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Office of Legacy Management

Pinellas Environmental Restoration Project

Interim Remedial Action Plan for Source Removal at the Northeast Site

August 2008

U.S. Department of Energy

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Contents

Figures

Tables

Plates

Acronyms and Abbreviations

bls	below land surface
cDCE	*cis*-1,2-dichloroethene
CTL	cleanup target level
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
F.A.C.	*Florida Administrative Code*
FDEP	Florida Department of Environmental Protection
ft	feet
Hawthorn	Hawthorn Group
IRAP	Interim Remedial Action Plan
LDA	large diameter auger
µg/kg	micrograms per kilogram
µg/L	micrograms per liter
NAPL	nonaqueous-phase liquid
OSHA	Occupational Safety and Health Administration
PPE	personal protective equipment
RBCA	Risk-Based Corrective Action
RCRA	Resource Conservation and Recovery Act
STAR	Science, Technology, and Research
SWMU	Solid Waste Management Unit
TCE	trichloroethene
TCLP	Toxicity Characteristic Leaching Procedure
UHC	underlying hazardous constituent
USGS	U.S. Geological Survey
UTS	Universal Treatment Standards
VC	vinyl chloride
VOC	volatile organic compound
WAC	Waste Acceptance Criteria
yd^3	cubic yards

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1.0 Interim Remedial Action Objective

The objective of this Interim Remedial Action is to remove the source of contamination at the Northeast Site at the Young - Rainey Science, Technology, and Research (STAR) Center in Largo, Florida. The U.S. Department of Energy (DOE) plans to implement soil excavation using a large diameter auger (LDA) followed by off-site disposal of the contaminated soil. DOE chose this source removal method during a feasibility study conducted in 2008 (DOE 2008a); this study is summarized in Section 3 of this Interim Remedial Action Plan (IRAP).

DOE's ultimate goal at the Northeast Site is to close the site under the Florida Department of Environmental Protection's (FDEP's) Global Risk-Based Corrective Action (RBCA) rules (Chapter 62-780 *Florida Administrative Code* [F.A.C.]). These rules require removal of free product (nonaqueous-phase liquids) from the site and also require an evaluation of soils as a source of groundwater contamination during the selection of the appropriate risk-management option for site closure. For the purposes of this IRAP, contaminant source is defined as contaminant concentrations in soil that result in unacceptable contaminant concentrations in groundwater (i.e., groundwater concentrations exceeding poor water quality cleanup target levels [CTLs] as determined under the RBCA rules). This definition of contaminant source includes both nonaqueous-phase liquids and contaminants sorbed to the soil matrix.

This source removal action will affect only the source of contamination; it will not treat the dissolved-phase contaminant plumes located hydraulically downgradient from the source areas. However, DOE plans to add biological amendments adjacent to the source area following source removal to enhance contaminant biodegradation. This has the potential to treat any residual amounts of contaminants located in soils outside the excavation areas and decrease dissolved-phase contaminant concentrations for a short distance downgradient from the source area. This will shorten the life of the plume but will not affect the dissolved-phase plume located farther from the source area.

2.0 Site Description

The former DOE Pinellas Plant facility consisted of the property currently known as the STAR Center, located in Largo, Florida (Figure 1). The Northeast Site is located at the northeast corner of the STAR Center (Figure 2). The Pinellas Plant was constructed in the mid-1950s as part of a nationwide nuclear weapons research, development, and production complex. Production of weapons-related components at this facility ceased in September 1994. During the period of DOE ownership, the property was used for disposal of drums of waste resins and solvents. As a result of this practice, the surficial aquifer was impacted by volatile organic compounds (VOCs). Administration of DOE activities at the Northeast Site is currently the responsibility of the DOE Office of Legacy Management.

2.1 Hydrogeology

The STAR Center is located on the western coastal plain of the Florida Peninsula. The Florida Peninsula is a broad, partially submerged shelf of the Gulf of Mexico and is composed of alternating layers of sands and gravels, and carbonate deposits such as limestone. The uppermost (i.e., most recent) deposits are known as the surficial sediments and consist of silty to shelly sands (Figure 3 and Figure 4). At the Northeast Site, the average thickness of the surficial sediments is about 30 feet (ft). Depth to water ranges from about 1 to 5 ft below land surface (bls), depending on the season. No municipal water supplies are obtained from the surficial aquifer due to the poor yield and poor quality of the groundwater.

Underlying the surficial sediments is the Hawthorn Group (Hawthorn). The Hawthorn is an aquitard that separates the surficial aquifer from the underlying upper Floridan aquifer, which is the primary source of drinking water for Pinellas County. The Hawthorn is composed of sandy clay with some carbonate lenses and forms a widespread confining layer between the surficial aquifer and the Floridan aquifer. The Hawthorn is about 70 ft thick in the area of the STAR Center. The hydraulic conductivity of the Hawthorn is several orders of magnitude lower than that of either the surficial or Floridan aquifers. Therefore, in the vicinity of the STAR Center, the Hawthorn is thick and impermeable enough that it severely restricts vertical groundwater flow, making it highly unlikely that contamination will ever reach the Floridan aquifer. The three monitoring wells at the STAR Center that are screened in the upper Floridan aquifer have shown no contamination.

One man-made pond, the East Pond, exists on the Northeast Site for the purpose of collecting storm water runoff from parking lots and buildings. The East Pond is hydraulically connected to the shallow portion of the surficial aquifer. Typically, the shallow surficial aquifer recharges the East Pond, but occasionally, during periods of high rainfall, the East Pond recharges the shallow surficial aquifer. The East Pond is hydraulically connected to the South Pond, located along the southern boundary of the STAR Center, by a pipe; water may flow through the pipe in either direction.

The surficial aquifer at the STAR Center, including the Northeast Site, acts as a two-layer hydraulic system. The tendency of water levels in wells screened in the shallow surficial aquifer to differ from those in wells screened in the underlying deep surficial aquifer, such as the differences observed when one zone is pumped and the other is not, indicates a horizontal-to-vertical anisotropy with regard to the aquifer's hydraulic conductivity. On the basis of such observations, a representative vertical hydraulic conductivity for the aquifer is expected to be about 0.1 to 0.01 of the horizontal value. Groundwater movement between the shallow and deep portions of the surficial aquifer is almost certainly controlled by the amount of recharge from rainfall.

Groundwater flow at the Northeast Site is shown for the shallow and deeper portions of the surficial aquifer for September 2007 (wet season) on Figure 5 and Figure 6 and for February 2008 (dry season) on Figure 7 and Figure 8. In the shallow surficial aquifer, groundwater flow is generally toward the east with an occasional southeastward component. The hydraulic gradient in the shallow surficial aquifer was about 0.0035 ft/ft in February 2008. Calculations using Darcy's Law along with approximations of 1 ft/day for hydraulic conductivity and 0.3 for effective porosity indicate that groundwater at the Northeast Site is estimated to move about 4-5 ft/year. This velocity is less than the historical estimates of 17 to 22 ft/year but is consistent with the velocity over the last couple of years. Similar flow patterns and velocity were observed in the deep surficial aquifer.

Geochemical conditions at the Northeast Site generally are moderately reducing, as evidenced by the low values of dissolved oxygen and oxidation-reduction potential. Dissolved oxygen concentrations generally are less than 1 milligram per liter, and oxidation-reduction potential values average approximately –100 millivolts, indicating iron-reducing conditions. These conditions are generally conducive to biological reductive dechlorination of the chlorinated ethene contaminants. In fact, biodegradation daughter products (such as vinyl chloride [VC] and ethene) are observed at the site, indicating that contaminant biodegradation is occurring naturally.

2.2 Historical Remediation Timeline

In the late 1960s, before construction of the East Pond in 1968, drums of waste and construction debris were disposed of in the swampy area of the Northeast Site. In 1985, an expansion of the East Pond was initiated to create additional storm water retention capacity, but excavation activities ceased when groundwater contamination was detected directly west of the pond. The U.S. Environmental Protection Agency (EPA) identified the Northeast Site as a Solid Waste Management Unit (SWMU) (DOE 1991), and a Corrective Measures Study for groundwater was developed (DOE 1993). Figure 9 shows a timeline of remediation activities at the Northeast Site.

Operation of an interim groundwater recovery system for the Northeast Site commenced in January 1992. The groundwater treatment system, as initially installed, consisted of four recovery wells and a surface treatment system for recovered groundwater. During 1993, DOE proposed a reconfigured system for the site consisting of four shallow and three deep recovery wells. After EPA approved the upgrade, the system was reconfigured and became operational on March 1, 1994.

Between August and October 1995 a portion of the Northeast Site was excavated to remove debris, drums of waste, and other materials that could inhibit future corrective measures. Location of the areas of excavation was based primarily on the results of a geophysical survey. Detailed descriptions of the debris removal activities were submitted to EPA and FDEP as part of the *Northeast Site Interim Measures Quarterly Progress Report* (DOE 1996).

In 1996, DOE submitted a Corrective Measures Implementation Plan to EPA Region 4 and FDEP, and this plan was approved by both regulatory agencies in 1997. As part of the Northeast Site Corrective Measures Study and Corrective Measures Implementation Plan, a pump-and-treat system in conjunction with an upgradient hydrogeologic barrier wall to prevent migration of the contaminant plume was identified as the best available technology. The treatment system was constructed in early 1997 and became operational by July 1997, processing groundwater from seven Northeast Site recovery wells and two Building 100 Area recovery wells. Subsequently, several additional recovery wells were installed at the Northeast Site, and some of the old recovery wells were abandoned. Groundwater recovery continued until early 2002 at the northern part of the Northeast Site and until early 2004 at the southern part of the Northeast Site, when nonaqueous-phase liquid (NAPL) remediation projects began in these areas.

During 1997, anaerobic bioremediation and rotary steam-stripping pilot tests were conducted in the northern and southern portions of the Northeast Site, respectively. These tests were designed by the Innovative Treatment Remediation Demonstration group, composed of regulatory and industry members to evaluate remedial options at the STAR Center.

NAPLs were identified in a few monitoring and recovery wells in about 1998. An *Interim Measures Work Plan for Remediation of Non-Aqueous Phase Liquids at the Northeast Site* was submitted to FDEP in late November 2001. The purpose of this document was to present the plan to remediate NAPLs at two areas (NAPL Areas A and B) of the Northeast Site using a thermal remediation method. FDEP approved this plan on January 10, 2002.

Construction of the NAPL Area A treatment system began in late May 2002, and system startup occurred on September 26, 2002. NAPL treatment was completed on February 28, 2003. The *Northeast Site Area A NAPL Remediation Final Report* (DOE 2003) describes the thermal remediation of Area A. Approximately 2,500 pounds of contaminants were removed from this area. Currently, contaminant concentrations in groundwater are near or below cleanup goals in this area.

Construction of the NAPL Area B treatment system began in July 2004 and was completed in early August 2005. Operations began on August 16, 2005, and NAPL treatment was completed on June 12, 2006. The *Final Report Northeast Site Area B NAPL Remediation Project at the Young - Rainey STAR Center, Largo, Pinellas County, Florida* (DOE 2007) describes Area B remediation. Approximately 18,400 pounds of contaminants were removed during this action. However, post-remediation groundwater monitoring indicated that elevated concentrations remained in the subsurface at a few locations, leading to the investigation described in the following section.

2.3 Contaminant Source Removal Areas and Groundwater Plume

To investigate the elevated contaminant concentrations remaining after NAPL remediation in the southern portion of the Northeast Site, DOE conducted four phases of soil sampling from August 2007 through June 2008, during which 754 soil samples were collected from 85 soil borings and analyzed for VOCs. The results of this investigation are described in detail in the *Northeast Site Source Characterization Data Report* (DOE 2008b) and are summarized in this section. Analytical results from the soil samples demonstrated that the following contaminants were found in multiple locations at elevated concentrations: trichloroethene (TCE), *cis*-1,2-dichloroethene (cDCE), and toluene. A statistical summary of the data is presented in Table 1.

To determine which concentrations represented a potential source of contamination, the data were compared to the default soil CTL (Table 1) based on leachability to poor quality groundwater as listed in Table II in Chapter 62-777 F.A.C. CTLs were chosen because they represent the lowest soil concentration at which a contaminant could be considered to be a source of contamination (i.e., have a negative impact to groundwater). Exceedances of the VC CTL were given secondary consideration relative to TCE, cDCE, and toluene exceedances because these latter three contaminants are primary source contaminants, meaning that they likely were present in the drums of waste that were buried at the site, whereas VC is a biodegradation product of TCE and cDCE.

Two distinct contaminant source areas were apparent, one to the north around monitoring wells PIN15−0587 and –0589 (the North Source Area) and one to the south around monitoring well PIN15−0586 (the South Source Area). Figure 10 shows the location of the source areas on the Northeast Site and Plate 1 shows a plan view of the source areas and lists the area and interval of source material in each excavation cell in the source areas. Thiessen polygons were applied to divide the source areas into cells that surround each soil boring. Source area interval and depth to Hawthorn for each excavation cell is listed in Table 2. In general, the highest contaminant concentrations were found within the lower 5 ft of the surficial sediments, although elevated concentrations were also found at shallow depths within the surficial sediments and a few feet into the Hawthorn as well.

Figure 11 and Figure 12 are 3D representations of the source areas. The total in-place volume of soil in the source areas is approximately 3,395 cubic yards (yd^3), of which approximately 2,241 yd^3 is within the surficial sands, and the remainder (1,154 yd^3) is within the Hawthorn. Approximately 4,184 yd^3 of clean soil (<CTLs) overlies the source areas. The surface area of the source areas is 5,621 square ft, or 0.13 acre.

The plume of contaminants dissolved in groundwater as of March 2008 is shown in Figure 13. VC is the contaminant with the lowest CTL and the contaminant that is transported most rapidly (and therefore moves farthest) in groundwater, so the extent of VC above the 10 µg/L CTL defines the boundaries of the plume for all contaminants. The TCE and cDCE plumes are shown on Figure 14 and Figure 15. As mentioned, the source removal action will eliminate the source of contaminants but will not remediate the contaminant plume located hydraulically downgradient from the source removal areas.

3.0 Summary of Remedial Alternatives Evaluation

DOE recently conducted a Feasibility Study to determine the best method for source removal at the 4.5 Acre Site (DOE 2008a), and the study concluded that soil excavation was the best choice for source removal. The three common methods of soil excavation, LDA, sloped excavation, and shored excavation, were evaluated and LDA was chosen as the preferred method to excavate the soils in the source areas. Relative to the 4.5 Acre Site, the Northeast Site has the same contaminants at similar concentrations, and the depth and lateral extent of contamination are also similar. Therefore, DOE determined that the conclusion from the Feasibility Study for the 4.5 Acre Site also applies for the Northeast Site source removal.

The LDA method has relatively minimal worker safety concerns and is the easiest, most practical, and most cost-effective method to implement for the required size and depth of excavation. The disadvantage of LDA is the approximately 10 percent of soil that remains between the auger borings, but this concern can be mitigated by using a smaller auger to remove most of this soil remaining between the larger borings. In addition to the augering, DOE plans to conduct enhanced bioremediation around the perimeter of the source areas following excavation. This will aid in removal of any small amounts of contaminant mass that may exist adjacent to the excavation areas.

Sloped excavation is not implementable due to encroachments onto the adjacent building and railroad tracks when using 4:1 side slopes (DOE 2008a). Shored excavation has significant disadvantages in that a considerable amount of cost and time (up to a year) is associated with dewatering prior to the start of excavation, and there are major concerns with the difficulty and safety of working in a small, deep excavation.

The Feasibility Study also evaluated the various options for treatment of the excavated soil. Thermal desorption, land farming, and off-site disposal were chosen for detailed evaluation, and this evaluation demonstrated that off-site disposal is the easiest and safest to implement, has the fewest regulatory and permitting issues, and is the most cost-effective option.

One of the main advantages of off-site disposal is that it has the fewest schedule risks. The thermal desorption treatment rate is highly dependent on moisture content because it takes substantially more energy and holding time to vaporize the extra water. In addition, mechanical units can break down and have periods of down time, resulting in some risk to schedule. Rate of treatment for land farming is dependent on weather and concentration of contaminants in the soil. Although 14 to 28 days of land farming for each batch of materials seems conservative, the site is subject to extended periods of rain, and the time to treat could double because the soil would be covered by tarps, greatly limiting contaminant volatilization.

In summary, the results of the feasibility study indicated that the preferred method of source removal is the use of LDA combined with off-site disposal of soil. In addition, DOE plans to add amendments to enhance bioremediation of any small amounts of contaminants potentially remaining adjacent to excavation areas. The source removal design and implementation are described in more detail in Section 4.

4.0 Source Removal Design and Implementation

DOE is in the process of procuring a subcontractor to conduct the source removal activities. Because of the variety of auger sizes available through the potential subcontractors and DOE's desire to allow a flexible approach to source removal activities, the exact design and method of implementation will not be known until the subcontractor is selected and their preliminary plan is finalized. Currently, selection of the subcontractor is scheduled for September 2008. Once the subcontractor's design is finalized, it will be submitted to FDEP as an addendum to this IRAP.

Therefore, for the purposes of this IRAP, this section presents DOE's best estimate of the design and implementation of LDA and off-site soil disposal for source removal at the Northeast Site.

4.1 Soil Excavation Using LDA

The LDA method involves first driving a steel casing into the ground where the augering will occur. The casing allows the augering of the soils and prevents the collapse of the surrounding soils into the boring and prevents groundwater from flowing into the boring. For the purposes of this IRAP, it is assumed that the LDA will be 5 ft in diameter. This diameter was chosen to use as an example and to estimate costs; DOE will make the final determination of auger diameter during subcontractor procurement.

Most auger borings will extend into the Hawthorn, but the steel casing does not need to be driven more than a few feet into the Hawthorn because the Hawthorn will not collapse into the uncased boring, and the amount of groundwater entering the boring from the Hawthorn should be minimal. Because depth of excavation can be controlled within the casing, the upper clean soil can be removed to the predetermined depth. The clean soil will be placed on one side of the casing, removed by front-end loaders and dump trucks, and hauled to the clean stockpile. Once the contaminated soil depth is reached, that soil will be removed and placed on the opposite side of the casing and again loaded and removed by dump truck to the contaminated soil stockpile. Once the soil is removed to the final depth, the hole is backfilled with flowable fill.

Dewatering of the excavation is not required for the augering process. The soils will be saturated when pulled from the casing, so runoff will need to be controlled with temporary containment measures. Runoff control is also required at all stockpiles by capturing the water and pumping it to an on-site air stripper. Small amounts of groundwater may need to be pumped from the casing prior to placing the flowable fill into the augered hole, and this water will also be directed to the air stripper.

Plate 1 presents an example of a potential augering layout for both the North and South source areas. The drawing shows the different excavation cells and lists the top and bottom of source area soil and depth to the top of Hawthorn. In addition, an auger hole pattern overlaid on the excavation cells shows how the borings would be located within the cells. Plate 2 presents the cross-sections of the excavation areas showing depths of clean soil, contaminated material above the Hawthorn, and contaminated material within the Hawthorn.

Table 3 summarizes the volumes to be excavated based on the augering layout shown in Plate 1. Quantities are organized by the soil disposal type: nonhazardous, hazardous < Universal Treatment Standards (UTS), or hazardous >UTS material. These waste disposal categories are defined in Section 6. In-place soil volume is shown and referred to as bank volume, in units of cubic yards. The in-place volume is calculated by counting the number of holes that would be drilled and applying the clean soil depths and contaminated soil depths and contamination levels of that cell to those holes. The loose cubic yard values include the "fluff" factor that occurs once soil is excavated and stockpiled. A fluff factor of 25 percent for the upper sandy material and 15 percent for the Hawthorn material is used. Soil weight in tons is also presented and is based on a conversion factor of 1.42 tons per in-place (bank) cubic yard.

After soil is removed to the required depth, any excess groundwater in the boring is pumped out, and the hole is filled with a low-strength, high-slump, unreinforced concrete mixture referred to as flowable fill. As the hole fills with flowable fill, the steel casing is extracted. The flowable fill is denser than the adjacent soils and therefore keeps the adjacent soils from collapsing into the hole once the casing is removed. The auger is then moved to a nearby location, and the process is repeated until all soil is removed from the excavation area. Because the flowable fill is low strength, future excavation for site development will not be hampered. However, the flowable fill likely will prevent the auger from overlapping each hole because the casing cannot be driven into the hardened fill and the relatively softer soil at the same time.

Use of the excavated clean soil as part of the flowable fill is not possible because of the high silt content of the clean soil. Clean soil from the excavation will be left on the site and graded out over areas disturbed by remediation after the project is complete.

In all LDA borings on the perimeter of the source removal areas, an organic vapor analyzer will be used to screen the soil to ensure that significant contaminant concentrations do not exist in these areas. In addition, soil samples may be collected and submitted for laboratory analysis to determine contaminant concentrations. If elevated contaminant concentrations are detected, DOE may add additional LDA borings outside the source removal areas.

4.2 Soil Remaining after LDA

Some soil will remain between the augered holes because excavation is conducted using a circular auger. This remaining soil is estimated to be 10 percent of the excavation volume, and could potentially contain enough contaminant mass to act as a source of contamination to groundwater. This section discusses the hydrology of the source area following LDA and describes the plan for mitigating any negative effects of the contaminants in the remaining 10 percent of soil.

It is expected that local groundwater flow processes will be affected by the installation of flowable fill in areas excavated by LDA. For the most part, the flowable fill columns will tend to act as low-permeability barriers to subsurface flow, much in the manner that grout curtains impede groundwater movement, so groundwater will tend to be diverted around them. Most flowable fill columns will extend several feet into the Hawthorn, so groundwater in the surficial aquifer would tend to flow around the source areas and not under them.

Though some groundwater also has the potential to migrate between columns (i.e., within the 10 percent of total area that is not removed), pressure-induced movement of concrete slurry (before it sets up) into the pores of soil separating adjacent columns is expected to strongly limit such intercolumn flow. The net effect should be zones in which very little moving groundwater, if any, comes in contact with small quantities of residual contamination that might remain after augering.

Figure 16 illustrates the type of flow pattern that is expected at a remediation zone located in the path of groundwater migrating toward the northwest. As indicated, local diversion of flow is anticipated around the east and south sides of the remediation zone. Though some buildup of water elevation on the upgradient side of the excavated area will result from this diversion, it is likely to be limited to a few inches or less due to the limited volume of obstructed flow. In addition to groundwater movement, rainwater falling on the surface of the source areas could infiltrate into the remaining 10 percent of soil. However, as discussed above, pressure-induced movement of the flowable fill into the surrounding soil may limit this movement.

Even though most groundwater is expected to flow around the excavated areas, there is still some potential for leaching of contaminants from inside the source areas following LDA. The subcontractor will be required to use a 6- or 8-inch-diameter auger to auger out a significant fraction of the soil remaining after LDA (Figure 17). Using an uncased boring will allow adjacent soil to collapse into the boring, resulting in removal of most of the soil remaining between the fill columns. These augered holes will then be backfilled with flowable fill, further reducing the flow of groundwater through the source areas.

In addition, once excavation has been completed, DOE also plans to implement enhanced bioremediation in a narrow zone around the outside of the source areas. This will serve to degrade any small amounts of contaminant mass located outside the excavation, and may degrade some contaminants in the soil remaining between the fill columns in the source areas. The current plan is to inject Edible Oil Substrate into the surficial sands on 10-ft centers, and to use the KB-1 culture of *Dehalococcoides ethenogenes* for bioaugmentation. The design for enhanced bioremediation will be submitted along with the subcontractor's final design for excavation in an addendum to this IRAP.

4.3 Disposal of Excavated Soil

All contaminated soil will be disposed of at off-site facilities licensed to receive contaminated soils, with no on-site treatment. As determined by regulatory requirements and the disposal facility's Waste Acceptance Criteria (WAC), the contaminated soils can be segregated on the basis of contaminant soil concentrations and results of Toxicity Characteristic Leaching Procedure (TCLP) testing into the following categories:

1. Hazardous >UTS,
2. Hazardous <UTS,
3. Nonhazardous, and
4. Clean materials (<CTLs).

These categories are described in more detail in Section 6.

Material classified as hazardous >UTS will require treatment at a licensed treatment, storage, and disposal facility to Land Disposal Restriction treatment standards before disposal at a Subtitle C landfill. Material classified as Hazardous <UTS will not require treatment prior to disposal at a Subtitle C landfill. Nonhazardous material will be disposed of at a Subtitle D landfill. Clean soils would be stockpiled separately and used to grade over the site after remediation.

One large pad lined with an impermeable liner will be constructed with a continuous berm around it and two interior berms, creating three separate stockpile areas. The pad will be constructed from existing surface material using cut-and-fill technique to create a sloped surface. A surface runoff trench will be located on the downslope side of the pad and will drain to a centrally located sump with sump pump. The pump will discharge via a double containment line to the on-site air stripper. The pad will be located so that material could be stockpiled from one side and loaded for off-site hauling from the other side to avoid equipment conflict.

Excess water will be allowed to drain from the stockpiled soil, and the stockpiles will be sampled. Samples will be analyzed using Method 8260B to determine concentrations of individual VOCs in the soil and using the TCLP method to determine waste disposal categories.

The soil will be hauled off site using highway-legal dump trucks. The trucks would exit the south side of the site and proceed east to the intersection of 114th Avenue and Belcher Road (Figure 18). Trucks would travel along a major arterial highway to the nearest interstate highway. All trucks hauling from the site would use this same haul route.

5.0 Health and Safety

A project-specific Health and Safety Plan will be written to address all activities (excavation, on-site treatment, backfilling), risks, and controls. Engineering controls, administrative controls, and personal protective equipment (PPE) will be used as required to keep the project workforce safe.

The soil contaminants all easily volatilize. The potential exists to excavate small quantities of contaminants at levels that exceed Resource Conservation and Recovery Act (RCRA) thresholds for hazardous waste. Consequently, all workers involved with excavation, treatment, and working within controlled areas should have 40-hour Occupational Safety and Health Administration (OSHA) hazardous waste worker training as required under 29 CFR 1910.120.

A fence around the entire work area will serve as general security to prevent public access. The area around the excavation site and contaminated material stockpiles will be controlled so that only workers and escorted visitors who meet training requirements may enter the area. Contaminant vapors will be monitored to determine appropriate levels of worker PPE. Access control points for donning and doffing PPE will be established. In addition, a decontamination pad is required for decontaminating all vehicles and equipment that leave the controlled area.

Noise levels from large equipment and generators will be monitored to ensure that workers are protected according to OSHA requirements and to ensure that the county noise ordinance is not violated. Flowable fill will be used to backfill each hole after it is excavated. If the material is mixed on site, workers must be protected from silica and fine particles used in the mix. After the material is mixed, workers will wear proper skin protection to prevent intermittent contact with the material.

Off-site soil disposal requires the temporary stockpiling of contaminated materials and loading of trucks. All truck shipments of soil will be lined and covered to prevent spills. Although most trucks have automatic mechanical tarping devices, special platforms can be built for workers to stand on to place tarps, if necessary. A specific truck route has been established with the STAR Center to minimize conflicts with site tenants (Figure 18).

The following activities and risks are associated with the soil excavation and disposal. Mitigation measures are listed in parentheses.

Physical Hazards

- Constructing stockpile pads and installing liners. Liners require seam welders and hauling of heavy materials. High winds lifting the liner material before it can be anchored also create hazards (monitor weather conditions and provide temporary anchoring of liner material).
- Interaction with heavy construction equipment (use designated roads, wear safety vests, use backup alarms).
- Underground utilities (use lockout/tagout, locate utility lines before digging).
- Abandonment of existing wells using drill equipment (requires close oversight to avoid pinch and rotating hazards).
- Working in hot, humid conditions and exposure to direct sunlight/ultraviolet radiation (take numerous breaks, drink fluids, wear long sleeves and sunscreen).
- Lightning or hurricanes (monitor weather, shut down site when lightning is within 3 to 8 miles).

- Removing and covering stockpiles daily with tarps will require working on uneven surface and involve hazards during windy days (could mitigate with mechanical system that rolls tarps up).
- Noise from casing drivers, generators, and blowers (monitor noise levels, use ear protection if needed).
- Flammable fuels used to run portable generators, vehicles, and augering equipment (use containers that meet OSHA and National Fire Protection Association requirements).
- Electrical hazards (enforce strict compliance with electrical and lockout/tagout procedures).
- Use of high-pressure (e.g., Hotsy) sprayers for decontamination of equipment and vehicles (use PPE, provide training on how to handle properly).

Chemical Hazards

- Workers exposed to volatile contaminants (monitor, use respirators if required).
- Silica exposure to workers when soils dry out and conditions are windy (control dust through application of water).

Biological Hazards

- Snakes, insects (use insect repellant, conduct routine inspections of the site).

6.0 Environmental Compliance and Waste Management

The Northeast Site is included as a SWMU under the RCRA Hazardous and Solid Waste Amendments Permit that was reissued on August 21, 2007, under the authority of FDEP. The permit was modified under the provisions of Section 403.722, Florida Statutes; and Chapters 62-4, 62-160, 62-730, 62-777, and 62-780, F.A.C., to incorporate the Global RBCA regulations. The permit requires the investigation and remediation, if necessary, of any releases of hazardous waste or hazardous constituents from any SWMUs at the facility. According to consultation with FDEP, the main regulatory program applicable to this remedial action (source removal) is Global RBCA promulgated under Chapter 62-780 F.A.C.

DOE has prepared this IRAP in accordance with the RBCA regulations and State guidance for approval by FDEP. Chapter 62-780.680 F.A.C. lists the RBCA site closure requirements. In accordance with RBCA requirements, DOE plans to conduct a remedy for the removal of source material that is consistent with the long-term remedy, that will not adversely affect the long-term strategy, and that will facilitate cleanup of contaminants in the groundwater.

The regulations require confirmatory sampling following source removal. However, it is DOE’s position that because of the very detailed source area characterization conducted and the relative accuracy of the recommended source removal technology, confirmatory sampling will not be necessary.

The IRAP will serve as DOE’s permit for the source removal activity but will need to be supplemented with an additional permit for storm water management and any other necessary permits. DOE will be required to obtain a storm water permit, develop a storm water pollution prevention plan, control surface water runoff, and conduct inspections throughout the duration of remediation.

Discussions with the State have indicated that separate air permits will not be necessary because the planned actions, including excavating, stockpiling, sampling and transporting the contaminated soil, and operating an air stripper to treat runoff from stockpiles, will meet the generic unit exemption under 62-210.300 F.A.C. The State also confirmed that no ambient air monitoring is required for this project, and best management practices should be used to minimize fugitive dust emissions.

The soils will be categorized and segregated on site into three separate waste piles on the basis of current characterization data and on-site screening during excavation. The soil will be separated according to the following categories:

- Nonhazardous: Soil passes TCLP—existing analysis of total concentrations in soils (micrograms per kilogram [µg/kg]) is less than 20 times the leachate TCLP criteria (micrograms per liter [µg/L]). It is assumed that this soil can be disposed of at a Subtitle D landfill.
- Hazardous <UTS: Soil fails TCLP—existing analysis of total concentrations in soils (µg/kg) is greater than 20 times the leachate TCLP criteria (µg/L), but soil underlying hazardous constituents (UHC) concentrations are less then than the Land Disposal Restriction UTS for soil (40 CFR 268.49); the UHC concentrations for soil are 10 times the UTS. It is assumed that this soil can be disposed of directly (without treatment) at a Subtitle C landfill.
- Hazardous >UTS: Soil fails the TCLP—existing analysis of total concentrations in soils (µg/kg) is greater than 20 times the leachate TCLP criteria (µg/L), and soil UHC concentrations are greater than the UTS. It is assumed that this soil requires treatment to below UTS concentrations before it can be disposed of at a Subtitle C landfill.

In addition to these three categories, the clean soil that overlies the source area soils will be segregated during excavation and will be spread over the disturbed areas once the source removal is completed. Clean soil is defined as containing contaminant concentrations less than default soil CTLs based on leachability to poor quality groundwater.

Stockpiled soil will be sampled and analyzed according to an approved waste analysis sampling plan. Soil disposal and need for treatment will be based on TCLP analysis and comparison of total VOCs to UTS. Analysis conducted in accordance with the sampling plan may show that the soils are nonhazardous and are suitable for disposal at a less restrictive landfill, such as a Subtitle D landfill.

Portions of the soils are currently characterized as hazardous on the basis of existing analysis of total concentrations in soils that are greater than 20 times the leachate TCLP criteria. RCRA requirements will apply to transportation and disposal of the soil. As a result of consultation with FDEP and verification that the IRAP will act as the permit, as stated above, a RCRA permit is not required, and management and storage requirements under RBCA will apply. The duration of on-site storage of the excavated soil will be defined by the subcontractor's design for excavation and soil disposal. Once a subcontractor is chosen, DOE will submit the final design to FDEP as an addendum to this IRAP. The estimated duration of the excavation project is 4–5 months, and DOE anticipates that several waste shipments will be occurring during that time. Subcontractor personnel will be required to receive training in accordance with RCRA requirements and will supply training documentation.

An on-site air stripper will be used to treat the groundwater generated from the augering operations and runoff from the waste piles. A permit will not be required to operate the air stripper because it meets the generic unit exemption under 62-210.300, F.A.C. The STAR Center maintains an Industrial Wastewater Discharge Permit that allows the STAR Center's process wastewater to be combined with the site's sanitary discharge before being discharged to the Pinellas County Sewer System, in compliance with Sewer Use Ordinance 91-26. At the STAR Center, the permit is managed in a way that requires all discharges to the STAR Center's sanitary sewer system to meet the contaminant level requirements of the permit. All wastewater generated during treatment that is to be released to the STAR Center's sanitary sewer must meet the contaminant levels specified in the permit, plus any additional requirements for start-up and shutdown.

The permit also requires that the STAR Center submit formal written notification to the Pinellas County Utilities 30 days before the introduction of new wastewater or pollutants to the system and 48 hours before the discharge of treated groundwater to the sewer. During the initial start-up of the air stripper, samples of effluent from the treatment system shall be taken daily for the first week for compliance monitoring. For the first week of monitoring, the subcontractor shall submit all compliance monitoring samples to a laboratory for 24-hour turnaround on the analyses. Thereafter, compliance monitoring samples shall be taken weekly.

The interim action will comply with the Pinellas County noise ordinance. The noise ordinance includes specific requirements regarding types of noise and noise levels.

7.0 Quality Assurance

Sample collection procedures, field documentation procedures, and field quality control sampling will follow the guidance in the *Sampling Procedures for the Young - Rainey STAR Center and the 4.5 Acre Site* (DOE 2006a) and the *Quality Assurance Project Plan for the Young - Rainey STAR Center and the 4.5 Acre Site* (DOE 2006b). Sampling procedures, including sampling equipment decontamination, sample containers, sample preparation, and sample handling, will be followed to ensure that samples are representative of the media from which they were collected. Quality control data reported will include laboratory blanks, matrix spike duplicates, and surrogate recoveries.

8.0 Reporting

The duration of the interim remedial action is less than 6 months. Therefore, a total of two reports will be issued for the project: an Interim Remedial Action Progress Report after 3 months of work and an Interim Remedial Action Final Report at the conclusion of the project.

In addition, the subcontractor's final design for excavation will be submitted to FDEP as an addendum to this IRAP, as discussed in Section 4. This will also include the design for enhanced bioremediation outside the source areas, as mentioned in Section 4.2.

9.0 Schedule

A schedule of activities is included as Table 4.

10.0 References

DOE (U.S. Department of Energy), 1991. *RCRA Facility Investigation Report, Pinellas Plant*, Environmental Restoration Program, Albuquerque Operations Field Office, Albuquerque, New Mexico, September.

DOE (U.S. Department of Energy), 1993. *Corrective Measures Study Report Northeast Site,* March.

DOE (U.S. Department of Energy), 1996. *Northeast Site Interim Measures Quarterly Progress Report*, January.

DOE (U.S. Department of Energy), 2003. *Northeast Site Area A NAPL Remediation Final Report*, Grand Junction Office, Grand Junction, Colorado, September.

DOE (U.S. Department of Energy), 2006a. *Sampling Procedures for the Young - Rainey STAR Center and the 4.5 Acre Site*, DOE-LM/GJ1159-2006, Office of Legacy Management, Grand Junction, Colorado.

DOE (U.S. Department of Energy), 2006b. *Quality Assurance Project Plan for the Young - Rainey STAR Center and the 4.5 Acre Site*, DOE-LM/GJ1287-2006, Office of Legacy Management, Grand Junction, Colorado.

DOE (U.S. Department of Energy), 2007. *Final Report Northeast Site Area B NAPL Remediation Project at the Young - Rainey STAR Center, Largo, Pinellas County, Florida*, DOE-LM/1457-2007, Office of Legacy Management, Grand Junction, Colorado, April.

DOE (U.S. Department of Energy), 2008a. *Pinellas Environmental Restoration Project 4.5 Acre Site Source Removal Feasibility Study*, DOE-LM/1606-2008, Office of Legacy Management, Grand Junction, Colorado, April.

DOE (U.S. Department of Energy), 2008b. *Northeast Site Source Characterization Data Report,* Office of Legacy Management, Grand Junction, Colorado, July.

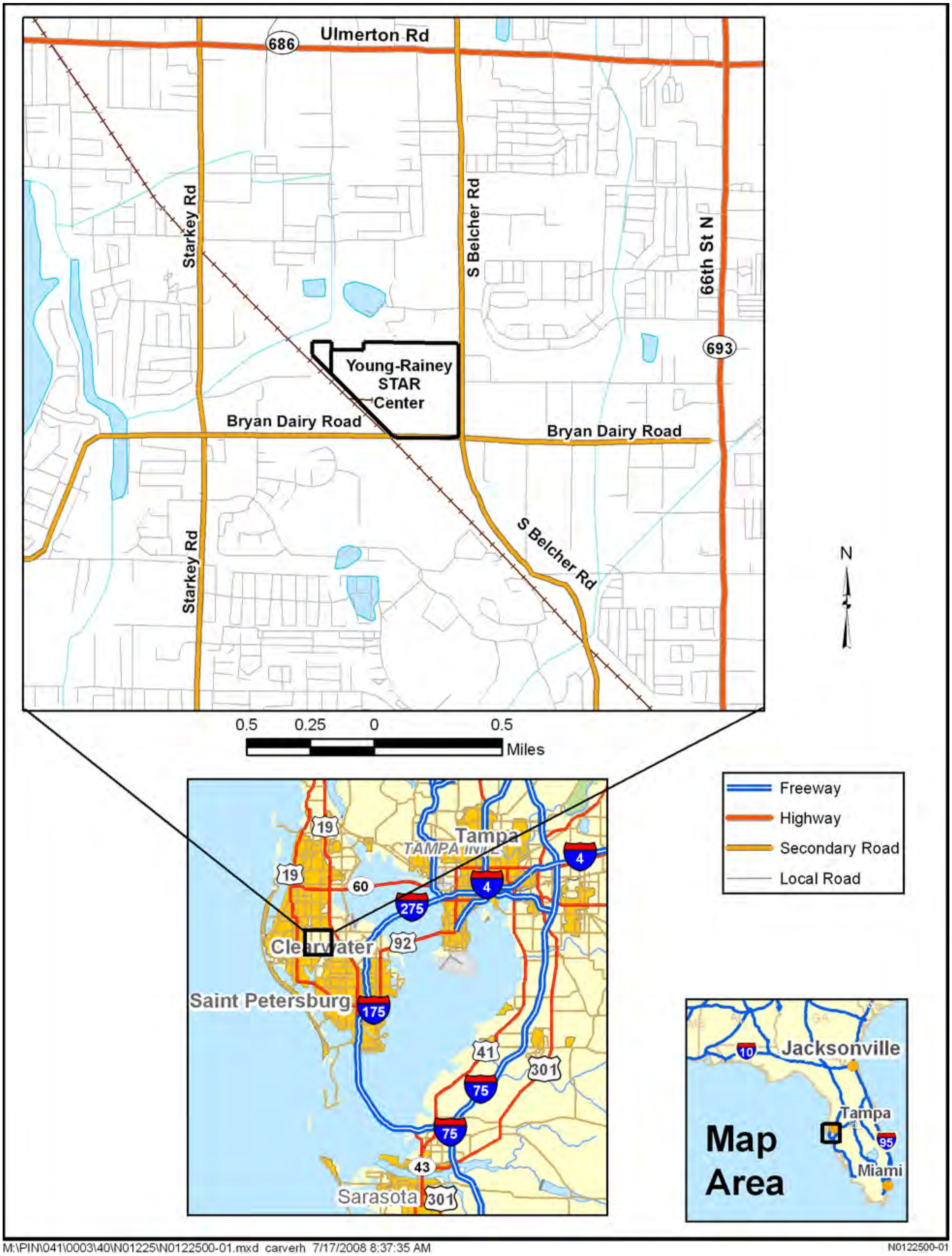

Figure 1. Site Location Map

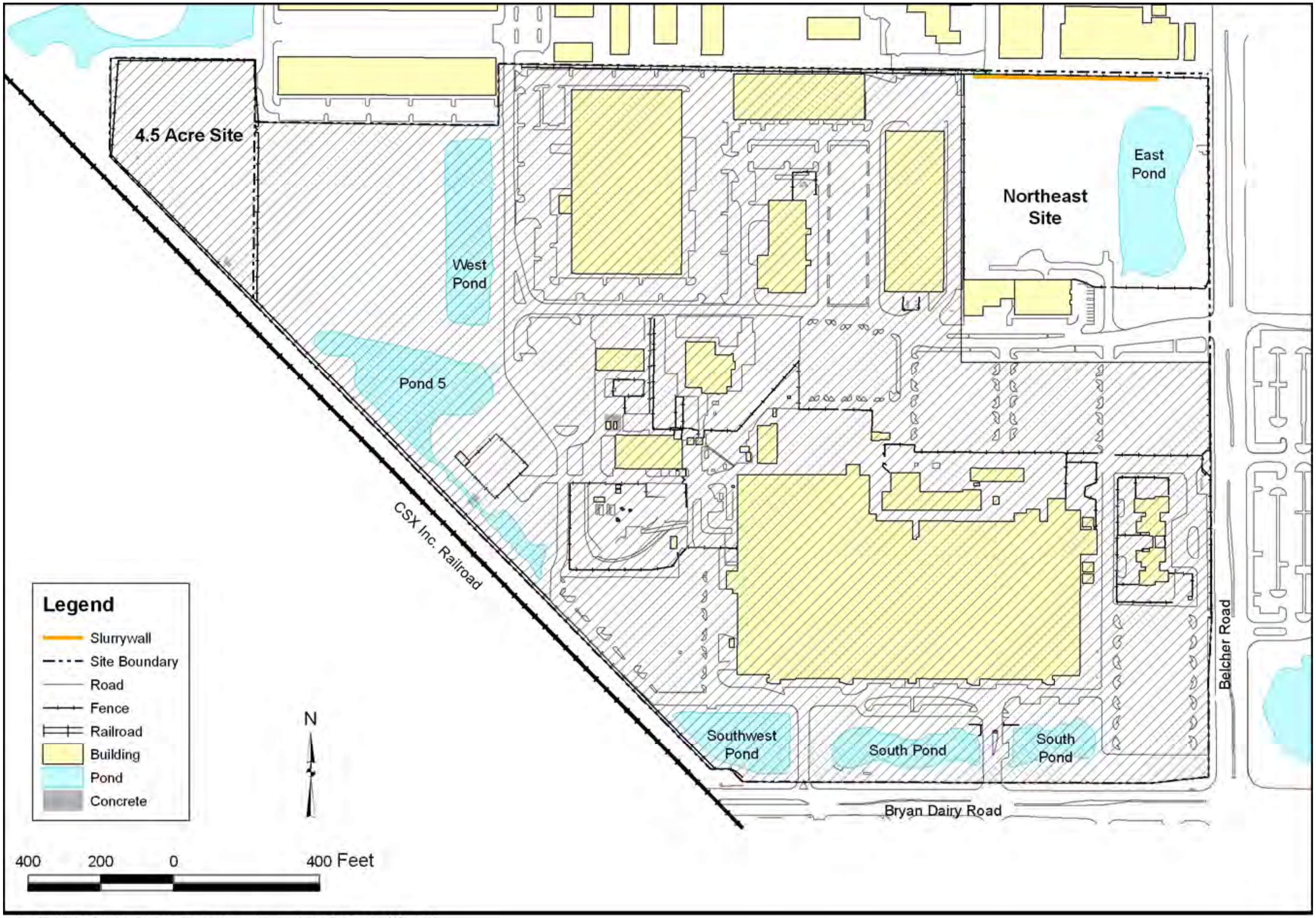

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Figure 2. Northeast Site Location

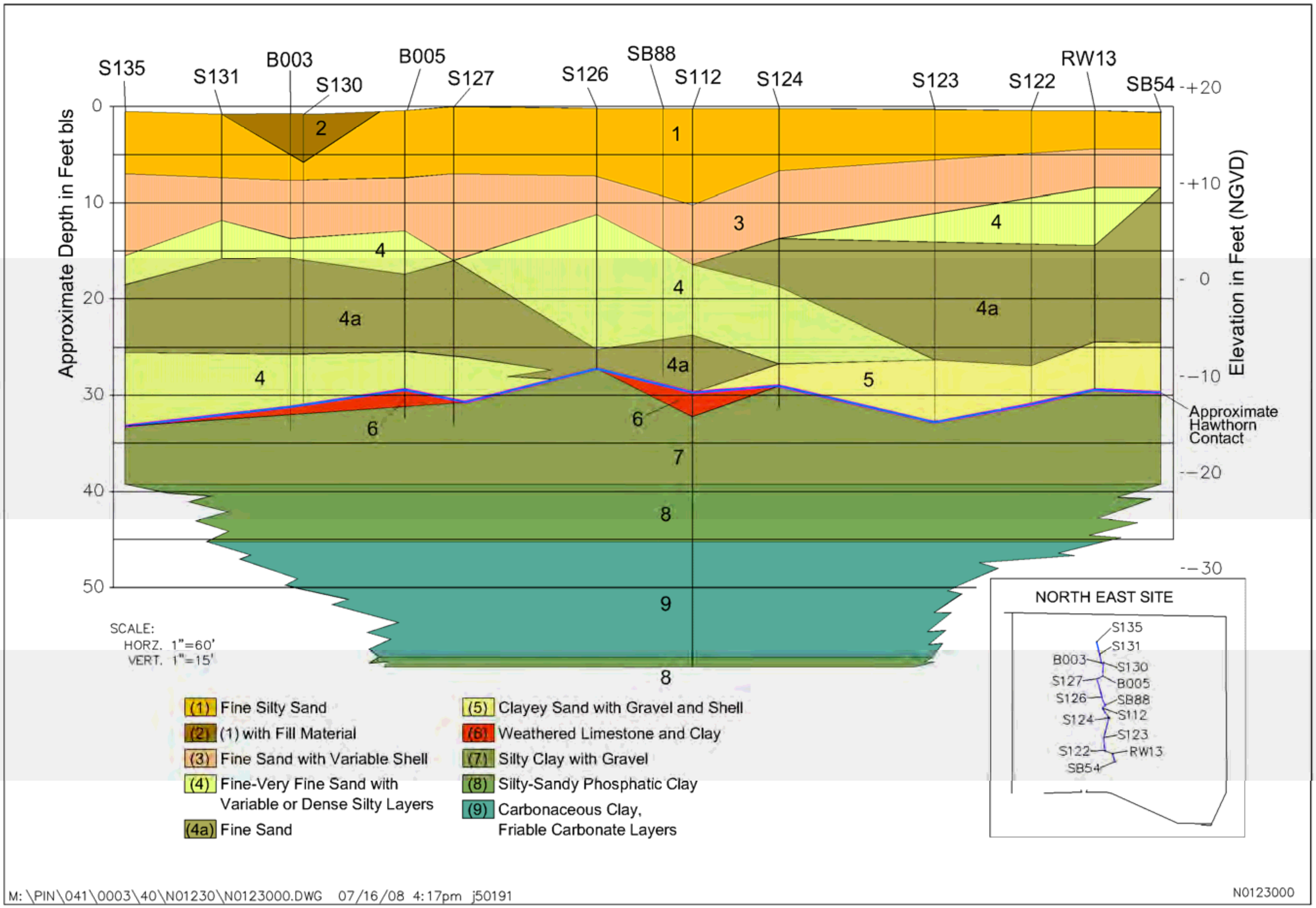

Figure 3. Geologic Cross Section North to South

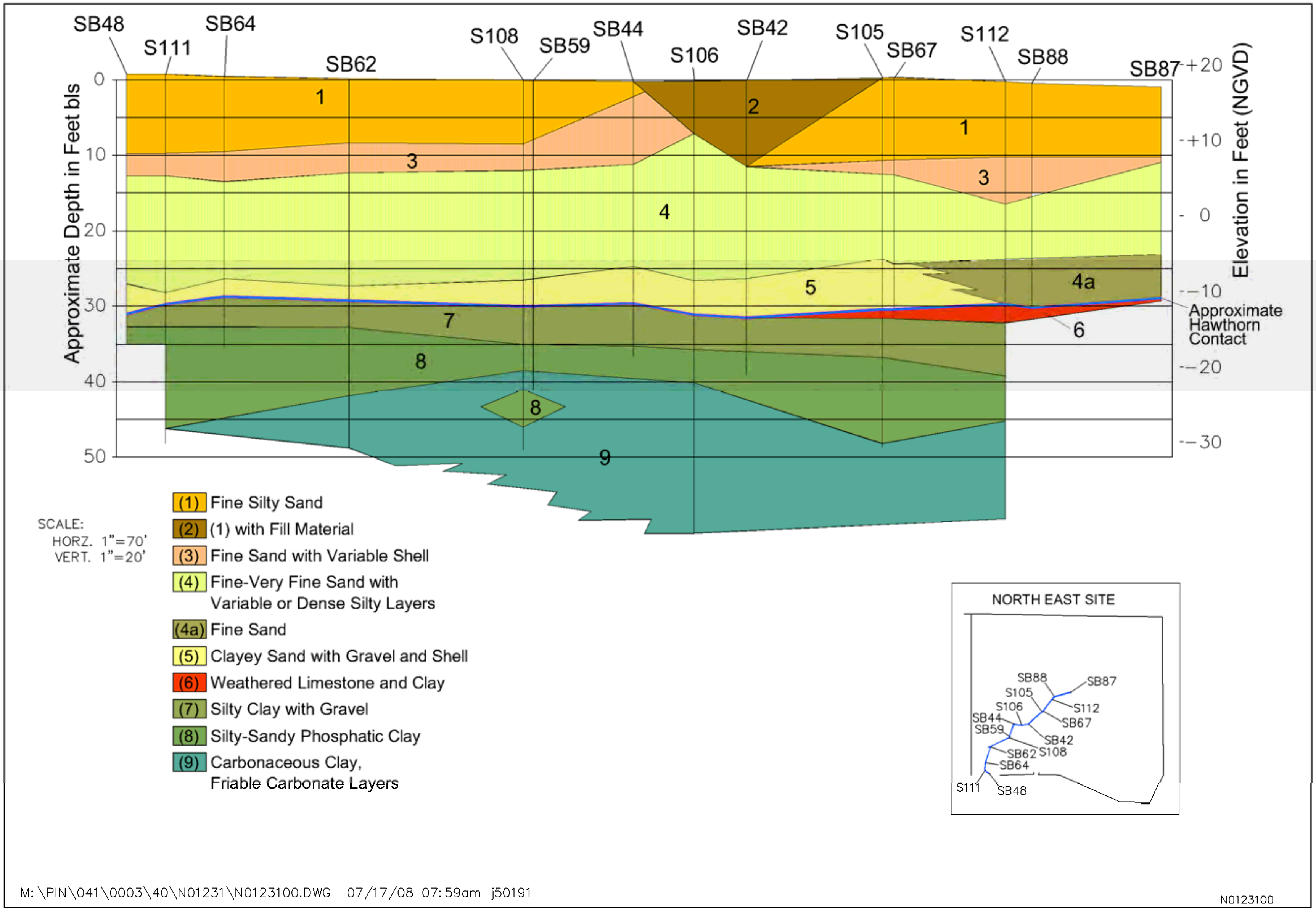

Figure 4. Geologic Cross Section Southwest to Northeast

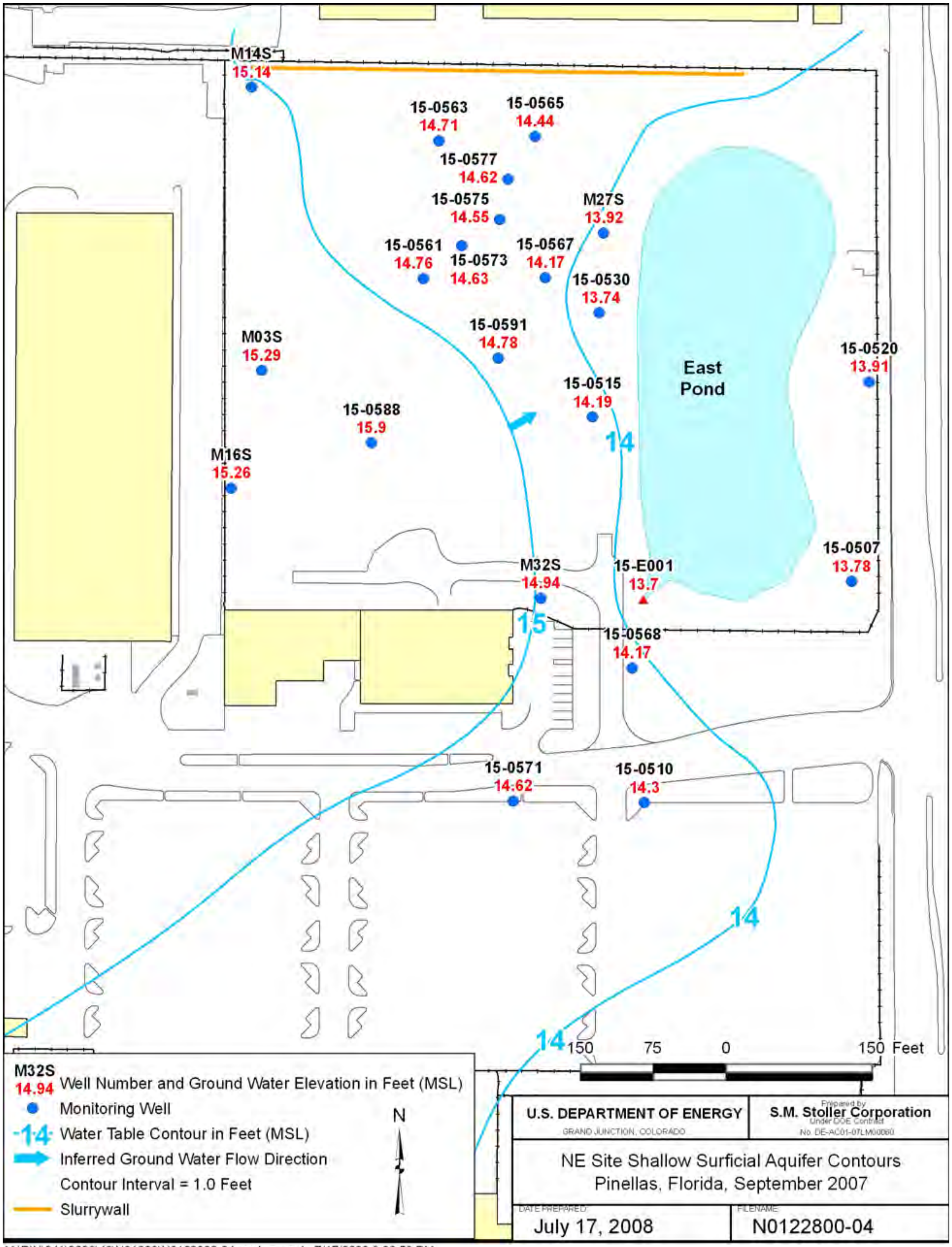

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Figure 5. Shallow Surficial Aquifer Contours—September 2007

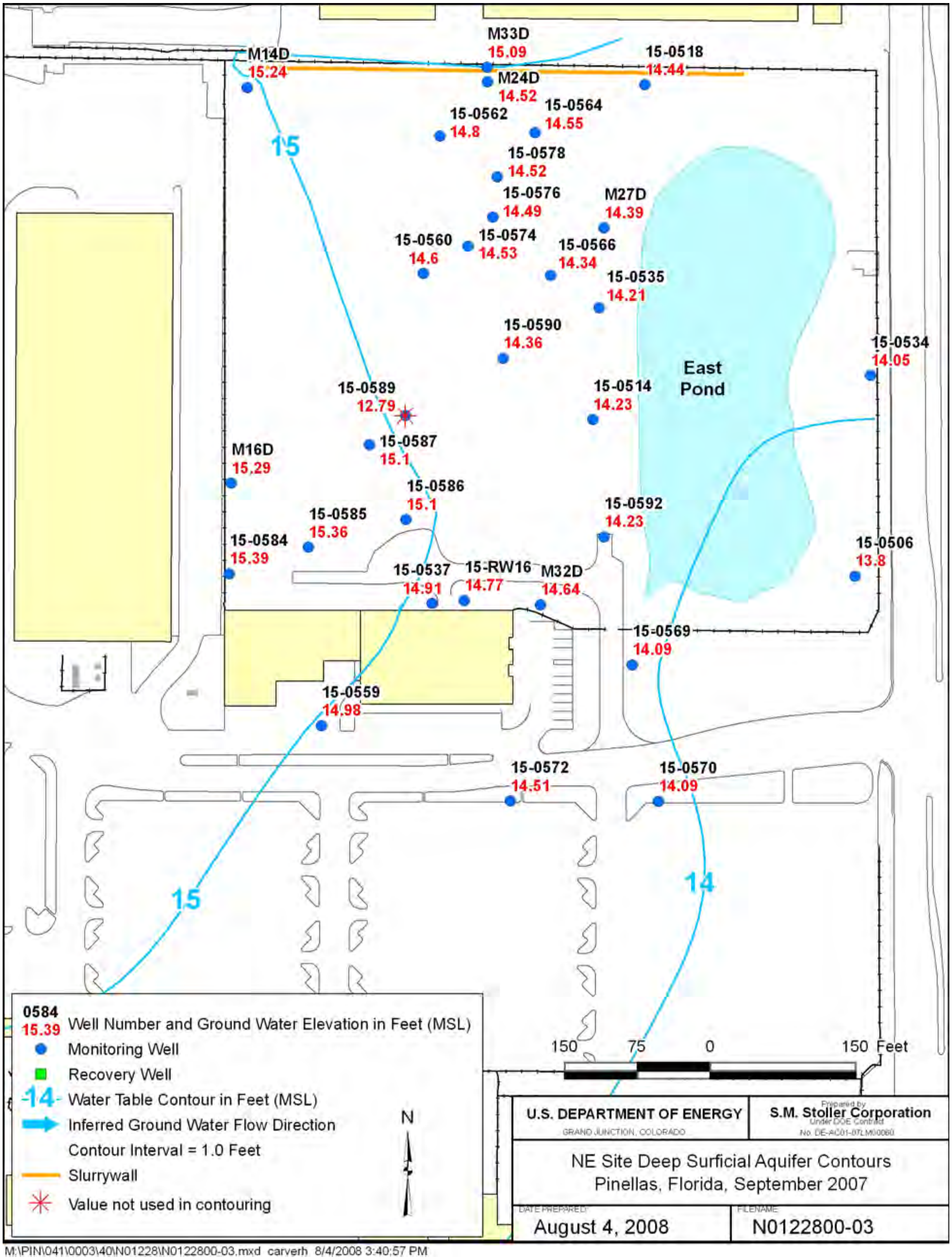

Figure 6. Deep Surficial Aquifer Contours—September 2007

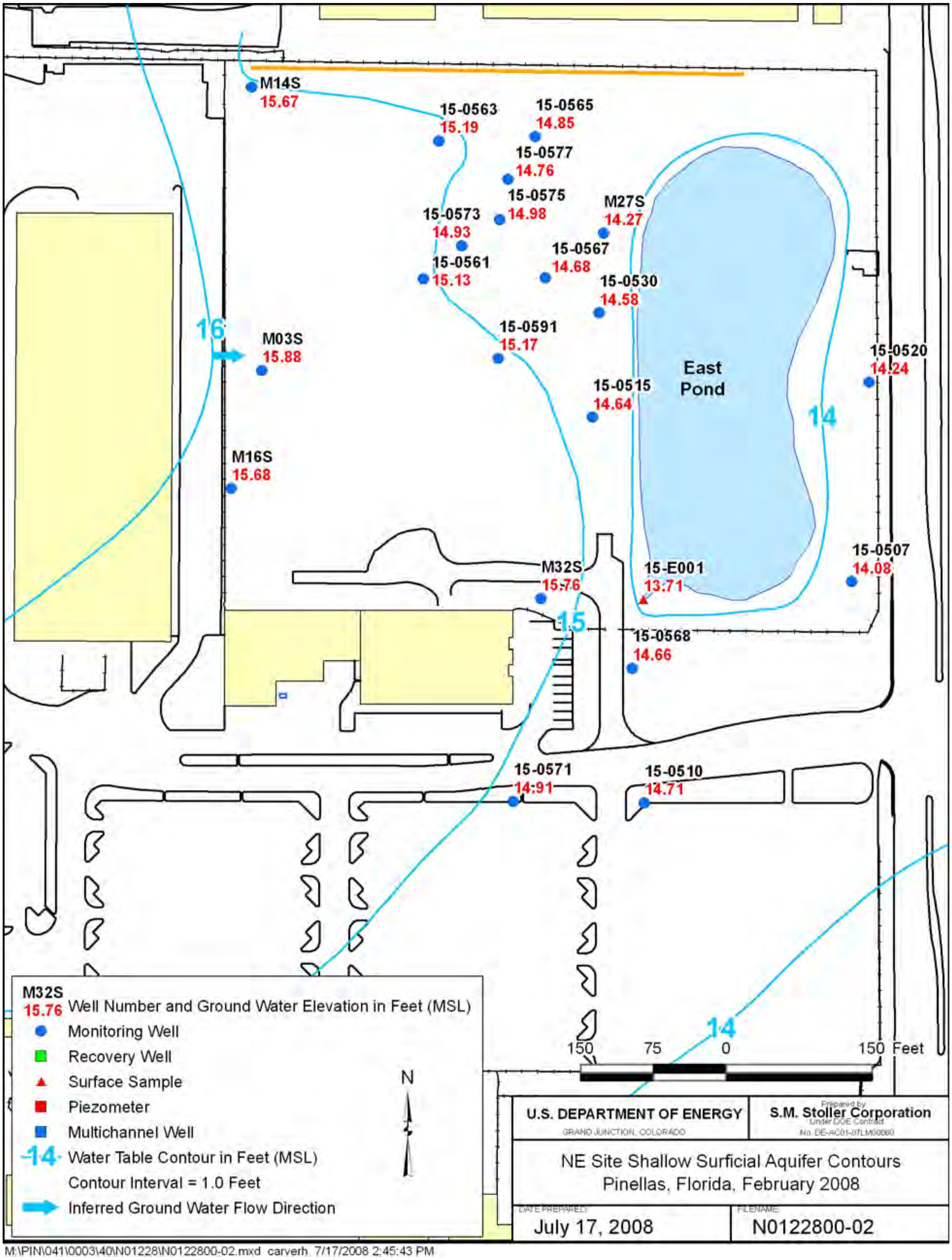

Figure 7. Shallow Surficial Aquifer Contours—February 2008

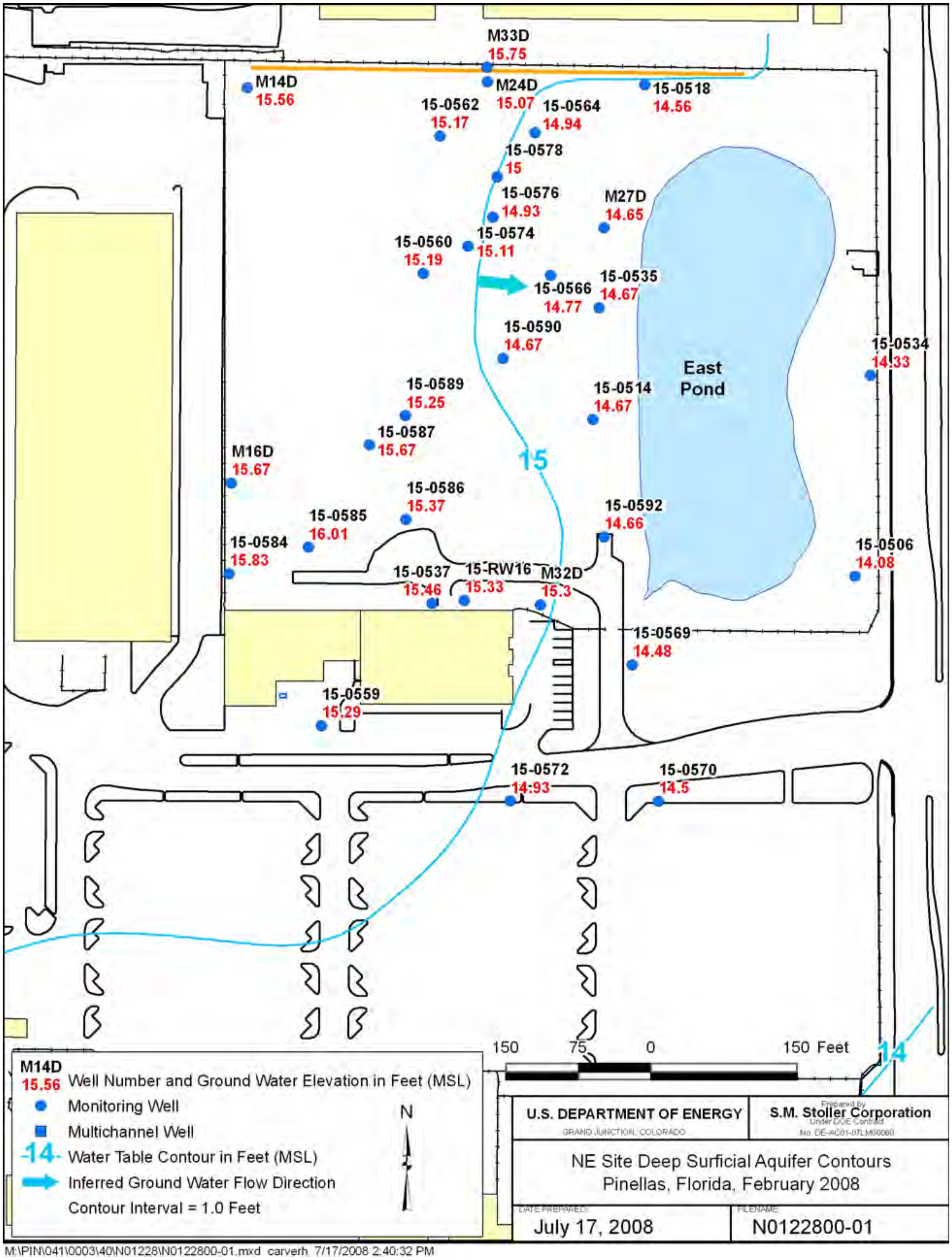

Figure 8. Deep Surficial Aquifer Contours—February 2008

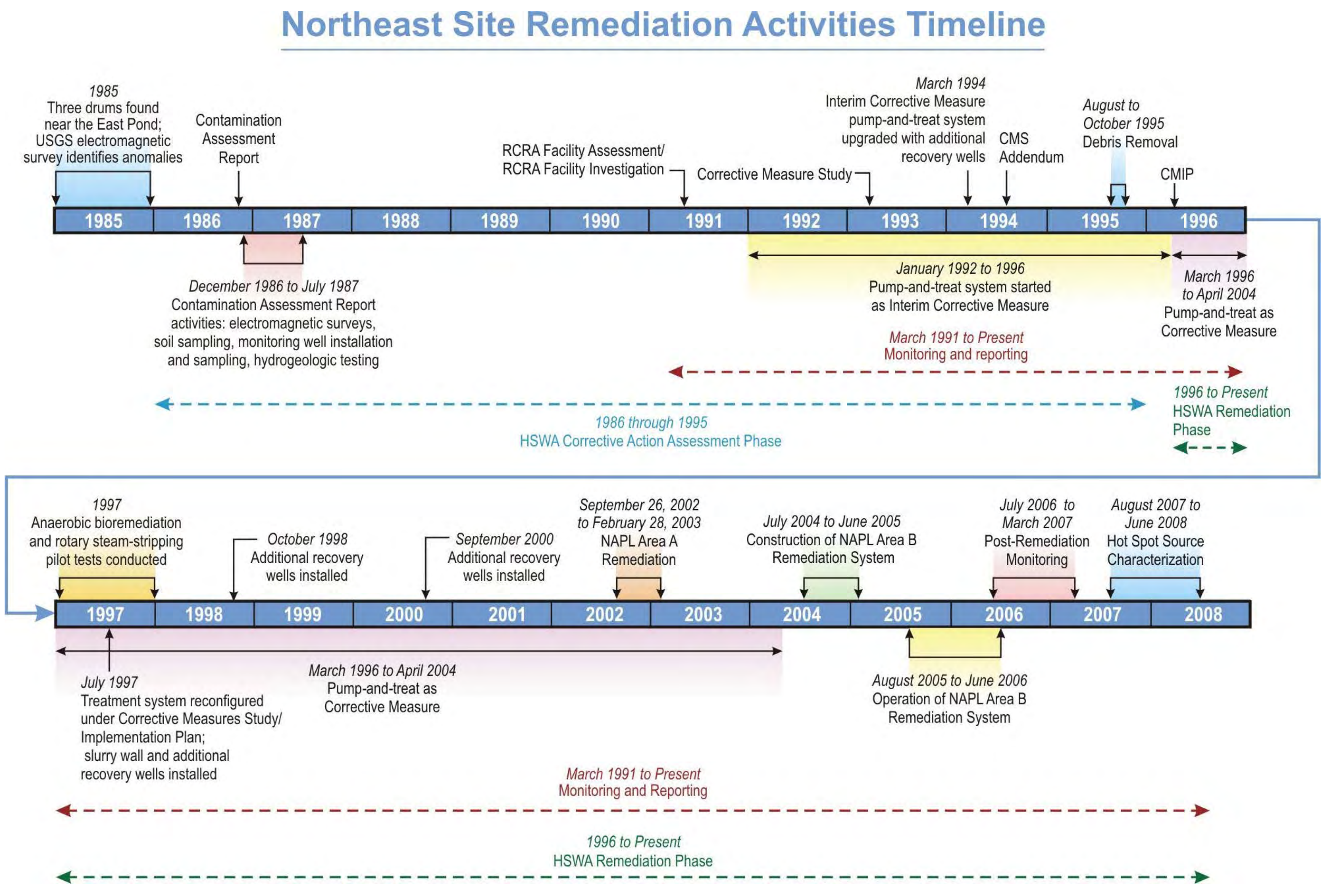

Figure 9. Northeast Site Environmental Restoration Activities Timeline

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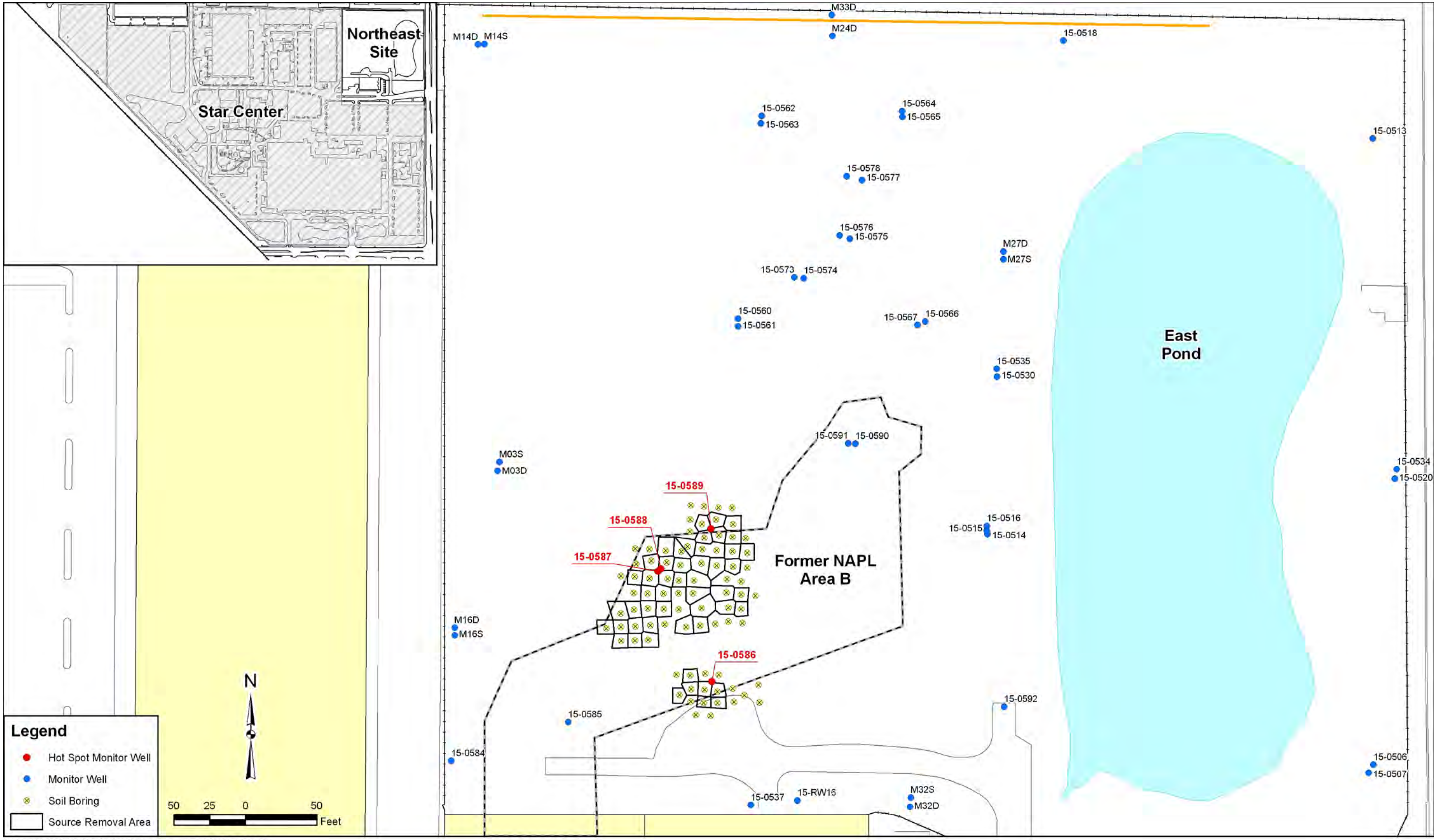

Figure 10. Location of the Source Removal Areas at the Northeast Site

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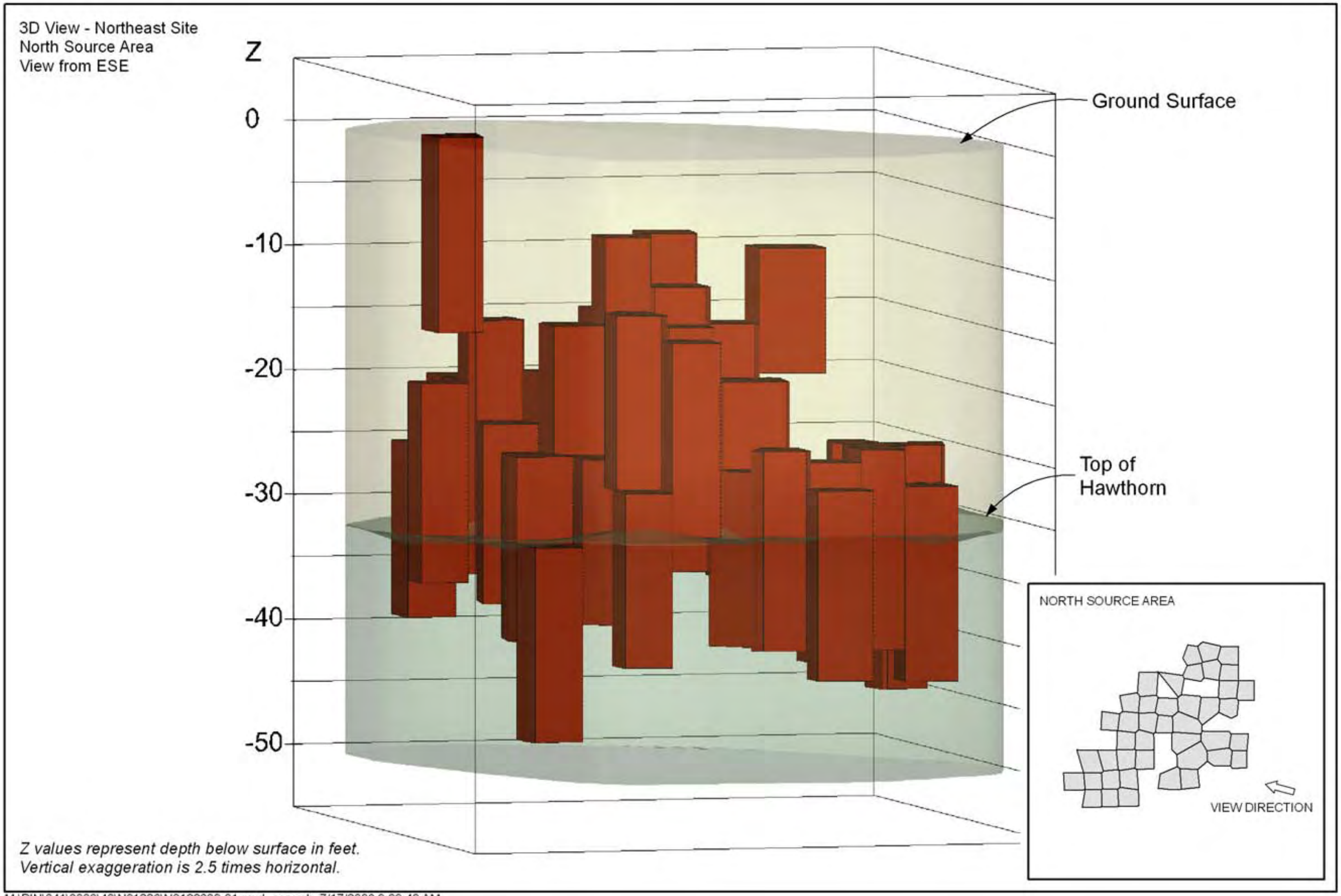

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Figure 11. 3D View of the North Source Area

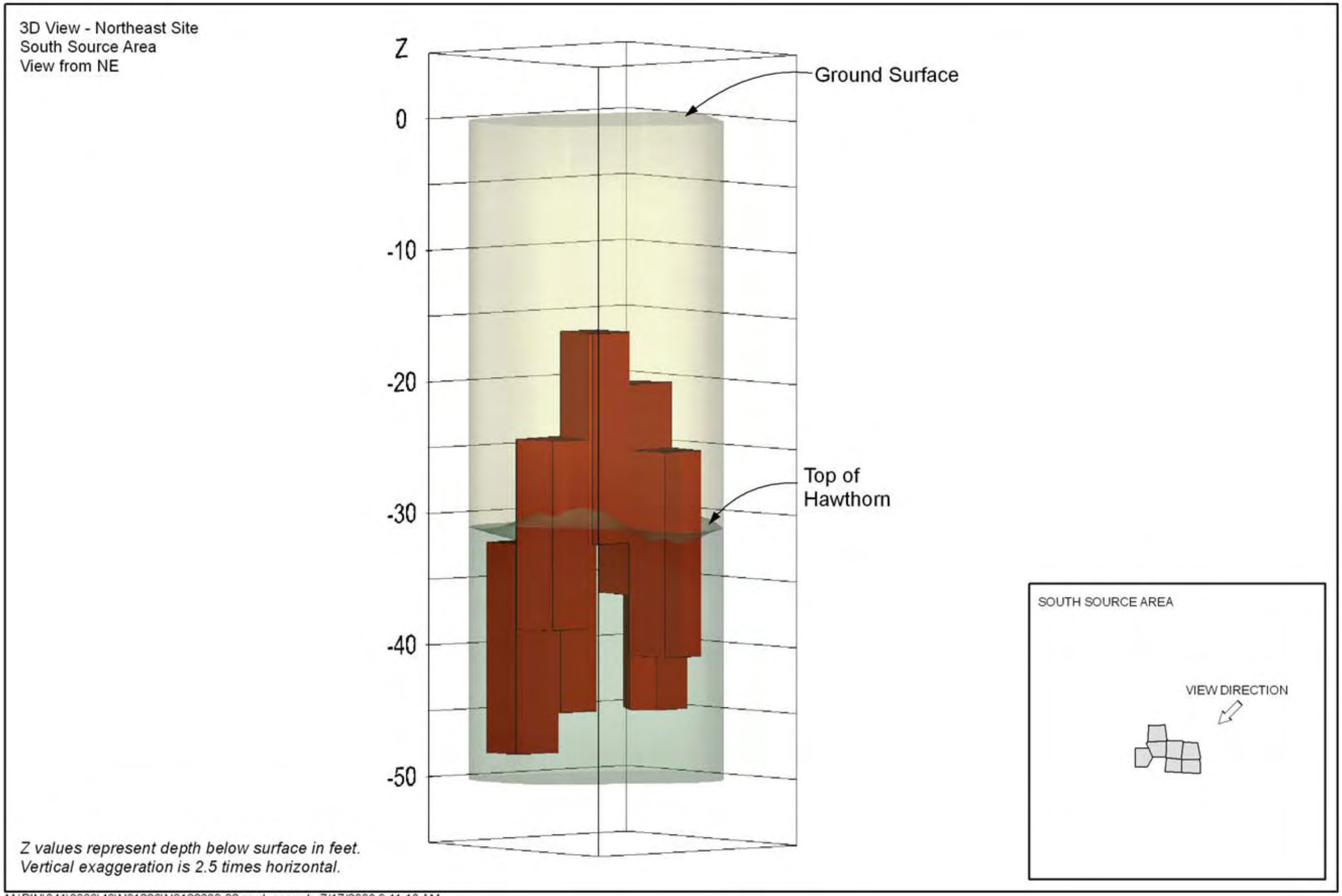

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Figure 12. 3D View of the South Source Area

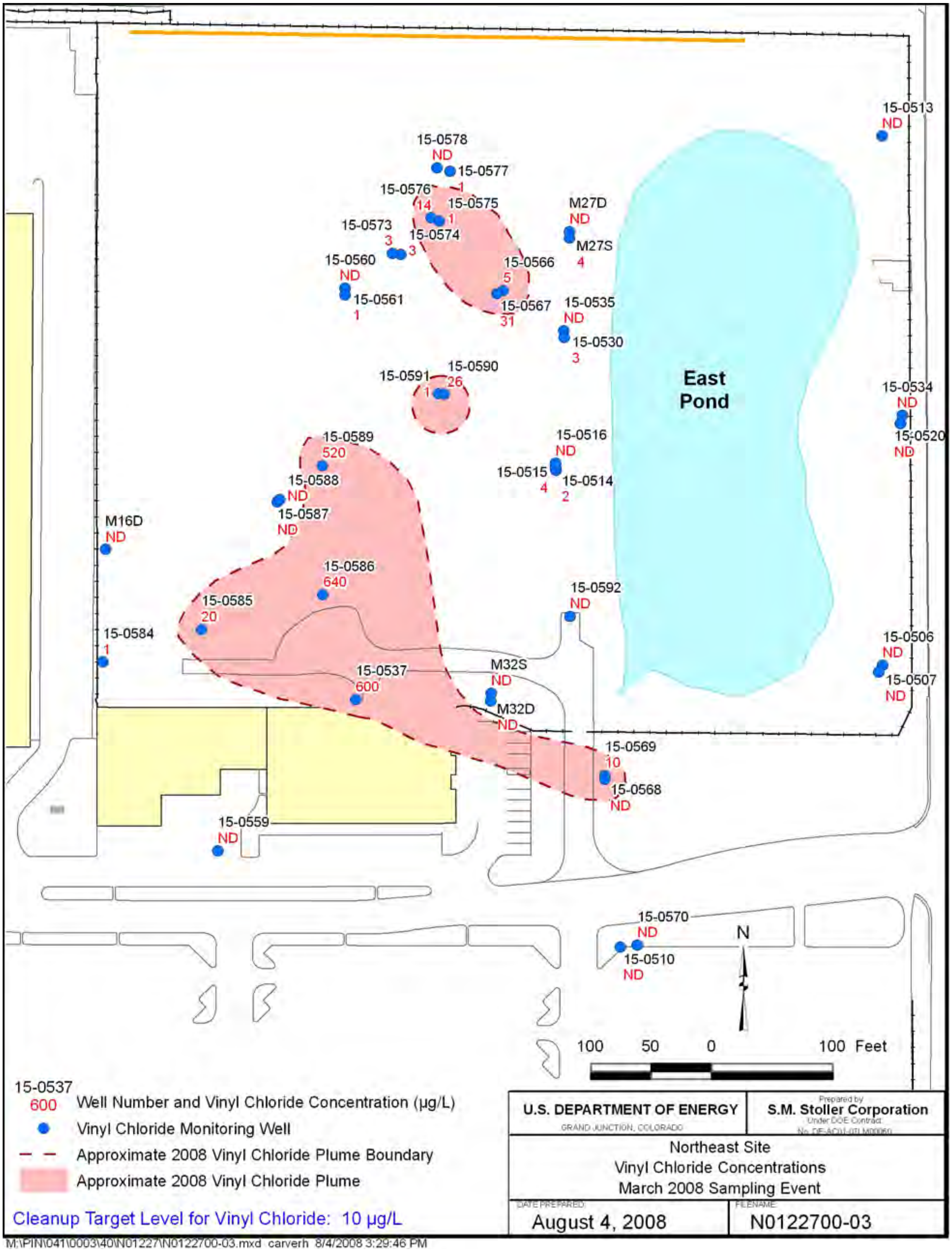

Figure 13. VC Plume, March 2008

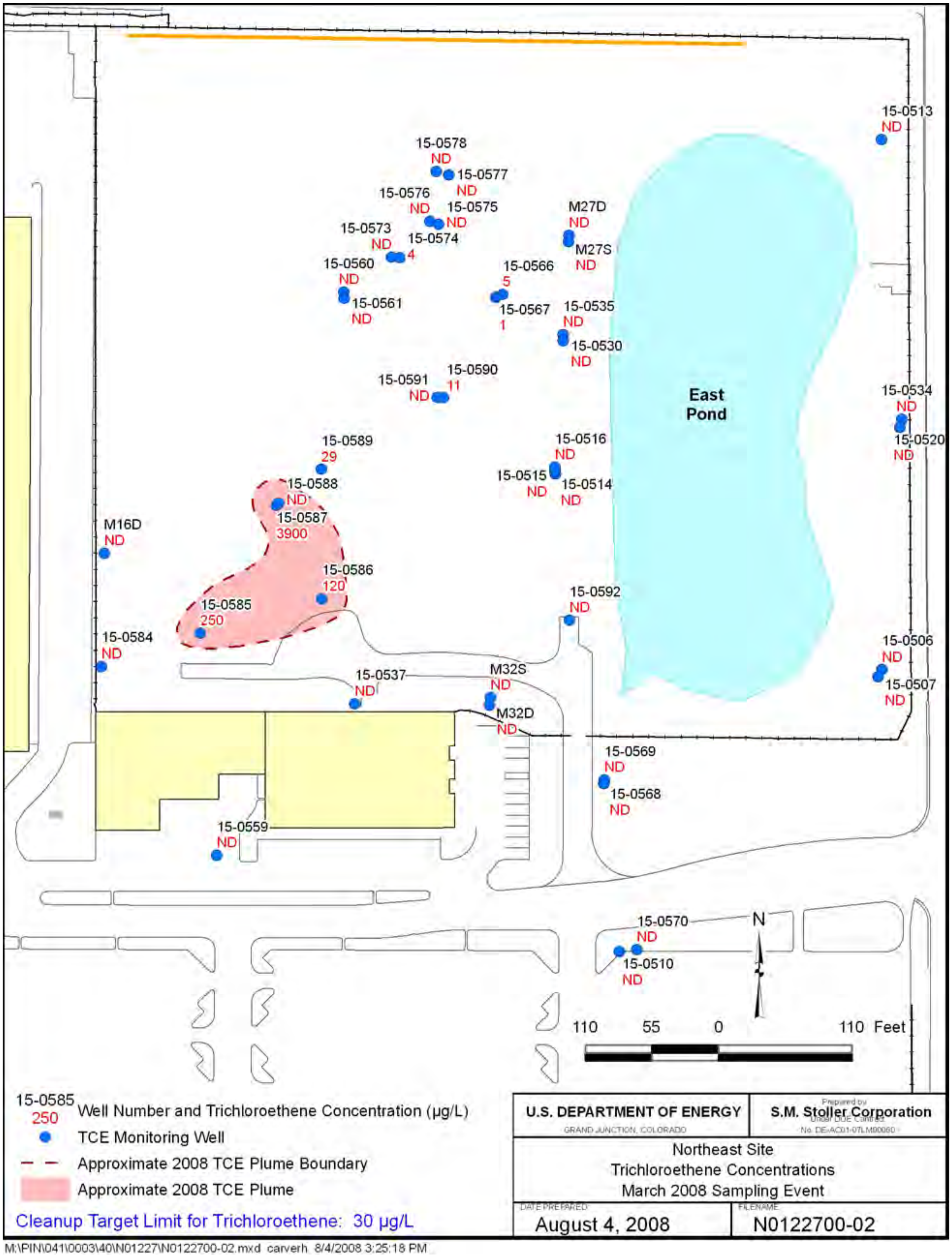

Figure 14. TCE Plume, March 2008

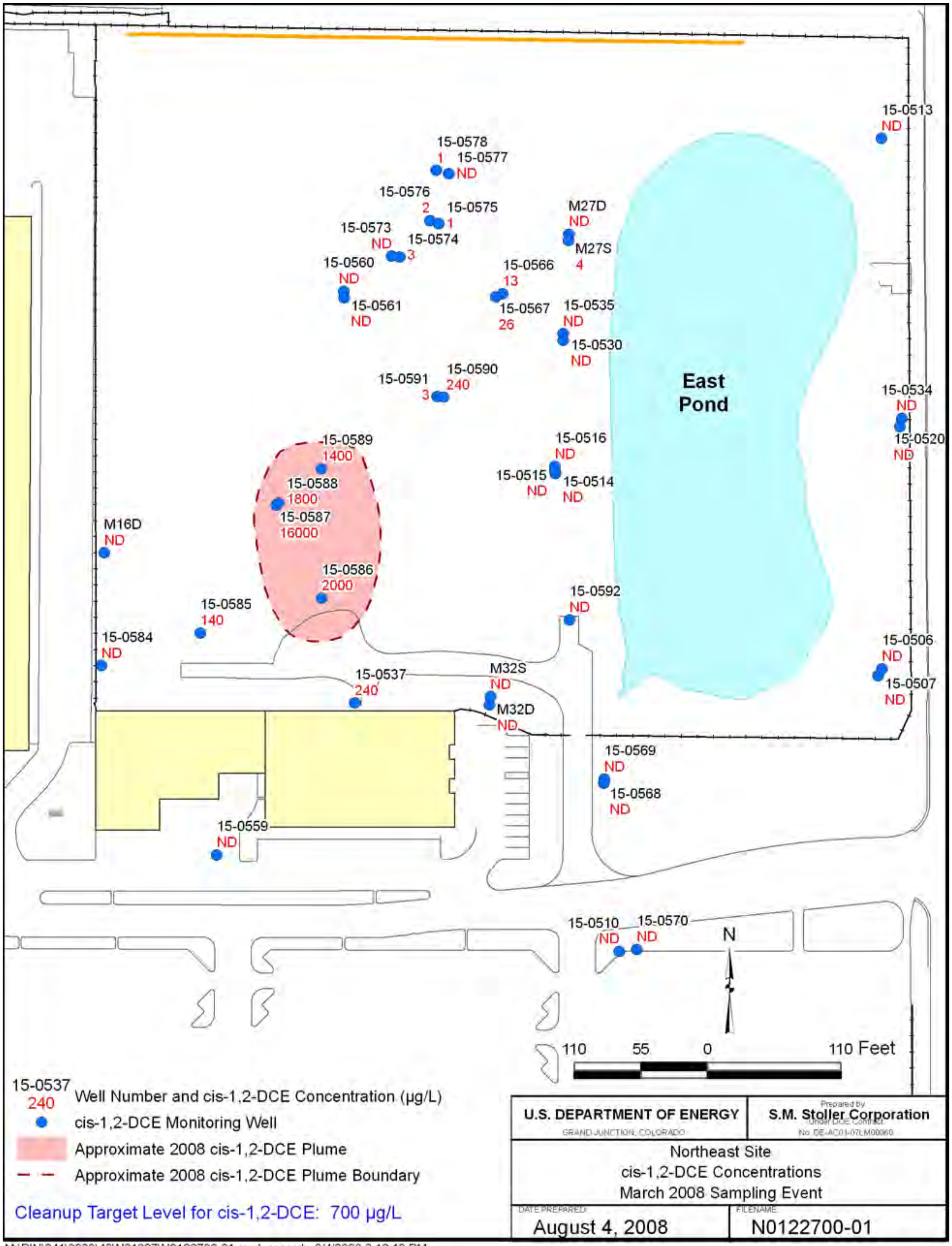

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Figure 15. cDCE Plume, March 2008

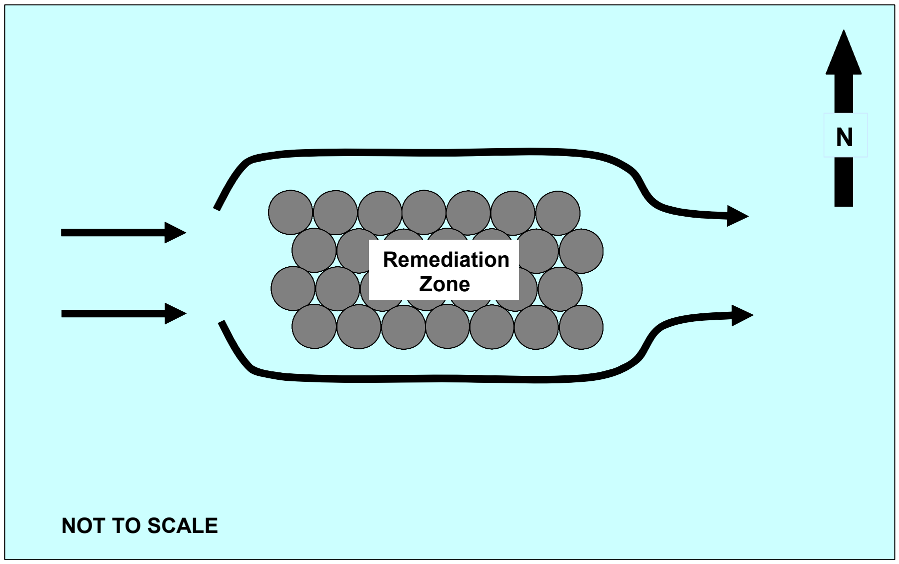


Figure 16. Map View of Expected Flow Patterns Near a Zone of Flowable Fill Columns

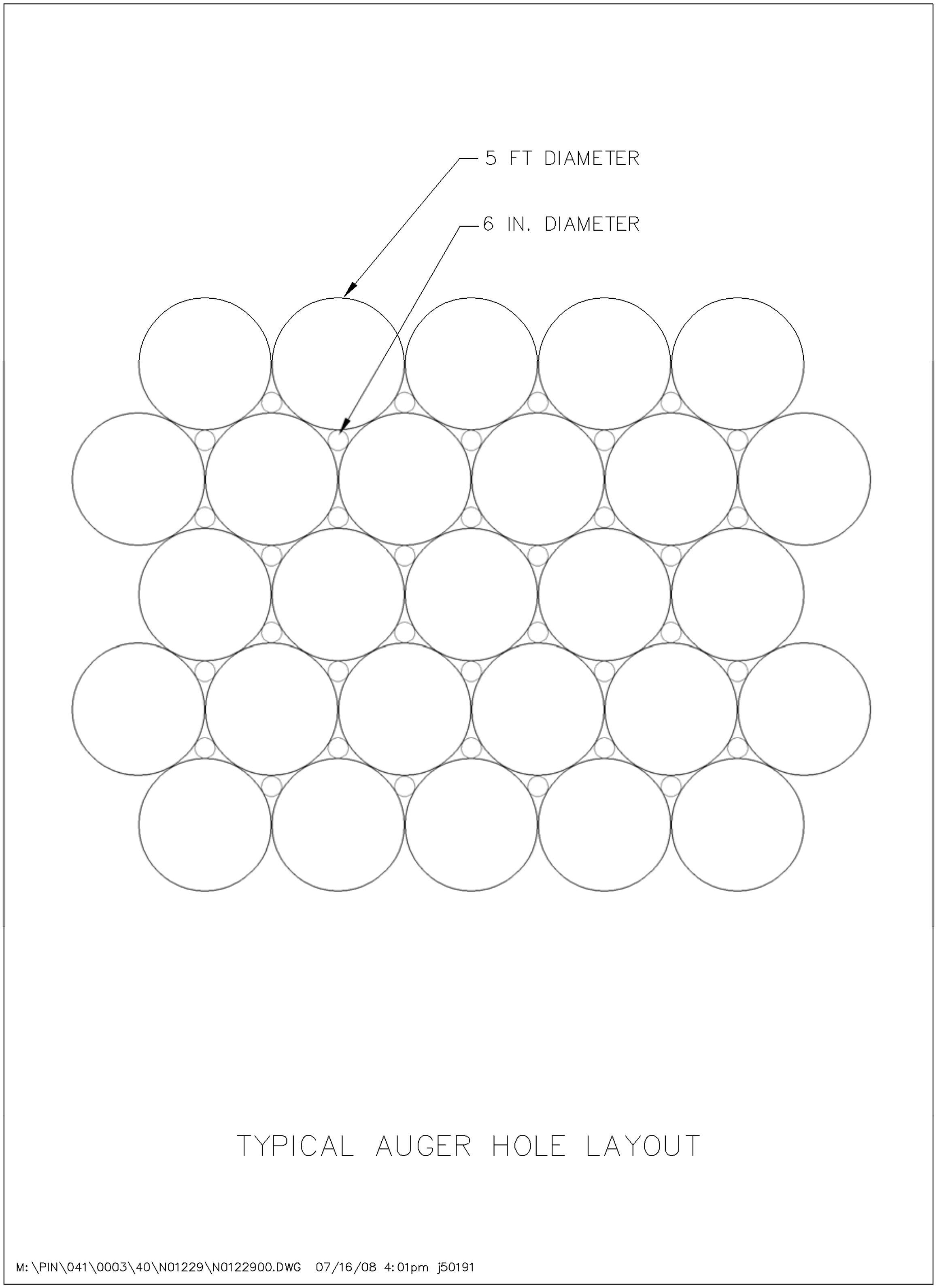


Figure 17. Typical Auger Hole Layout

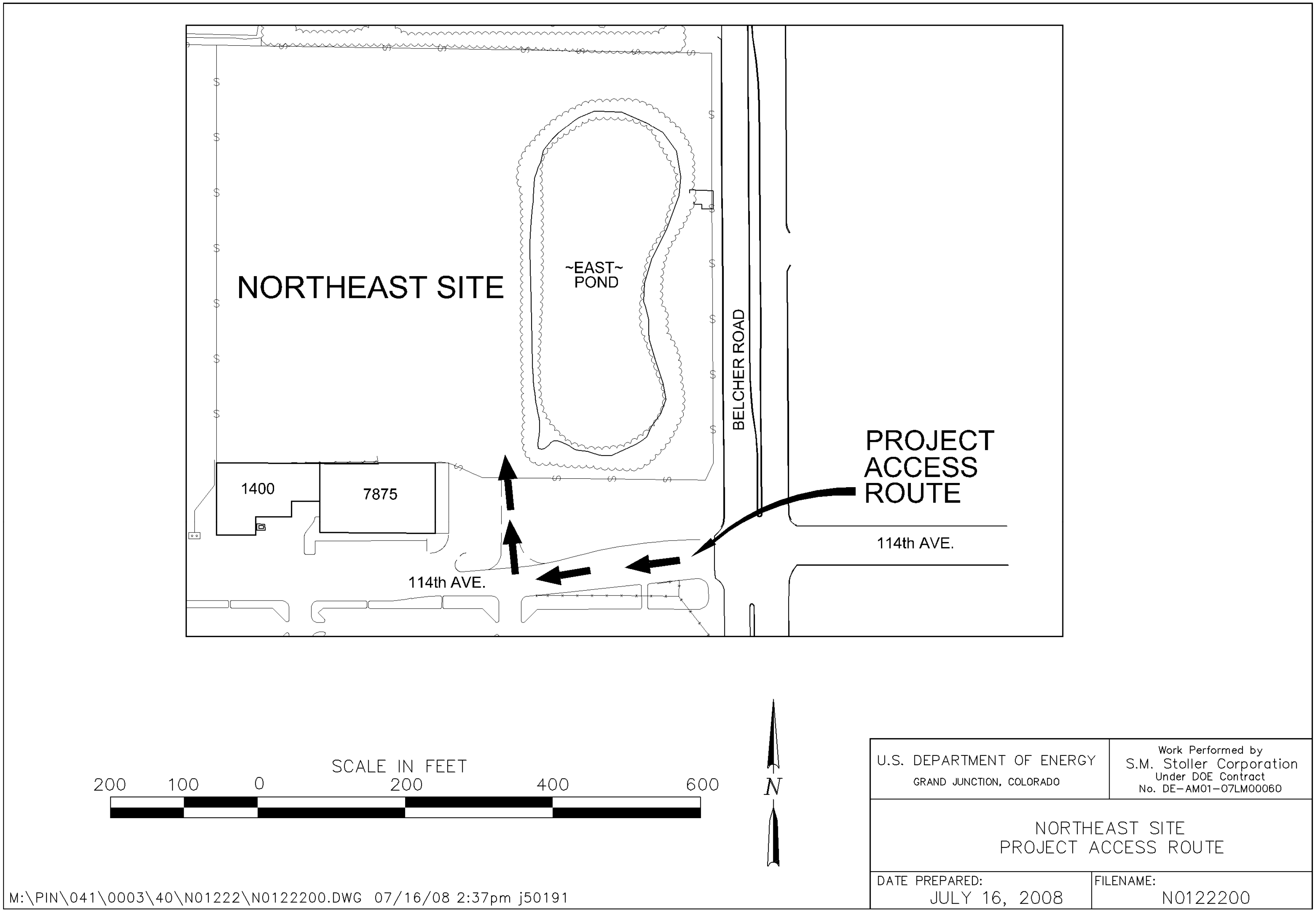


Figure 18. Source Removal Access/Haul Route

Table 1. Summary of Data for Detected Analytes
Table is arranged by frequency of detection. Concentrations in µg/kg. Duplicate samples were not included in the values in this table. Nondetect values are not included in the statistics.

Analyte	CTL	Maximum Detected Concentration	Average Detected Concentration	Median Detected Concentration	Number of Detections Out of 754 Samples	Number of CTL Exceedances Out of 754 Samples	Location of Maximum Concentration	Depth of Maximum Detected Concentration (ft bls)
cis-1,2-Dichloroethene	4,000	28,000	1,227	110	564	48	SB264	32
Toluene	5,000	60,000	5,485	110	423	58	SB0587NW	26
Vinyl chloride	70	6,300	279	20	250	64	SB230	26
Trichloroethene	300	1,500,000	13,040	51	235	75	SB267	29
Methylene chloride	200	920	25	3	181	2	SB270	30
Benzene	70	270	20	4	133	8	SB251	26
trans-1,2-Dichloroethene	7,000	490	20	2	83	0	SB251	22
Ethylbenzene	6,000	3,000	119	3	76	0	SB0587NW	26
o-Xylene	2000[a]	970	65	4	70	0	SB0589SW	32
m,p-Xylene	2000[a]	8,700	489	13	64	4	SB0587NW	26
1,1-Dichloroethene	600	500	36	2	62	0	SB264	32
Trichlorofluoromethane	330,000	8	3	2	36	0	SB267	5
Tetrachloroethene	300	14,000	1,075	88	33	10	SB0587NW	26
1,2-Dichloroethane	100	760	150	23	11	4	SB271	30
1,1,1-Trichloroethane	19,000	1	1	1	2	0	SB270	25
1,1,2-Trichloroethane	300	2	1	1	2	0	SB246	15
Chloroform	4,000	1	1	1	1	0	SB203	17
Bromomethane	300	2	2	2	1	0	SB245	36
1,1-Dichloroethane	4,000	5	5	5	1	0	SB224	4
1,4-Dichlorobenzene	22,000	1	1	1	1	0	SB259	25

[a]2,000 µg/kg is the CTL for total xylenes

Table 2. Source Area Intervals, Depth to Hawthorn, and Soil Disposal Designation

Soil Boring ID	Excavation Cell Number	Source Interval Top (ft bls)	Source Interval Bottom (ft bls)	Depth to Hawthorn (ft bls)	Predicted Soil Disposal Designation
North Area					
PIN15–SB0589NW	N-1	29	37	29	Nonhaz
PIN15–SB0589NE	N-2	24	33	28	Haz <UTS
PIN15–SB204	N-3	27	39	32	Haz <UTS
PIN15–SB0589SW	N-4	24	35	29	Haz <UTS
PIN15–SB0589SE	N-5	24	35	29	Nonhaz
PIN15–SB206	N-6	24	40	30.5	Nonhaz
PIN15–SB213	N-7	9	25	30.5	Nonhaz
PIN15–SB208	N-8	26	34	30	Nonhaz
PIN15–SB211	N-9	25	40	31	Nonhaz
PIN15–SB235	N-10	27	38	31	Nonhaz
PIN15–SB0587NW	N-11	17	35	30	**Haz >UTS**
PIN15–SB0587NE	N-12	15	34	30	Nonhaz
PIN15–SB216	N-13	21	35	31	Nonhaz
PIN15–SB239	N-14	19	32	28	Nonhaz
PIN15–SB238	N-15	26	35	31	Nonhaz
PIN15–SB237	N-16	24	40	32	Nonhaz
PIN15–SB218	N-17	10	40	31	Nonhaz
PIN15–SB0587SW	N-18	8	32	30	**Haz >UTS**
PIN15–SB0587SE	N-19	12	30	29	Haz <UTS
PIN15–SB219	N-20	15	40	33	Nonhaz
PIN15–SB240	N-21	19	31	30	Nonhaz
PIN15–SB222	N-22	14	40	32	Haz <UTS
PIN15–SB221	N-23	8	35	30	Nonhaz
PIN15–SB241	N-24	18	33	32	Nonhaz
PIN15–SB249	N-25	20	34	31.5	Nonhaz
PIN15–SB250	N-26	15	39	30.5	Nonhaz
PIN15–SB244	N-27	19	37	32	Nonhaz
PIN15–SB243	N-28	15	40	30.5	Nonhaz
PIN15–SB252	N-29	25	33	30.5	Nonhaz
PIN15–SB251	N-30	13	35	30.5	Haz <UTS
PIN15–SB255	N-31	27	35	29.5	Nonhaz
PIN15–SB269	N-32	20	39	31	Haz <UTS
PIN15–SB257	N-33	24	40	34	Nonhaz
PIN15–SB268	N-34	20	35	31	Nonhaz
PIN15–SB267	N-35	20	39	30	**Haz >UTS**
PIN15–SB264	N-36	15	40	32	**Haz >UTS**
PIN15–SB258	N-37	23	36	32	Haz <UTS
PIN15–SB259	N-38	25	37	33	Nonhaz
PIN15–SB260	N-39	32	39	32	Nonhaz
PIN15–SB270	N-40	25	35	33	Nonhaz
PIN15–SB266	N-41	20	40	33.5	Haz <UTS
PIN15–SB265	N-42	0	39	32.5	Nonhaz

Table 2 (continued). Source Area Intervals, Depth to Hawthorn, and Soil Disposal Designation

Soil Boring ID	Excavation Cell Number	Source Interval Top (ft bls)	Source Interval Bottom (ft bls)	Depth to Hawthorn (ft bls)	Predicted Soil Disposal Designation
South Area					
PIN15–SB233	S-1	29	40	30	Nonhaz
PIN15–SB225	S-2	20	40	30.5	Nonhaz
PIN15–SB0586SW	S-3	16	40	28.5	**Haz >UTS**
PIN15–SB0586SE	S-4	24	36	28	Haz <UTS
PIN15–SB228	S-5	29	40	32	Haz <UTS
PIN15–SB227	S-6	32	40	32	Nonhaz
PIN15–SB271	S-7	25	39	33	Nonhaz

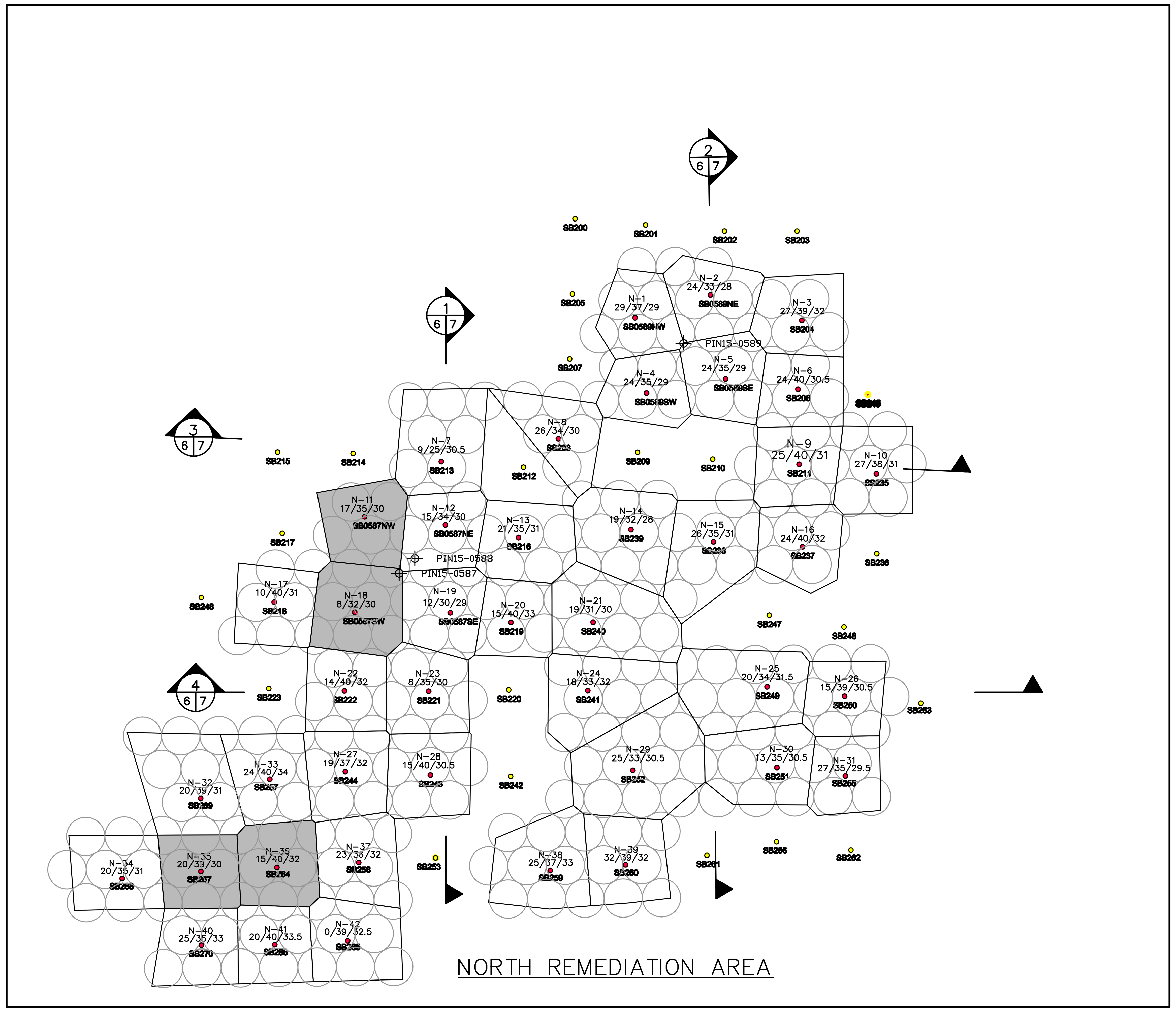
Table 3. Large Diameter Augering Soil Volumes and Weights

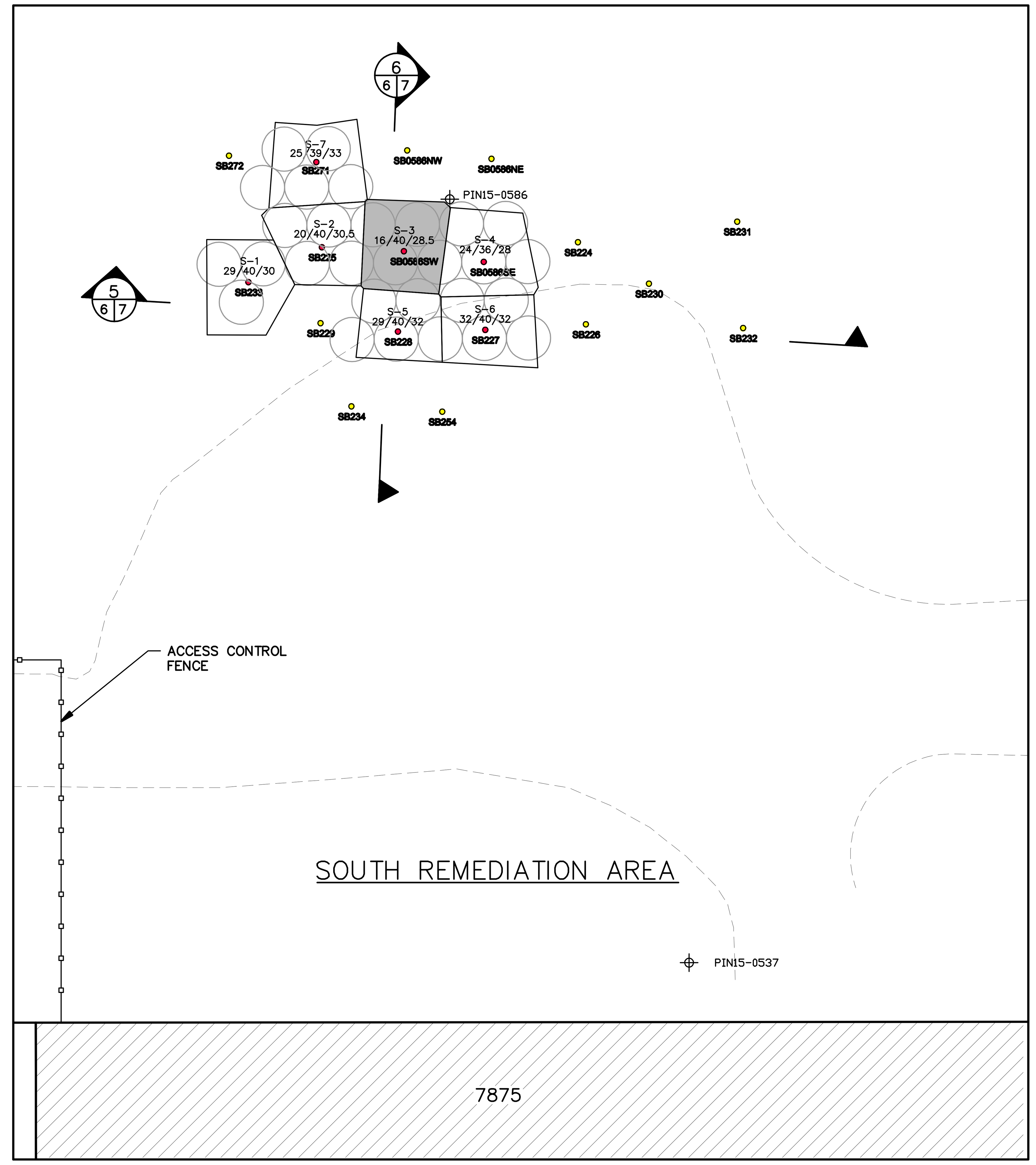
	Total Volumes		
	In-Place Volume B.C.Y.[a]	L.C.Y.[b]	Tons
Nonhazardous			
Surficial Material	**1,480**	**1,850**	**2,098**
Hawthorn Material	**754**	**867**	**1,068**
Total Nonhazardous:	**2,234**	**2,717**	**3,166**
Hazardous <UTS			
Surficial Material	**454**	**567**	**643**
Hawthorn Material	**265**	**305**	**376**
Total Hazardous <UTS:	**719**	**872**	**1,019**
Hazardous >UTS			
Surficial Material	**307**	**383**	**434**
Hawthorn Material	**135**	**156**	**192**
Total Hazardous >UTS:	**442**	**539**	**626**
Total Contaminated Material:	**3,395**	**4,128**	**4,812**
Total Noncontaminated Material:	**4,184**	**5,230**	**5,931**
Total Volume:	**7,579**	**9,358**	**10,743**

[a]Bank cubic yards
[b]Loose cubic yards

Table 4. Interim Action Schedule

Action	Schedule
Regulatory and Permitting	July 1−September 30, 2008
LDA Subcontractor Procurement	June 1−September 30, 2008
Excavation and Soil Disposal	November 2008 to April 2009
Demobilization	May 2009





NORTH REMEDIATION AREA

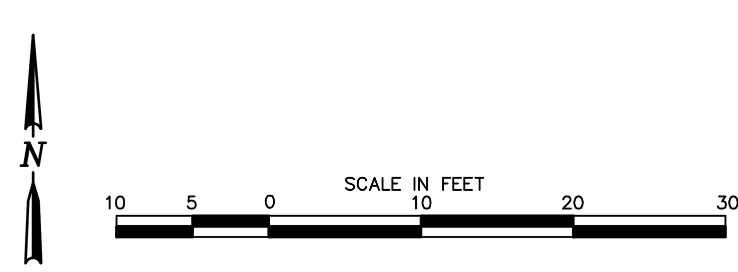
Excavation Cell Number	Source Interval Top (ft bls)	Source Interval Bottom (ft bls)	Depth to Hawthorn (ft bls)	soil disposal designation
N-1	29	37	29	Nonhaz
N-2	24	33	28	Haz < UTS
N-3	27	39	32	Haz < UTS
N-4	24	35	29	Haz < UTS
N-5	24	35	29	Nonhaz
N-6	24	40	30.5	Nonhaz
N-7	9	25	30.5	Nonhaz
N-8	26	34	30	Nonhaz
N-9	25	40	31	Nonhaz
N-10	27	38	31	Nonhaz
N-11	17	35	30	**Haz > UTS**
N-12	15	34	30	Nonhaz
N-13	21	35	31	Nonhaz
N-14	19	32	28	Nonhaz
N-15	26	35	31	Nonhaz
N-16	24	40	32	Nonhaz
N-17	10	40	31	Nonhaz
N-18	8	32	30	**Haz > UTS**
N-19	12	30	29	Haz < UTS
N-20	15	40	33	Nonhaz
N-21	19	31	30	Nonhaz
N-22	14	40	32	Haz < UTS
N-23	8	35	30	Nonhaz
N-24	18	33	32	Nonhaz
N-25	20	34	31.5	Nonhaz
N-26	15	39	30.5	Nonhaz
N-27	19	37	32	Nonhaz
N-28	15	40	30.5	Nonhaz
N-29	25	33	30.5	Nonhaz
N-30	13	35	30.5	Haz < UTS
N-31	27	35	29.5	Nonhaz
N-32	20	39	31	Haz < UTS
N-33	24	40	34	Nonhaz
N-34	20	35	31	Nonhaz
N-35	20	39	30	**Haz > UTS**
N-36	15	40	32	**Haz > UTS**
N-37	23	36	32	Haz < UTS
N-38	25	37	33	Nonhaz
N-39	32	39	32	Nonhaz
N-40	25	35	33	Nonhaz
N-41	20	40	33.5	Haz < UTS
N-42	0	39	32.5	Nonhaz

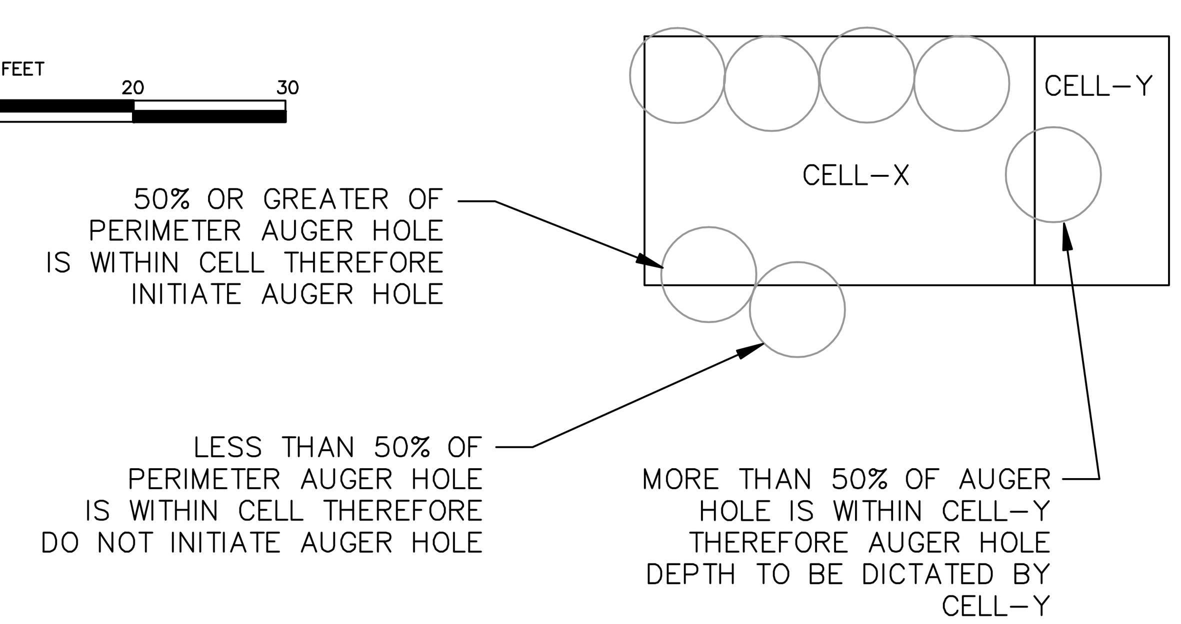
SOUTH REMEDIATION AREA

Excavation Cell Number	Source Interval Top (ft bls)	Source Interval Bottom (ft bls)	Depth to Hawthorn (ft bls)	soil disposal designation
S-1	29	40	30	Nonhaz
S-2	20	40	30.5	Nonhaz
S-3	16	40	28.5	**Haz > UTS**
S-4	24	36	28	Haz < UTS
S-5	29	40	32	Haz < UTS
S-6	32	40	32	Nonhaz
S-7	25	39	33	Nonhaz

LEGEND

- Source Removal Area Boundary
- SB072 — Soil Boring ID
- Primary Source Contaminant Exceeds CTL
- Primary Source Contaminant Detected, but does not exceed CTL
- Primary Source Contaminant not Detected
- (23/35/30) — Source Removal Area Top (ft.) / Source Removal Area Bottom (ft.) / Depth to Hawthorn (ft.)
- E-23 — Cells Label
- Cells Containing RCRA Hazardous Waste > UTS
- Fence
- Property Line





NOTE:

AUGER HOLE PLAN SHOWN BASED ON HYPOTHETICAL 5' DIAMETER AUGER HOLES WITH 1.5' DIAMETER INTERMEDIATE HOLES. SUBCONTRACTOR PROPOSED PLAN SHALL PROVIDE LAYOUT WIYH 95% SOURCE REMOVAL.

REVISION NO.	DATE	DESCRIPTION	DRAWN BY	CHECKED BY	PROJECT A/E	APPROVAL
1	7/14/08	ADDITIONAL AREAS PER PHASE IV SOIL BORING'S	CJW	MWM	M. Madril	JD

U.S. DEPARTMENT OF ENERGY
GRAND JUNCTION, COLORADO

Work Performed by
S.M. Stoller Corporation
Under DOE Contract
No. DE-AM01-07LM00060

PROJECT LOCATION: Young-Rainey STAR Center LARGO, FLORIDA

REFERENCE: REFERENCE NAMES HERE

APPROVALS	DATE
DRAWN BY: J. WHITNEY	6/17/08
ENGINEER: M. MADRIL	6/17/08
PROJECT ENGINEER: M. MADRIL	6/17/08
APPROVED BY: J. DANIEL	6/17/08
PROJECT MANAGER: J. DANIEL	6/17/08
DOE CONCURRENCE: (SEE RECORD)	

4.5 ACRE SITE / NORTHEAST SITE
SOURCE REMOVAL

PLATE 1
NORTHEAST SITE
LDA LAYOUT

PROJECT NO. PIN-041-0003-40-000
DRAWING NO. N01223-R01-C05-D+

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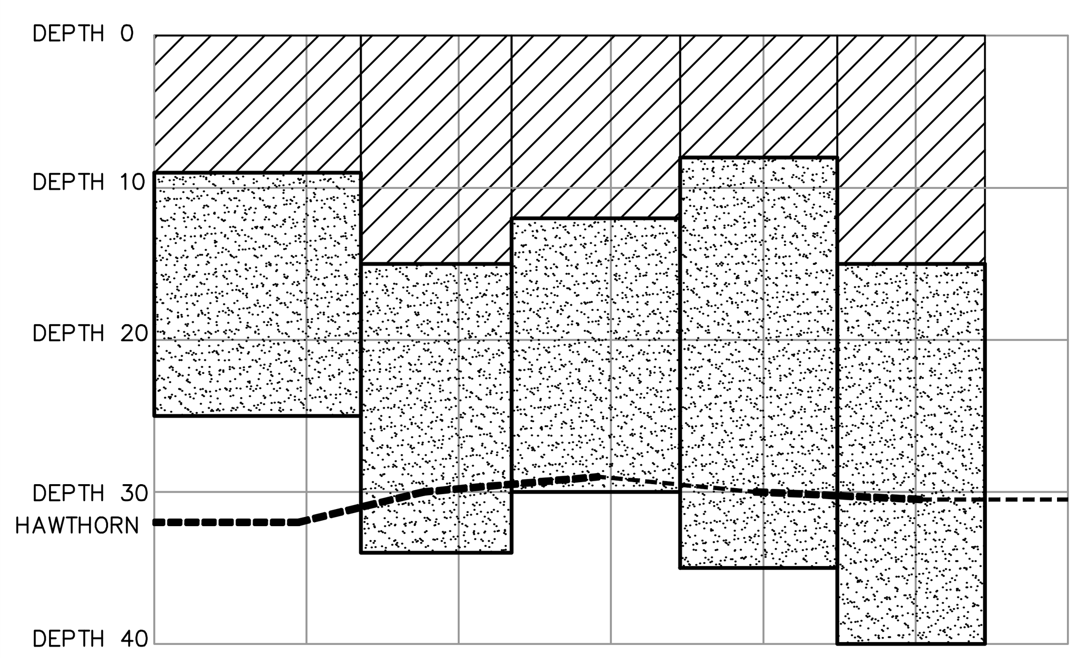
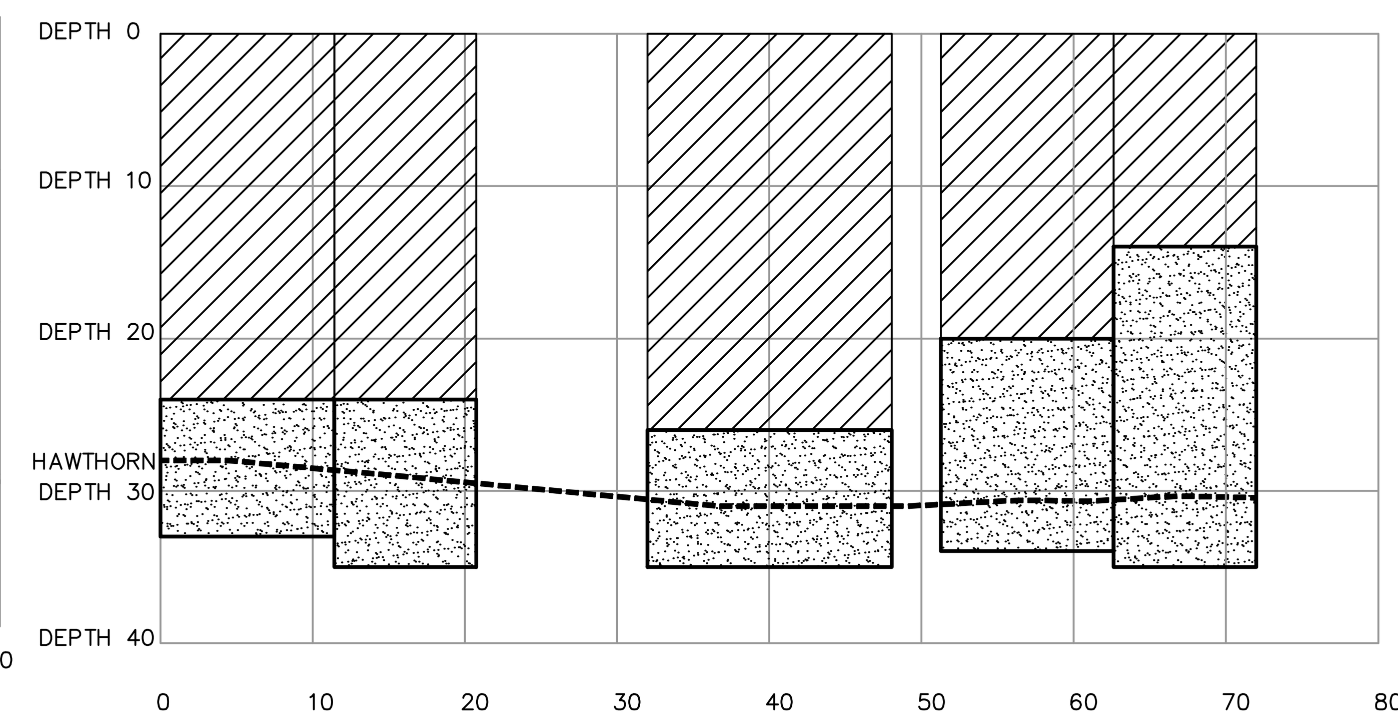
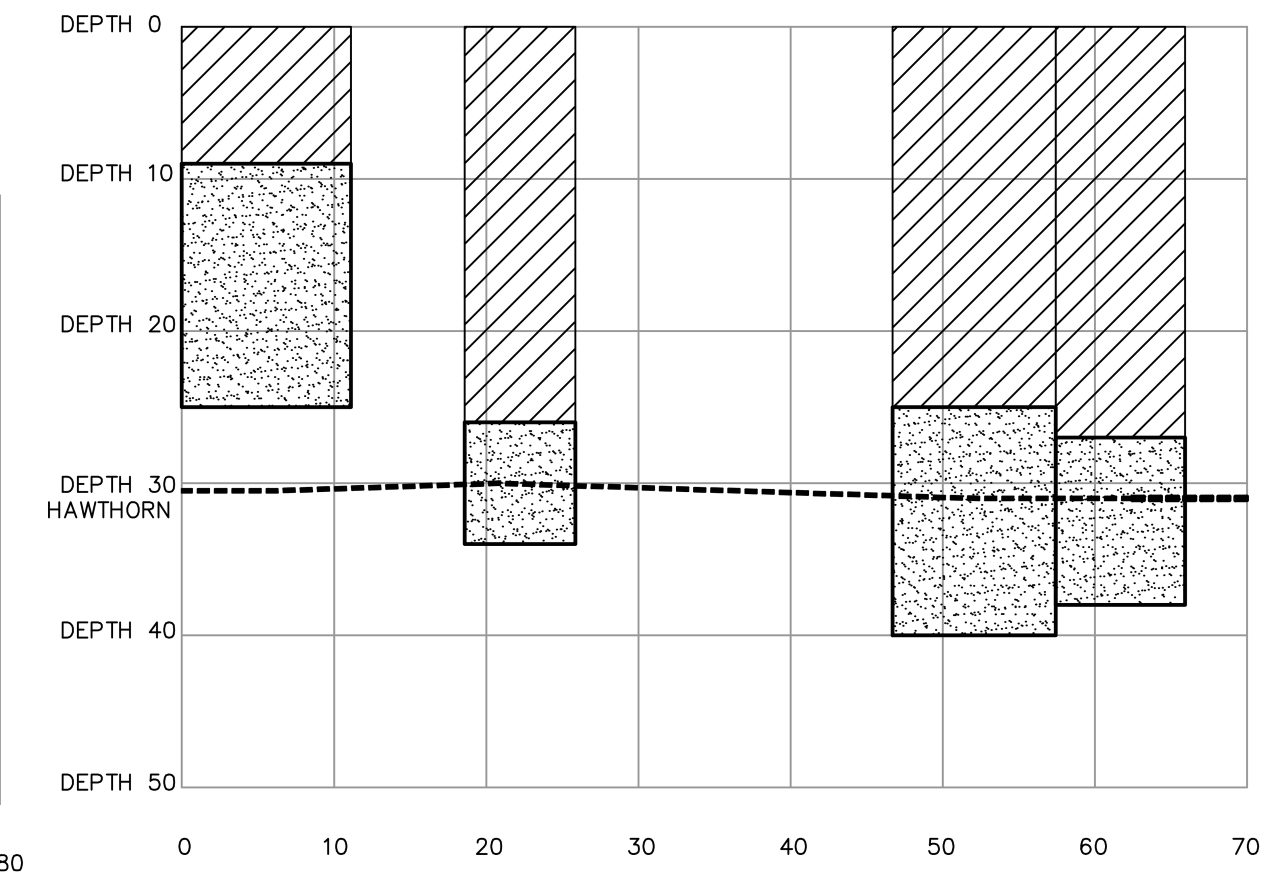


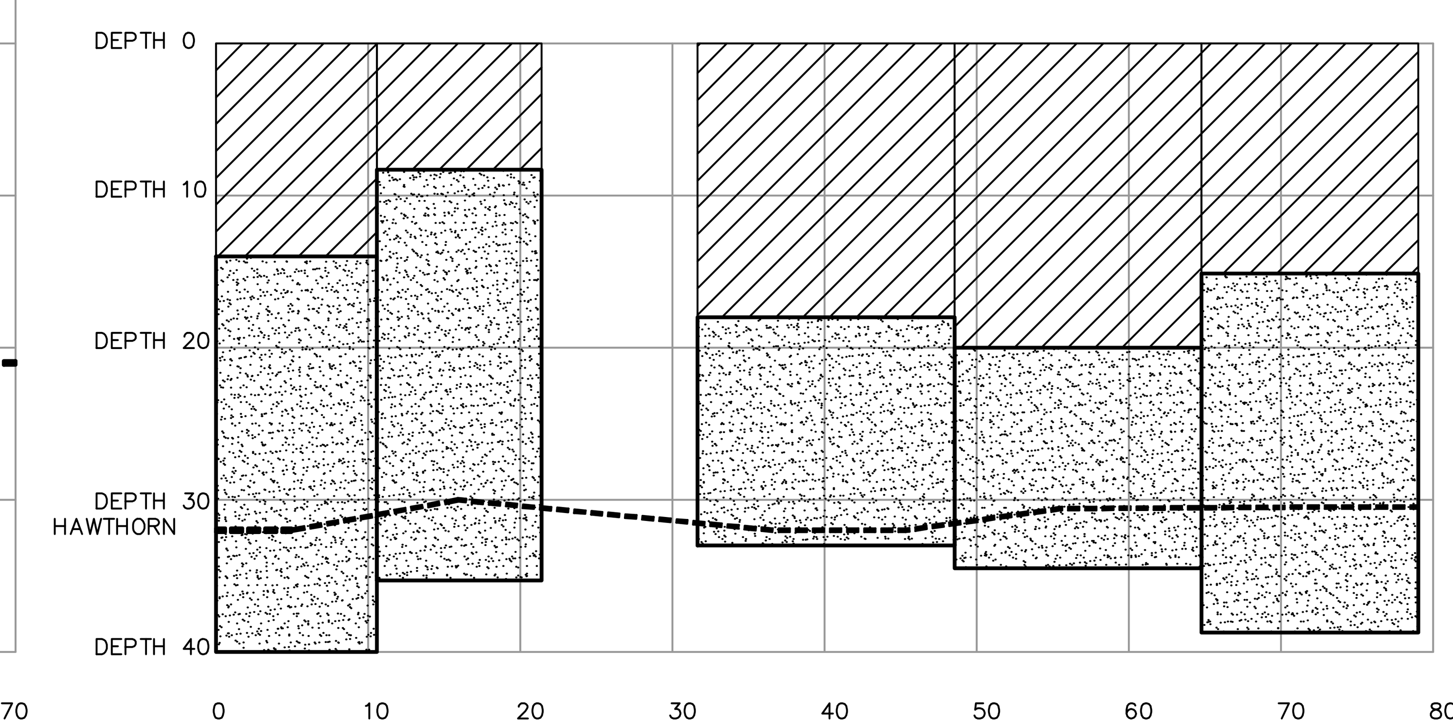
1 6|7 SECTION
SCALE: VERT. 1"=10'
HORIZ. 1"=10'



2 6|7 SECTION
SCALE: VERT. 1"=10'
HORIZ. 1"=10'

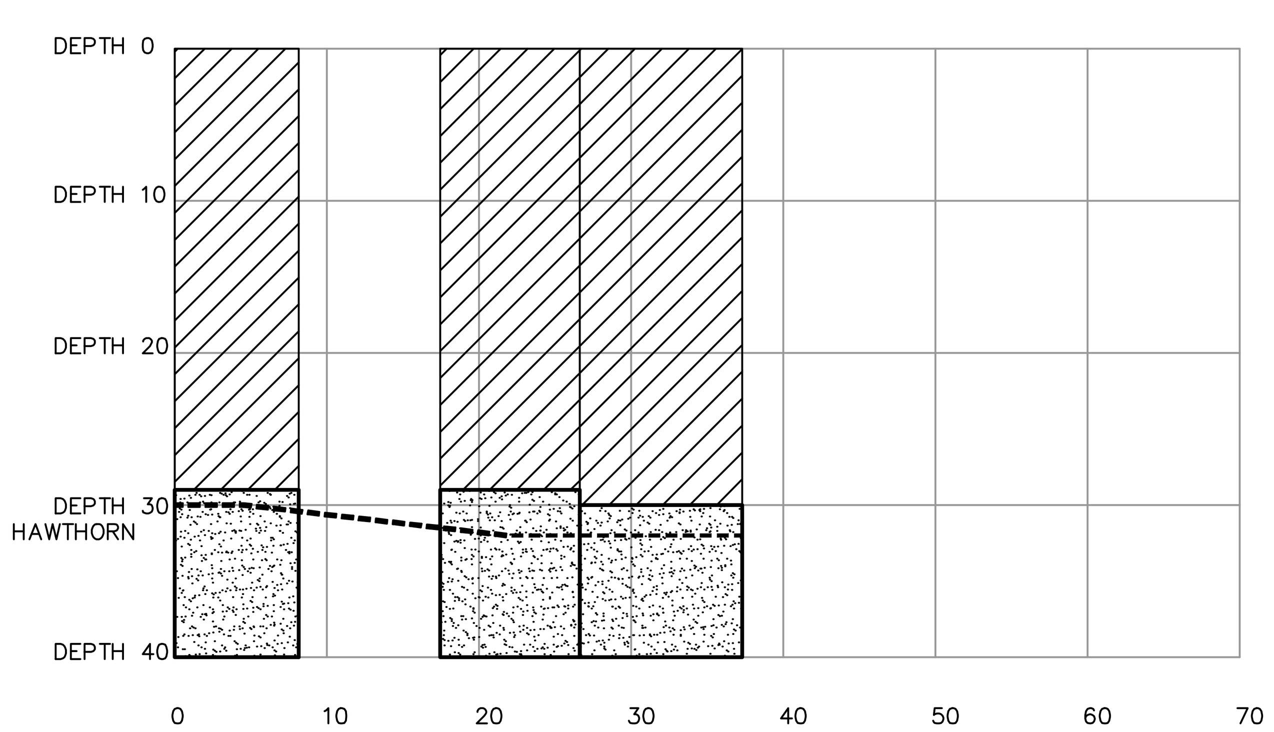


3 6|7 SECTION
SCALE: VERT. 1"=10'
HORIZ. 1"=10'

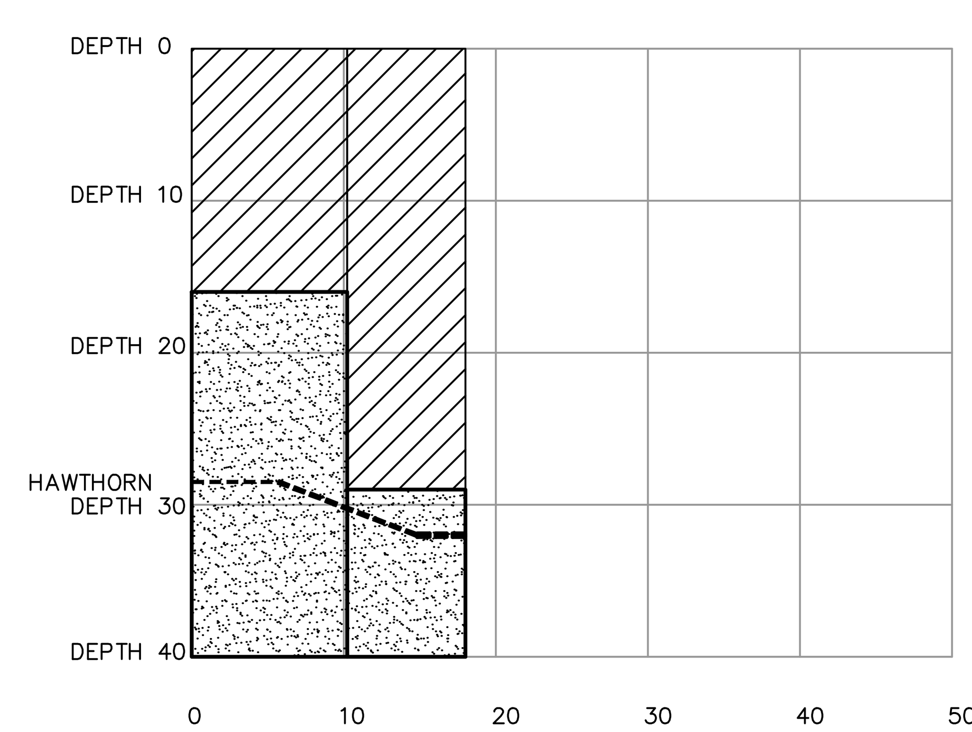


4 6|7 SECTION
SCALE: VERT. 1"=10'
HORIZ. 1"=10'

NORTH REMEDIATION AREA



5 6|7 SECTION
SCALE: VERT. 1"=10'
HORIZ. 1"=10'



6 6|7 SECTION
SCALE: VERT. 1"=10'
HORIZ. 1"=10'

SOUTH REMEDIATION AREA

NOTE:

1. CROSS-SECTIONS REPRESENT CLEAN MATERIAL AND CONTAMINATED MATERIAL AT CELLS NOT AUGER HOLES.

LEGEND

NON-CONTAMINATED AREA
SOURCE REMOVAL AREA
HAWTHORN FORMATION INTERFACE
E-1 CELL LABEL
SW-1 CELL LABEL

REVISION NO.	DATE	DESCRIPTION	DRAWN BY	CHECKED BY	PROJECT A/E	APPROVAL

U.S. DEPARTMENT OF ENERGY
GRAND JUNCTION, COLORADO

Work Performed by
S.M. Stoller Corporation
Under DOE Contract
No. DE-AM01-07LM00060

PROJECT LOCATION
Young-Rainey
STAR Center
LARGO, FLORIDA

REFERENCE

APPROVALS	DATE
DRAWN BY: J. WHITNEY	6/17/08
ENGINEER: M. MADRIL	6/17/08
PROJECT ENGINEER: M. Madril	6/17/08
APPROVED BY: J. DANIEL	6/17/08
PROJECT MANAGER: J. DANIEL	6/17/08
DOE CONCURRENCE: (SEE RECORD)	

4.5 ACRE SITE / NORTHEAST SITE
SOURCE REMOVAL

PLATE 2
NORTHEAST SITE, LDA REMOVAL, CROSS-SECTIONS

PROJECT NO. PIN-041-0003-40-000
DRAWING NO. N01224-R00-C06-D+

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