sampling, will be used to the extent possible to minimize the volume of IDW generated during field activities. Large volumes of IDW, such as wastewater generated during de-watering and decontamination activities will be managed as described in the above Sections addressing LLRW liquids, hazardous waste, or mixed waste, as appropriate.

Radioactive waste management will be performed in accordance with the Transportation Plan. Radioactive waste shipments will be made in accordance with procedural controls, and DOT and NRC regulations. To the extent practical, the number of waste packages and waste shipments will be minimized to reduce the risk of a contamination event occurring during transportation.

5.7 NUCLEAR CRITICALITY PROTECTION

As described in Section 4.12.2, the waste Burial Pits are known to contain quantities of enriched Uranium. Operational surveys will be conducted during excavation operations to monitor for potential discrete items and contaminated soil. Guidance has been developed and incorporated into site policies and procedures for handling such materials to ensure compliance with the requirements of License Application Chapter 4, Nuclear Criticality Safety of Materials License SNM-033 (Reference 9-2). This guidance will ensure adequate steps and precautions are taken to provide nuclear criticality safety.

6.0 ENVIRONMENTAL MEASUREMENTS AND MONITORING PROGRAMS

Westinghouse has committed to conduct the proposed action in a manner that protects the health and safety of the public, site workers and the environment. This commitment includes development of programs and procedures that provide for monitoring, detection and control of potential releases of hazardous substances, including radioactive material, to the environment.

6.1 RADIOLOGICAL MONITORING

The site radiological protection and environmental monitoring programs are conducted in accordance with License No. SNM-33, Hematite's Radiation Protection Plan (Reference 9-58), Environmental Monitoring Program (Chapter 11, Reference 9-1) and the Effluent and Environmental Monitoring Plan (Reference 9-13). Activities related to environmental monitoring and control will comply with the Hematite Quality Assurance Program Plan (Reference 9-68). The license commitment for environmental monitoring and control serves as a baseline commitment. As decommissioning activities progress, the environmental monitoring program will be revised as necessary to ensure adequate environmental monitoring and controls are in place. Some of the methods that will be used to determine the extent to which monitoring program changes are necessary include the following:

- The project management team will review work plans for each task to identify potential impacts to the environment that may require modifications to existing monitoring procedures and/or specific mitigation controls;

- Readiness reviews for work activities will include consideration of environmental impacts and associated mitigation and monitoring requirements;

- Proposed procedure revisions will be evaluated to determine affects on existing environmental considerations and monitoring; and,

- The Project Oversight Committee, which provides management oversight and review of remediation activities, will evaluate potential environmental impacts of work during its review process. The committee will review/approve proposed procedure modifications and ensure appropriate resources are directed toward their implementation.

Environmental samples will be collected and analyzed in accordance of the Environmental Monitoring Program (EMP). Environmental monitoring and sampling locations and effluent release points are identified in the EMP. Sample frequency may vary due to inclement weather, operating conditions, or a variance in decommissioning activities, and as authorized by the EMP. More frequent or additional samples may be collected as required for special studies and evaluations. Should a significant continuous upward trend be noted in any of the sampling data, actions will be taken to investigate the cause and remedial actions will be implemented, as appropriate.

Environmental samples will be collected in accordance with approved site procedures and analyzed by contract laboratories selected from the approved vendors list.

6.1.1 LIQUID EFFLUENT

Storm water and wastewater effluent will be monitored during the proposed action in accordance with the site National Pollutant Discharge Elimination System (NPDES) monitoring program, as described in Section 6.2.1. The monitoring parameters listed in the NPDES permit include biological, chemical and radiological constituents that will be used as indicators of potential surface water impact during remediation. Monitoring results that approach or exceed the specified limits will result in the associated work activity being modified or stopped until appropriate evaluations and corrective actions can be completed. Radiological results will continue to be reported to the Missouri Department of Natural Resources (MDNR) on a semiannual basis, or more frequently, as requested. Site wastewater will also be monitored in accordance with the site EMP and in compliance with NRC License No. SNM-33.

6.1.2 AIR EFFLUENT

During decommissioning activities, air quality will be monitored for radiological contaminants as determined by the RSO. The sampling program will be designed based on the potential that the effluent from a work area has for contributing to the dose to a member of the general public. Environmental air samplers will be placed at the predominant upwind and downwind locations relative to remediation activities. Data from the selected locations will confirm the presence or absence of contaminants, based on the differences between upwind and downwind sample results. Moderate-volume samplers will be used to collect 24-hour air samples through filters. Samples will be collected daily and analyzed for gross alpha and gross beta radioactivity, as well as for total suspended particulate concentrations by means of gravimetric determination. Airborne effluent monitoring systems, when used, will be calibrated at intervals not to exceed 12 months.

Additionally, job coverage will be performed by trained Health Physics (HP) Technicians. Radiation surveys will be performed during remediation, handling and loading activities to ensure that the radiation protection limits established in the applicable Radiation Work Permit are not exceeded. If those limits are approached or exceeded, the associated work activity will be modified or stopped until appropriate evaluations and corrective actions can be completed.

6.1.3 EFFLUENT LIMITS

Radiological effluent limits for the proposed action will be consistent with the regulatory limits specified in NRC License No. SNM-33 and 10 CFR 20, Appendix B (Reference 9-49). The regulatory and control limits for air and liquid effluents are provided by the EMP. If the control limits are exceeded, an investigation will be conducted and corrective action implemented, as appropriate.

6.2 PHYSIOCHEMICAL MONITORING

In addition to monitoring for radiological parameters, liquid and air effluents will be monitored for physiochemical parameters during the proposed action, as described below.

6.2.1 LIQUID EFFLUENT

As discussed in Section 6.1.1, liquid effluent will be monitored during the proposed action in accordance with the site NPDES monitoring program. Presently, storm water and wastewater are discharged from the Hematite facility under NPDES Permit No. MO-0000761. This permit allows water discharges from the facility to an un-named tributary of Joachim Creek. The facility is currently discharging water through three Outfalls (see Figure 1-4): 001 – sanitary wastewater, 002 – site dam overflow and 003 – storm water. The permit effluent and monitoring requirements are listed in the EMP.

On February 24, 2006, Westinghouse received the renewed NPDES permit for the Hematite Site. The new permit modified the monitoring program for Outfalls 001 through 003, and added three Outfalls that represent other possible locations for point source discharges of surface water runoff. The three existing Outfalls and three additional Outfalls are:

- Outfall 001 – Discharge from the facility sanitary wastewater treatment plant to the un-named tributary downstream of the Site Pond;
- Outfall 002 – Discharge from the Site Pond to the un-named tributary;
- Outfall 003 – Discharge to the Site Pond from facility storm drains;
- Outfall 004 – Discharge from the east culvert, which collects runoff from paved and un-paved areas east of Building 260, and conveys it to the un-named intermittent stream located to the east of the Central Site Tract;
- Outfall 005 – Discharge from the south culvert, which collects runoff from paved and un-paved areas southwest of Building 252, and conveys it to the low-lying area north of the Union Pacific railroad tracks; and,
- Outfall 006 – Intermittent stream east of the Central Site Tract that collects runoff from the east culvert (proposed Outfall 004) and non-point-source runoff from paved and un-paved areas on the eastern side of the Central Site Tract.

In conjunction with the discharges to and from the Site Pond, these additional Outfalls include the locations from which point-source discharges of facility runoff could occur during site decommissioning activities.

The Effluent and Environmental Monitoring Plan (Reference 9-13) describes Westinghouse's monitoring programs for the six Outfalls, as reflected in the revised NPDES permit.

6.2.2 AIR EFFLUENT

Air effluent monitoring for physiochemical parameters during the proposed action will consist of collecting real-time measurements of respirable dust and volatile organic compounds (VOCs). No lead monitoring will be performed since it is not present in a form that could become airborne during remediation activities. Occupational monitoring for other chemical contaminants, such as those present in the Burial Pits, will be conducted on an as-needed basis. This monitoring will be prescribed in the task-specific health and safety checklists to be prepared prior to implementing the work.

Continuous aerosol monitors will be used to provide real-time data for respirable dust near work areas associated with soil remediation, material handling and container loading. Locations of the monitors will be determined prior to the start of daily activities based on prevailing wind direction. Locations will be adjusted, as necessary, based on significant changes in wind direction. Wind direction will be determined by a wind sock or equivalent device. Monitors will be set up with size-selective inlets to measure the concentration of airborne particulate matter with an aerodynamic diameter of 10 microns (PM10) or less. The monitors will be set to alarm upon exceeding a pre-set PM10 concentration limit, selected to protect workers and ensure airborne PM10 concentrations at the property boundary are well below regulatory limits. If an alarm level is exceeded, associated activities will be stopped, and actions will be taken to improve emission controls or reduce the production of emissions until local levels fall below the alarm level.

Photo-ionization detectors (PIDs) will be used to provide real-time data for VOCs near work areas associated with chemical contamination. PIDs use an ultraviolet light source to measure the ionization potential of contaminants in air. They are especially useful for measuring total airborne concentrations of VOCs such as TCE and PCE, although they do not provide data regarding the respective contributions of individual compounds. Thus, PID readings will be combined with historical process knowledge regarding the types of compounds likely to be encountered in specific work areas to identify potentially unsafe conditions.

6.2.3 EFFLUENT LIMITS

The storm water and wastewater effluent limits for each parameter specified in the NPDES permit will apply during the proposed action. Air effluent limits for physiochemical parameters will be as follows:

- 5 mg/m^3 for PM10 concentrations, based on the OSHA requirements for respirable particulate matter; and,

- 100 parts per million (ppm) for VOC concentrations, based on OSHA requirements for PCE and TCE.

If monitoring results exceed these control limits, an investigation will be conducted and corrective action implemented, as appropriate.

6.3 ECOLOGICAL MONITORING

Disruption to the local ecology will be considered during planning and implementation of the proposed action. Work plans will be evaluated to ensure that the extent to which habitats outside the Central Site Tract are expected to be disturbed, is minimized. Immediately prior to conducting remediation activities, the site will be inspected to determine whether any wildlife nests or dens are within or in close proximity to the planned work zones. If necessary, appropriate steps will be taken to assist in the safe relocation of the affected wildlife. During remediation, daily activities will be observed to ensure overhead equipment is clear of trees where birds may be nesting. Overall consistency with the work plans will be evaluated on an on-going basis to ensure remediation activities do not result in unplanned disturbances of habitats.

In addition to monitoring specific areas where remediation activities are conducted, other affected areas will be monitored to ensure that impacts to habitat are minimized. For instance, NPDES outfalls will be inspected periodically to ensure the effects of erosion at discharge points are minimized. Also, transportation and haul routes will be monitored for potential wildlife activity (such as deer crossings). Appropriate mitigation measures, such as outfall improvement or signage warning vehicle operators to use extra caution, will be implemented as necessary, to minimize ecological impacts during remediation.

The Environmental Monitoring Program (Chapter 11, Reference 9-1), Effluent and Environmental Monitoring Plan (Reference 9-13), Missouri State Operating Permit (Reference 9-39), and the associated site environmental monitoring and sampling procedures provide controls for site area ecological monitoring. These controls include information relative to equipment sensitivity, method of analysis, sample locations, frequency of samples, analysis type, regulatory limits, data recording and storage, and actions to be taken for anomalous results or when results do not meet requirements.

7.0 COST BENEFIT ANALYSIS

A specific cost-benefit analysis is not appropriate for comparison of the two alternatives, i.e., no action and the proposed action, because: (1) the costs of the proposed action are significantly greater (i.e., several orders of magnitude) than no action, and it is difficult to quantify the benefits of the proposed action, (2) the no-action alternative does not achieve the long-term objectives for the site, and (3) the no-action alternative does not comply with NRC regulatory requirements regarding the cessation of principle activities. However, costs and benefits of the two alternatives are discussed in accordance with the guidance of NUREG-1748.

7.1 NO-ACTION ALTERNATIVE

The costs associated with no action are essentially the Operating and Maintenance (O&M) costs and the preparation for decommissioning costs that Westinghouse is currently experiencing. At the present time, the annual costs are approximately $3M, which includes decommissioning preparatory costs. These costs would be somewhat reduced if only maintenance and monitoring were continued indefinitely. However, because there would be no end to maintenance and monitoring programs, the costs could eventually approximate the predicted costs for decontamination and decommissioning as outlined in the Decommissioning Plan.

The no-action alternative offers some potential benefits, besides significantly reduced costs in the short term such as no disturbance of site soil and streams, and no short-term increase in site noise and traffic levels. There would be no impact to environmental resources, no changes to visual/scenic resources and no generation of large volumes of wastes. However, these minimal benefits do not compare favorably with the potential long-term adverse effects of continued migration of chemical and radiological contaminants from the site into the surrounding environment.

In addition, there would be unnecessary costs associated with the exemption request: preparation costs and review costs. Although minimal compared to the decommissioning and decontamination costs, these would still be significant.

7.2 PROPOSED ACTION

A detailed cost estimate for the completion of the proposed action has been prepared and submitted as a separate document. A summary of the Decommissioning Cost Estimate and Funding Plan is included as Chapter 15 of the Decommissioning Plan.

The major long-term benefits from the proposed action that have been discussed previously in this Environmental Report include the following:

- Removal of radiological and hazardous chemical source terms that could potentially result in the continual migration of contaminants into surrounding soil, surface water and groundwater;
- Reduction of hazardous chemical and radiological contamination in site soil, surface water and groundwater to acceptable levels;
- Safe off-site disposal of waste materials from the site;
- Improved visual and environmental conditions on the site;
- Potential economic benefits from alternative use of site land; and,
- Public confidence that the site is no longer a potential health or environmental risk.

It is difficult to assign a monetary value to the achievement of these benefits since it is impossible to quantify their effects if either achieved or not achieved, and some of their potential effects are based on hypothetical assumptions. Nevertheless, achievement of these benefits returns the site to an environment more closely resembling that which existed prior to the construction and operation of the facility. This pre-operation environment hypothetically provides more opportunities for future use by the public for recreational or socioeconomic purposes.

During the actual decommissioning and remediation activities there are likely to be some adverse environmental impacts as described previously in this ER. However, as also discussed, actions are planned to mitigate those adverse effects and minimize their impact to the environment. The costs associated with these mitigating features are included in the costs provided in Chapter 15 of the Decommissioning Plan. In conclusion, the long term benefits outweigh the short-term impacts on the environment.

8.0 SUMMARY OF ENVIRONMENTAL CONSEQUENCES

Based on a review of the issues discussed in this document, implementation of the proposed action is not anticipated to cause significant adverse environmental or socioeconomic impacts to the communities surrounding the Hematite Site. Section 4.0 provides detail discussion of the short-term and long-term environmental consequences resulting from the proposed decommissioning actions. As discussed in Section 4.0, the long-term impacts of the proposed action will be beneficial overall. A summary of expected short-term and long-term impacts for each of the resources evaluated in Section 4.0 is presented in the following Table 8-1.

Table 8–1

Summary Of Proposed Action Impacts

Item	Short-Term Impact	Long-Term Impact
Land Use	• Site Land Use Would Be Restricted To Decommissioning Activities • No Impact On Surrounding Land Areas	• Potential For Economic Or Recreational Use Of Site Land
Transportation	• Increased Traffic From Waste Transport And Increase In Workforce • Potential Public Exposure To Hazardous Waste If There Are Transportation Accidents	None
Geology And Soils	• Potential For Soil Erosion And Contamination Transport From Central Site Tract To The Remainder Of The Property And Neighboring Properties.	• Removal Of Contaminated Soils And Stabilization Of Site With Soil Erosion And Sedimentation Controls • Restoration Of Site To Conditions Similar To Surrounding Environs

Table 8–1 (continued)

Summary Of Proposed Action Impacts

Item	Short-Term Impact	Long-Term Impact
Water Resources	• Increased Potential For Surface Water Runoff To Carry Contaminated Sediments From Central Site Tract Into Nearby Streams • Diversion Of Streams Bordering The Central Site Tract Might Be Required To Remove Contaminated Sediments.	• Elimination Of Potential For Surface Water And Groundwater Contamination • Reduction/Elimination Of Hazardous Chemical And Radiological Contamination In Groundwater To Acceptable Levels As A Result Of Removal Of Source Terms In Central Site Tract Soil
Ecological Resources	• Interruption Of Potential Habitats In The Central Site Tract During Remediation • Interruption Of Stream Habitats Bordering The Central Site Tract If Streams Are Diverted For Sediment Remediation	• Improved Habitats Resulting From Soil And Stream Remediation And Removal Of Source Terms In The Central Site Tract
Air Quality	• Increased Potential For Dust, Radioactive Contamination and Voc Emissions During Soil Excavation And Concrete Demolition • Slightly Higher Emissions Resulting From Use Of Construction Vehicles And Equipment	• Reduced Potential For Airborne Radioactivity As A Result Of Reduced Surface Soil Contamination Levels In The Central Site Tract

Table 8–1 (continued)

Summary Of Proposed Action Impacts

Item	Short-Term Impact	Long-Term Impact
Noise	• Increased On-Site Noise Levels Due To Use Of Construction Vehicles And Equipment	None
Historical And Cultural Resources	None	None
Visual/Scenic Resources	• Temporary Degraded View Of The Central Site Tract Due To Soil Excavation And Heavy Equipment Use	• Improved Central Site Tract Landscape And Better Views Of The Joachim Creek Floodplain For Passing Motorists
Socio-economic	• Increase In Construction And Equipment Operator Jobs For The Local Area	• Potential Contribution To The Local Economy Resulting From Alternative Future Site Use
Environmental Justice	None	None
Waste Management	• Increased Risk Of Worker Exposure To Hazardous Chemicals Or Radiological Contamination During Waste Handling	• Removal And Safe Off-Site Disposal Of Waste Materials From The Site

Table 8–1 (continued)

Summary Of Proposed Action Impacts

Item	Short-Term Impact	Long-Term Impact
Public And Occupational Health	• Increased Risk Of Worker Exposure To Hazardous Chemicals Or Mixed Waste During Burial Pit Excavation • Increased Risk Of Worker Internal Radiation Exposure Due To Airborne Contamination During Soil Remediation Activities • Increased Risk Of Worker External Radiation Exposure From Waste Handling And Burial Pit Excavation • Increased Risk Of Worker Accidents Involving Heavy Equipment Use And Deep Excavations • Radiation Dose To Even The Critical Member Of The Public Is Well Below Regulatory Limits During Remediation Activities	• Elimination Of The Risk Of Exposure To Hazardous Materials At The Site • Elimination Or Significant Reduction Of Contaminant Migration Into The Nearby Environment And The Attendant Risk Of Public Exposure • Reduction Of Radiological Dose At The Site To Acceptable Levels From All Pathways

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