GROUNDWATER MONITORING NETWORK EVALUATION
Existing CCR Landfill
Rockport Plant
Indiana-Michigan Power Company
Rockport, Indiana

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1.0 OBJECTIVE

This Groundwater Monitoring Network Evaluation Report has been prepared by Amec Foster Wheeler Environment & Infrastructure, Inc. (Amec Foster Wheeler), on behalf of American Electric Power (AEP), to document the results of the monitoring well network evaluation conducted for the Ash Landfill at the Rockport Plant in Rockport, Indiana. The Groundwater Monitoring Network Evaluation was conducted to evaluate the adequacy of the existing monitoring well network and, if applicable, to make recommendations for additional well installations.

Specifically, the existing monitoring well network at the Ash Landfill was evaluated for compliance with the coal combustion residuals (CCR) Final Rule issued by the U.S. Environmental Protection Agency (USEPA) on 17 April 2015. Regulations pertaining to Groundwater Monitoring and Corrective Action are contained in the Code of Federal Regulations (CFR) 40 CFR 257.90 through 98. The focus of this evaluation was on §257.91 (Groundwater Monitoring Systems).

2.0 BACKGROUND INFORMATION

2.1 Facility Location and Description

The Rockport Power Plant is located in southwest Indiana (**Figure 1**) in Spencer County, on property extending into three Townships: Ohio, Hammond and Grass. The plant is situated on the north bank of the Ohio River, just northeast of the intersection of State Route (SR) 66, and United States (US) Highway 231. SR 66 runs along the river between the Town of Grandview (about 1.5 miles to the east) and the City of Rockport (about 1 mile to the southwest), and US 231 runs south from Interstate 64 (about 20 miles north of the plant), crossing the Ohio River into Kentucky via the William H. Natcher Bridge just southwest of the Power Plant.

The site is owned and operated by Indiana-Michigan Power Company, a regional unit of AEP. The property was developed in the late 1970s and early 1980s. The facility consists of two coal-fired 1,300-megawatt (MW) power generating units. The first unit went into operation in December 1984, and the second in December 1989. The facility has two existing CCR storage/disposal units consisting of the ash landfill located north-northeast of the generating plant, and two adjacent bottom ash (BA) ponds located just south of the generating plant at the north end of a wastewater pond complex. The general layout of the property and the locations of the CCR units are shown on **Figure 2**.

The following description of CCR generation and handling processes at the Rockport Plant is summarized from a letter sent by AEP to the Indiana Department of Environmental Management (IDEM) on 6 May 2009:

> The plant burns about 9-10 million tons of coal per year. The coal, delivered by barge, is off-loaded to the coal storage yard then transported by conveyor into one of the two generating units, where it is pulverized to a powder then injected and burned. The heat produced in burning coal converts water to steam used to drive the turbine generators which produce electricity. The burning of coal produces two types of ash - fly ash and bottom ash. The Rockport Plant produces about 400,000 tons of fly ash and 140,000 tons of bottom ash per year.

Fly ash is the fine particulate matter entrained in the hot flue gases. To remove the fly ash prior to the gases exiting through the plant stack, the flue gas is routed through an electrostatic precipitator (ESP), where the ash particles adhere to electrically charged plates. Mechanical rappers knock the fly ash off the plates down into a series of collection hoppers. From the hoppers, the fly ash is pneumatically conveyed to a storage silo. From the silo, the ash is either loaded dry into closed trucks and shipped offsite for various uses, or conditioned with a small quantity of water and hauled by truck to the onsite landfill for disposal.

Bottom ash (BA) includes the heavier coal ash particles that fall to the bottom of the steam generator and are collected into refractory-lined hoppers. The hoppers are kept full of water to protect the lining and break the fall of large pieces of hot slag which shatter upon contact with the relatively cool water. From the hoppers, the BA-water mixture is routed to a crusher station where the ash is crushed to a size suitable for pumping. The BA is then pumped to one of the BA ponds located in the wastewater pond complex, where it precipitates out and can be reclaimed after the pond is drained.

2.2 Description of CCR Unit

2.2.1 General

The CCR unit referred to as the Ash Landfill, or Landfill, is located about 8,000 feet (1.5 miles) northeast of the generating plant. **Figure 3** shows the general layout of the landfill and the monitoring well locations, using the U.S. Geological Survey (USGS) topographic quadrangle map of 1964 (photorevised 1982) as a base. **Figure 4** is a topographic map for the whole plant area.

In March 1984, AEP submitted an application to develop 606 acres in the northern portion of the property for CCR disposal, including 460 acres for fly ash disposal (Storage Area 1) and 146 acres for bottom ash disposal (Storage Area 2). The Indiana Environmental Management Board (precursor agency to IDEM) issued a permit to construct in August 1985, and an operating permit (Facility Permit FP 74-2) in July 1987.

Because the bottom ash produced by the plant has been sold or used onsite for beneficial reuse purposes since the plant started operation, the portion of the property reserved for bottom ash storage and/or landfilling (Area 2) has never been used. The 1984 Permitted Boundary shown on the figures in this report includes only Area 1, the 460-acre area reserved for fly ash disposal. That area is transected by a north-south power line right-of-way (ROW). The area east of the ROW (Storage Area 1A) includes both closed and currently active portions of the fly ash landfill. The area to the west of the ROW has not been used for landfilling, but includes support facilities for the active landfill, including an office trailer, stockpile areas, leachate storage and ponds and a NPDES discharge structure.

The fly ash landfill is currently permitted by IDEM Office of Land Quality, Solid Waste Permits Section, as a Restricted Waste Site (RWS) under Indiana Administrative Code (IAC) 329 Title 10 (Solid Waste Landfill Disposal Facilities) Rule 9-4. A Restricted Waste Site may accept only one type, or related types, of waste. The waste is classified according to the results of certain leaching tests for specific parameters specified in the regulation. Classifications range from Type I (highest leachate concentrations) to Type IV (lowest leachate concentrations), and the landfill

requirements (including liner system and leachate handling requirements) are determined according to the waste class. The active landfill is permitted as a Restricted Waste Site Type I. The permit was most recently renewed on 10 February 2015, and expires on 11 February 2020. A copy of the permit is provided in **Appendix A**.

2.2.2 Surface Water and Leachate Control

As shown on the topographic maps in **Figures 3 and 4**, the original topography of the fly ash storage area was relatively flat, with grade elevations between 390 and 395 feet above Mean Sea Level (MSL, equivalent to the National Geodetic Vertical Datum of 1929, or NGVD29). Beyond the permitted boundary, the original topographic relief rose gently to the north-northwest, and more steeply toward hills to the northeast and northwest.

Stormwater from the landfill area is directed to perimeter drainage systems. The northeast, north and northwest perimeter of the landfill site is drained by Shafer Drain, part of a former agricultural drainage system that flows to Honey Creek southwest of the landfill. A perimeter ditch on the southeast landfill boundary also drains southwest to Honey Creek. Honey Creek flows southeast across the plant property to the Ohio River.

Leachate from the landfill cells is collected in lined ponds located north and west of the active landfill area. Prior to discharge, the leachate is transferred to the Leachate Treatment Pond (north of the West Leachate Pond), where it is diluted with well water from supply well PW-7. The effluent from the Leachate Treatment Pond is discharged and monitored under National Pollution Discharge Elimination System (NPDES) Permit No. IN0051845 at Station 002.

2.2.3 Construction and Operational History

Construction on the original fly ash landfill, located in the northeast portion of the permitted area (Area 1), was conducted between 1985 and 1987. In the early years of operation, much of the fly ash generated at the plant was beneficially reused (primarily for Ready-Mix concrete production), and filling of the landfill proceeded more slowly than anticipated at the time of permitting.

The original landfill cells were constructed on the east end of the permitted area, from north to south, with final cover being placed over the cells in this area (showed as Closed Landfill on the figures in this report) between 2000 and 2007. After 2007, expansion of the landfill continued into the southeast section of the area shown as the Active Landfill on the figures.

The ash that was landfilled originally (in the late 1980s and early 1990s) was generated from combustion of fuel high in western coal (relative to eastern coal), and was classified as Type II. This waste had very low permeability, and (consistent with the permit) was placed in cells lined with 5 feet of clay soil (either native in-situ soil or from borrow areas) having an average bulk permeability of 10^{-6} centimeters per second (cm/sec) or less. No leachate collection system exists between the CCR and the liner in the original landfill cells. Runoff from the cells was collected in a central pond west of the original landfill and within the currently active landfill area, and transferred from there to the leachate treatment pond for discharge via NPDES Station 002. In

2014, the original leachate collection pond in the active landfill area was removed and replaced with the perimeter leachate collection ponds (north and west).

Over a period of years after the mid-1990s, the chemistry of the fly ash changed due to changes in the sources of coal used for combustion at the plant, as well as the introduction of new materials used for emissions controls after 2007 (including sodium bicarbonate used for sulfur dioxide removal in a dry sorbent system, and granular activated carbon used for mercury removal). The landfill was reclassified as a Type I landfill through a permit modification approved by IDEM in August 2012. Under the modified permit, new cells are lined with a composite liner consisting (from the bottom up) of: 2 feet of clay with a bulk permeability of 10^{-7} cm/sec or less, a 30-mil PVC synthetic liner, and 2 feet of bottom ash containing a piping network for leachate collection. In some cells, bottom ash (which is still classified as a Type II waste) is also being placed below the composite liner to raise the subgrade level, to allow gravity drainage of the leachate collection system to the collection ponds. Current landfill construction is proceeding according to the design in the modified permit, *Fly Ash Landfill Redesign Construction Drawings, Storage Area 1A, RKP Permit #FP-74-2* prepared by Terracon and dated February 2012 (Terracon 2012).

2.2.4 Area/Volume

The total area inside the 1984 permit boundary for Area 1 is approximately 460 acres. The latest permit renewal, issued on 15 February 2015, indicates the total permitted landfill area is 554 acres, including 408 acres in Area 1 and 146 acres in Area 2 (the area designated for bottom ash storage). The permitted portions of Area 1 include Area 1A east of the power line ROW (approximately 175 acres), and Area 1B west of the ROW (approximately 233 acres). Area 1A includes the closed landfill area (approximately 41 acres) and the active landfill area (approximately 134 acres). Within the active landfill area, 110 acres have been approved for conversion from a Type II to a Type I RWS.

Based on information provided by AEP, the total permitted volume of landfill space for Type I waste is 10,840,300 cubic yards (CY). The total estimated volume of fly ash disposed in the Type I RWS through December 31 2015 was 324,523 CY, leaving 10,514,777 CY of capacity in Area 1A. Area 1B is expected to be developed for landfilling as Area 1A approaches capacity.

2.3 Previous Investigations

Site investigations were performed on the Plant property in the late 1970s and early 1980s to support design, construction and permitting in advance of plant start-up, which occurred in December 1984.

Specifically for the landfill area, AEP prepared a Landfill Application Package (AEP 1984) containing the methods and findings from a Site Investigation performed in 1983 by AEP Civil Engineering personnel of the northern portion of the plant property, to support permitting of the two CCR stockpile and landfilling areas. A location map and cross-sections as well as a bedrock topography map and a map showing the locations of existing oil and gas wells from that document are provided in **Appendix B**.

In addition, numerous subsequent submittals related to the landfill have been made by AEP to IDEM. These public records, including IDEM responses and notifications, are available for download from IDEM's online Virtual File Cabinet (VFC). They include additional borrow area investigation reports, landfill design submittals, permit modifications, and semi-annual groundwater monitoring reports (GWMRs). While an in-depth review of the totality of these records was beyond the scope of the current study, Amec Foster Wheeler has consulted selected documents available through the VFC for information on the landfill history and current permit status.

Information related to the monitoring wells installed at the landfill was provided to Amec Foster Wheeler by AEP, and construction details for those wells are summarized in **Table 1**. Monitoring well logs are reproduced in **Appendix C**.

2.4 Hydrogeologic Setting

The following sections provide information on the hydrogeologic setting of the AEP Rockport Plant, including climate, physiography and drainage, geology, hydraulic properties of the principal groundwater flow zone, surface water and interactions between surface water and groundwater, and water users.

2.4.1 Climate and Water Budget

The area of Rockport has a continental climate regime. As described by Ray (1965), summers are long hot and humid, and winters are damp and relatively mild, with brief periods of intense cold. Mean monthly temperatures vary from 35 degrees Fahrenheit (ºF) in January to 79ºF in July.

The closest meteorological station with long-term data is Owensboro, Kentucky. Based on National Climatic Data Center (NCDC) data for the period from 1971 through 2000, as reported by the Midwest Regional Climate Center (MRCC, http://mrcc.isws.illinois.edu/), the normal annual precipitation in Owensboro is 45.07 inches. Precipitation is well distributed throughout the year, on average, but can be highly variable from month-to-month. Monthly normal precipitation varies from 2.67 inches in October to 4.66 inches in May. However, monthly extremes during the period from 1928 through 1990 ranged from 0.06 inches in October 1987 to 16.15 inches in March 1964.

Mean annual potential evapotranspiration in Owensboro is between 31 and 33 inches, according to mapped data available from the Kentucky Climate Center (http://www.kyclimate.org/index.html). The adjusted annual potential evaporation estimated in the Landfill Application Package (AEP 1984, Table 10), based on climatic data from Tell City, was 32.22 inches per year. The mean monthly water balance developed for the landfill resulted in the following breakdown (Table 11) for an estimated annual precipitation of 44.27 Inches:

- Surface Runoff – 13.23 inches (30%);
- Actual Evapotranspiration – 25.69 inches (58%);
- Percolation (groundwater recharge) – 5.44 inches (12%).

2.4.2 Regional and Local Geologic Setting

2.4.2.1 Physiography and Drainage

The area of Rockport lies in the western Interior Low Plateau physiographic province of the United States, in a subarea referred to as the Wabash Lowland. It is an area of broad alluviated valleys and dissected uplands of rolling to hilly terrain with gentle slopes and moderate relief (Ray 1965). The topography in the vicinity of the Rockport Plant is shown on the U.S. Geological Survey (USGS) topographic map reproduced in **Figure 4**.

Drainage in the area is provided by the Ohio River, which is adjacent to the plant property on the southeast, is over 2,000 feet wide in the vicinity of the plant, and flows to the southwest toward Owensboro, Kentucky. The plant property slopes gently across a terraced surface from elevations greater than 410 feet on its northern edge, where it is bordered by low hills and an upper terrace, to as low as 390 feet along the top of the bank of the Ohio River. Much of the property is drained by Honey Creek, which flows south-southeast to the Ohio River and is incised down to an elevation of approximately 380 feet. The power generation plant was developed on the portion of the property between US 231 on the west and Honey Creek on the east. It is located on a watershed divide between Honey Creek and an unnamed tributary offsite to the southwest.

The natural topography over most of the property (outside the channel of Honey Creek) prior to development of the power plant consisted of a relatively flat terrace surface marked by east-west oriented crests and swales. Multiple low-gradient drainage ditches crossed the area, connecting the two watersheds (Honey Creek and the watershed to the west). Regrading for development of the power plant and associated facilities (including construction of the wastewater pond complex) disrupted some of the existing natural drainage as well as the man-made drainage that existed on the surface of the terrace and is still depicted on the USGS topographic map in **Figure 4**.

2.4.2.2 Geology

The area of the site lies in the southern portion of a broad shallow downwarp structure referred to as the Illinois Basin (also known as the Eastern Interior Basin), and is underlain by sedimentary bedrock of Pennsylvanian age. The bedrock underlying the site and most of Spencer County is the Pennsylvanian age Raccoon Group, consisting of sandstone and shale with minor amounts of mudstone, coal and limestone (Grove 2006). The rock reported from onsite borings that extended through the unconsolidated overburden into bedrock has been described primarily as shale. The boring for bedrock wells finished at the MW-5 location (at the northeast landfill perimeter) encountered interbedded sandy claystone, sandy shale, limestone, coal and claystone.

The bedrock surface beneath the overburden is uneven, and includes rounded hills, ridges and valleys (draining southeast) representing the erosional surface that existed prior to filling of the valley with glaciofluvial sediments.

The geology of the near-surface unconsolidated Quaternary sediments associated with the Ohio River valley is depicted on the geology map in **Figure 5** (which excludes the far east portion of the Plant property), and described in detail by Ray (1965). These sediments range in thickness from about 20 feet on northern sections of the property, to as much as 130 feet along the Ohio River west of the mouth of Honey Creek. They include windblown sediments (loess) up to 30 feet thick that mantle bedrock on the northeast perimeter of the property, possibly merging with lacustrine deposits in the tributary valley at the northwest corner of the property, and two series of Wisconsin age valley-train deposits (Tazewell and Cary) under most of the property. The valley-train sediments that fill the broad river valley were deposited by meltwater from retreating continental glaciers to the north and northeast, and were subsequently reworked by modern drainage systems, including the Ohio River and the Honey Creek drainage on the plant property.

Generally, the valley train deposits thicken and coarsen to the southeast, from the loess-mantled bedrock hills along the valley wall, toward and beyond the course of the modern Ohio River. In the subsurface, the valley train sediments typically coarsen downward, and can be classified generally into finer-grained sediments near the surface (including silt, sandy silt, silty clay and clay), and coarser-grained sediments (fine to coarse sand and some gravel) at depth.

Interpretive cross-sections of the subsurface were generated by AEP from data collected in the 1983 Site Investigation of the landfill area, and have been included in **Appendix B**. In the report of the Site Investigation included in the Landfill Application Package (AEP 1984), the unconsolidated sediments encountered above bedrock were grouped into four units, described below in descending order:

- Unit No. 1 – surficial silt and clay. This unit was found to be 2 to more than 15 feet thick. The upper section is predominantly silty, sandy clay that is stiff, and of low to medium plasticity. Very fine-grained sand and silt are stratified with the clay toward the bottom of the unit, suggesting a lacustrine depositional environment where these finer-grained deposits are thickest.
- Unit No.2 – well sorted sand. This unit, where present, was found to extend from the bottom of the fine-grained surficial unit to elevations of 373-376 feet. It was found to consist of fine to medium-grained, well-sorted subangular to subrounded quartz sand.
- Unit No. 3 – poorly sorted sand. This lower sand unit, consisting of poorly sorted, very fine to very coarse-grained sand, is the dominant unit between elevations of 373-376 feet and the underlying bedrock, which is typically found at elevations of 290 to 300 feet under most of the property, and at shallower depths in the north and northwest portions.
- Unit No. 4 – sand and gravel. Unit No. 4, consisting of poorly sorted sand, gravel and gravelly sand, was found to be gradational with Unit No. 3, and to occur as lenses within Unit No. 3. Gravel in this unit is subangular to rounded, ranges in size from 3/8 to 1 inch in diameter, and commonly contains coal particles.

2.4.2.3 Hydraulic Properties of Principal Groundwater Flow Zone

The saturated section of the unconsolidated sand and sand and gravel body comprising subsurface Unit Nos. 2, 3 and 4 (as described in the preceding section) makes up the principal groundwater flow zone underlying the site. This zone is hydraulically connected to the Ohio River but the connection is buffered by lower-permeability sediments that line the river bottom. Because of its relatively high permeability and its connection to the Ohio River, this zone represents an aquifer capable of supplying large yields to pumping wells. The depth to water in this zone typically ranges from 20 to 35 feet BGS, and the saturated thickness (which generally increases toward the river) ranges from less than 15 feet to more than 80 feet. Groundwater occurs in this zone under unconfined conditions, or semi-confined conditions where the surficial silt and clay directly overlie the saturated zone.

AEP provided information concerning pumping tests of varying lengths performed in this zone using onsite supply wells, including a pumping test performed in 1977 that was documented in the Landfill Application Package (AEP 1984), a pumping test performed in 2004 at a new supply well installed at the landfill for leachate dilution, and yield tests performed in 2011 and 2012 at two new replacement wells used for fire water supply. Based on the information reviewed, the principal groundwater flow zone underlying the site has a transmissivity ranging from 126,000 to 250,000 gallons per day per foot (gpd/ft), corresponding to 17,000 to 34,000 square feet per day (ft^2/day). The hydraulic conductivity of the formation ranges from 420 to 560 feet per day (ft/day), and the storage capacity (specific yield) ranges from 0.07 to 0.22. Pumping well yields range up to 1,000 gallons per minute (gpm), and specific capacities range from 48 to 121 gpm per foot of drawdown (gpm/ft).

2.4.3 Surface Water and Surface Water-Groundwater Interactions

The Ohio River at Owensboro drains a watershed of 97,000 square miles and the average flow is 121,200 cubic feet per second (cfs), according to Ray (1965). The stage in this section of the river is maintained by a downstream dam in Newburgh, Indiana above a minimum pool elevation of about 357.4 feet MSL (358 feet relative to the Ohio River Datum). The AEP Rockport Plant, located at River Mile (RM) 744-745, is halfway between the Newburgh Dam (RM 776) and the upstream Dam at Cannelton (RM 721). The river level at the Rockport Plant can be estimated by averaging the gauge data reported by the US Army Corps of Engineers (USACE) at Newburgh and Cannelton. A hydrograph (graph of water level over time) of the estimated daily stage in the Ohio River at the Rockport Plant from 2010 through 2015 is provided in **Appendix D-1**.

The water level in the Ohio River typically remains close to pool elevation in the summer and fall, and fluctuates at a relatively high frequency (for a few days to weeks), up to 20 feet above pool elevation, in the winter and spring months. The river stage typically reaches an elevation of 377 feet at least once in most years. The elevation of the 10-year flood is 387.7 feet, the 100-year flood level is 392 feet, and the level of the highest flood of record in the area (the flood of 1937) is 397 feet.

Groundwater levels and gradients in the glaciofluvial (valley train) sediments that fill the valley are strongly influenced by the Ohio River. Under low-water (pool) conditions, groundwater in the sediments flows under a low gradient toward the Ohio River. As the river level fluctuates in winter and spring, groundwater levels fluctuate along with it, although the effects are increasingly dampened with distance from the river. During rapid rises in river level, the groundwater gradient can be temporarily reversed to some distance from the river bank, resulting in excess groundwater being stored in the sediment (bank storage), and then draining slowly back toward the river again as the river stage falls.

2.4.4 Water Users

The Indiana Department of Natural Resources (IDNR) Division of Water maintains an online database of Significant Water Withdrawal Facilities (http://www.in.gov/dnr/water/4841.htm). A Significant Water Withdrawal Facility (SWWF) is defined as a facility that has the capacity to withdraw more than 100,000 gallons per day (gpd) in aggregate from surface water and/or groundwater, through one or more registered "sources" (individual pumping wells or stations). There are 10 SWWFs registered in Spencer County, of which the AEP Rockport Plant has the highest capacity.

2.4.4.1 Onsite Water Use

The main source of water used at the plant is the Ohio River. The plant's registered capacity for surface water is 80,000 gpm. According to the IDNR database, in 2011 the plant's actual average usage of river water was 22.3 million gallons per day (mgd), corresponding to an average surface water withdrawal of 15,500 gpm.

The plant also has seven registered water withdrawal wells. The locations of these supply wells are shown on **Figure 2**. The combined average withdrawal from these wells in 2011 was 0.59 mgd (410 gpm). Information available for the onsite water supply wells is summarized below (withdrawal rates are based on 2011 data available in the IDNR database):

- Wells PW-1 and PW-2 are used for plant potable supply. The combined average withdrawal rate for these two wells is approximately 120 gpm.
- Wells PW-3 and PW-4 are used for fire water supply as well as industrial supply. The combined average withdrawal rate for these two wells is approximately 120 gpm.
- Well PW-5 was installed on the west side of US 231 and was intended to be used for landscape watering around an energy education center constructed by AEP at that location. The well is inactive (no withdrawals since it was installed).
- PW-6 is a well installed immediately west of the active landfill to fill water trucks used for dust control. The average water withdrawal rate for this well is 17 gpm.
- PW-7 is a well installed southwest of the active landfill to provide water for treating landfill leachate prior to discharge, as required under the plant's NPDES permit. The average water withdrawal rate for this well is 39 gpm.

2.4.4.2 Offsite Water Users

The other nine SWWFs in Spencer County include the following:

- The City of Rockport public supply (five wells with a combined capacity of 1,163 gpm).
- The Town of Grandview public supply (two wells with a combined capacity of 970 gpm).
- Reo Water, Inc., public supply for the City of Richland, west of Rockport (five wells with a combined capacity of 1,130 gpm).
- The City of Boonville public supply, northwest of Rockport (four wells with a combined capacity of 2,050 gpm).
- Corn Island Shipyard, a marine barge manufacturer on the Ohio River in Grandview (one well with a capacity of 450 gpm).
- Three agricultural irrigation users (Christmas Lake GC, Loehr Farms and Allen Gray LP II), all located remotely from the AEP Rockport Plant.
- One coal washing operation (Buckhorn Processing) using surface water, located in Lamar, Indiana north-northwest of the AEP Plant.

The Ohio River navigation charts (USACE 2014) show surface water intakes and other major structures along the river. The charts for sections of the river adjacent to and immediately downstream of the AEP Rockport Plant show the industrial intakes for the AEP plant and Rockport Terminals (a coal barging facility), and shoreline facilities in Rockport for one commercial marina, two crushed stone operations, and two loading facilities (ADM and Coal Inland).

3.0 MONITORING NETWORK EVALUATION

3.1 Hydrostratigraphic Units

Based on the available information, two generalized hydrostratigraphic units can be distinguished within the unconsolidated subsurface materials below the AEP Rockport Plant.

The upper unit, consisting of surficial silt and clay (locally containing sand), is typically 8 to 25 feet thick, and is generally not saturated. However, it can serve as a perching layer above which water can accumulate in surface depressions or in more permeable surface fill. Soil sampling and permeability testing performed as part of the 1983 landfill Site Investigation indicates the bulk vertical permeability of the material in this unit is on the order of 10^{-7} to 10^{-6} centimeters per second (cm/sec), or 0.003 to 0.0003 ft/day.

The lower unit extends from the bottom of the surficial silt and clay to the top of bedrock, and consists of granular outwash deposits. These deposits consist primarily of sand, ranging from well-sorted fine sand to poorly-sorted fine to coarse sand, with lenses of gravelly sand and sandy gravel. This unit has an uneven bottom surface, but generally thickens to the southeast, toward the Ohio River. The lower section of this unit is saturated and represents the principal groundwater flow zone beneath the property. The saturated thickness in this unit ranges from less than 15 to more than 80 feet, and the bulk horizontal permeability (hydraulic conductivity) of this unit is on the order of 500 ft/day.

Bedrock underlying the unconsolidated deposits consists predominantly of shale, and is expected to have low permeability. Bedrock in the area of the Rockport Plant does not represent a significant medium for flow or storage of recently recharged (meteoric) groundwater, and is not a reliable source of fresh water supply, relative to the much more available source in the sandy overburden.

3.1.1 Horizontal and Vertical Position Relative to CCR Unit

Stratigraphic information for the area of the landfill is available from the lithologic logs for the monitoring wells (**Appendix C**) as well as the 1983 Site Investigation results illustrated in the maps and cross-sections in **Appendix B**, and several studies of nearby borrow areas.

The interface between the surficial silt and clay and the underlying granular outwash deposits occurs at an elevations of approximately 380 to 382 feet MSL below most of the landfill area (based on the logs for monitoring well locations MW-1, MW-2, MW-3, MW-8, and MW-18), or about 10 to 15 feet below original grade. On the northeast landfill perimeter (at locations MW-15, MW-16 and MW-17), the elevation of the interface is somewhat lower, closer to 370 feet. In a few locations (MW-4, MW-21), the surficial deposits are thin (less than 10 feet) and contain sandy interlayers. Bedrock elevations (at the base of the outwash deposits) rise from 286 to 290 feet at the southeast landfill perimeter to as high as 358 feet (at location MW-14) on the northern perimeter. Essentially, the outwash deposits thin and then pinch out moving northward from the landfill, as bedrock becomes shallower and the unconsolidated deposits overlying bedrock transition from outwash to less permeable terrace, lacustrine and loess deposits. Location MW-5 is located on top of a buried bedrock high, where bedrock is only 21 feet deep, and the overburden consists primarily of silty clay.

From the available documents, it appears that CCR in the closed sections of the landfill was placed close to or slightly below original grade, after removal of the top 1.5 feet of soil (including topsoil), and confirmation that at least 5 feet of in-situ silty clay soil was present. In the active landfill, bottom ash (a Type II waste) is still being placed at grade in some areas to raise the subgrade level for the Type I waste cell liner. A conservative estimate of the lowest elevation of CCR (including both bottom ash and flyash) in the landfill would be 390 feet MSL. The minimum separation between the bottom of the CCR and the underlying outwash deposits is 5 feet, by landfill design. In most locations, at least 10 feet of surficial silt and clay deposits would be expected to underlie the CCR. The outwash deposits underlying the surficial deposits thicken from about 15 feet or less near the northern landfill perimeter to as much as 90 feet at the southern perimeter.

3.1.2 Piezometric Conditions

Groundwater level data are available from piezometric measurements made in the landfill monitoring wells since 1985, and reported to IDEM in semi-annual groundwater monitoring reports (GWMRs). Each GWMR contains a plan sheet with a table summarizing water level and field parameter measurements, and a piezometric contour map (also known as a potentiometric map). Seven piezometric maps from May 2010 through May 2013 are reproduced in **Appendix D-2**

(more recent maps were not available in the IDEM VFC). **Appendix D-3** contains a summary of the piezometric data provided by AEP for the period from November 1992 through May 2015. Hydrographs (graphs of water level elevations over time, by well), for the period from November 1998 through May 2015, are provided in **Appendix D-4**.

A review of the data indicates that water levels in the wells north of the landfill, including MW-9S, MW-10S and MW-5S and 5I (both finished in bedrock at the north perimeter of the landfill) are significantly higher (by 20 to 25 feet) than in the rest of the landfill wells. These three locations are located at the fringes, or outside of, the principal groundwater flow zone (i.e., the sandy outwash deposits).

All of the other wells monitor the principal flow zone that extends under the landfill and thickens to the southeast toward the Ohio River. These wells exhibit relatively low seasonal fluctuations, on the order of 1 to 2 feet, in most years. The long–term amplitude of groundwater level fluctuations under the landfill area is on the order of 6 feet, between elevations of approximately 366 and 372 feet. At its highest level, groundwater below the landfill is approximately 18 feet below the lowest CCR elevation of 390 feet.

The dominant groundwater flow direction under the landfill is to the southeast. Due to the high permeability of this zone, hydraulic gradients are relatively low. The differences in water levels between clustered (shallow/intermediate and deep) wells at a single location is on the order of 0.1 feet or less, indicating almost no vertical gradient. The difference in water level elevations on any one date between upgradient locations at the northern perimeter (MW-14) and in the west (MW-8), and at the downgradient (southern) perimeter (such as MW-1 and MW-21) is on the order of 1 foot (ranging from 0.2 to 1.8 feet). The water level in well MW-12S, approximately 3,000 feet to the southeast of the southern landfill perimeter, is generally lower than in the landfill perimeter wells, ranging from about 0.3 to 2.0 feet lower than in MW-1S. In one event (May 2011), the water level elevation in MW-12S was higher than in the southern perimeter wells. This condition was related to a temporary flow reversal associated with a period of very high river levels, in which the Ohio River had spiked at 387.7 feet (the 10-year flood level) on April 28; this flow reversal was also observed in the wells monitoring the wastewater pond complex farther to the south. As illustrated on the piezometric map for May 2011 (**Appendix D-2**), however, this flow reversal only reached the southern landfill perimeter, and apparently did not propagate under the landfill, where the gradient continued to be southeasterly.

Based on the available data and the analysis described above, a water level elevation of 372 feet can be considered a high groundwater level in the sandy outwash deposits that underlie the active landfill.

3.1.3 Overall Flow Conditions

The principal groundwater flow zone underlying the landfill is the lower overburden unit consisting of granular outwash deposits (sand with some gravel). Recharge into this unit occurs laterally from hills and buried tributary valleys to the north-northwest. Recharge also occurs from the Ohio River to the southeast during relatively brief periods (spikes) of high water level in the river. Areal

recharge also occurs vertically from the surface. The rate of areal recharge varies locally according to the thickness and bulk permeability of the overlying silt and clay unit.

Groundwater flow in this zone is predominantly to the east-southeast, toward the Ohio River. Flow reversals occur during brief periods of high river level, but are temporary and do not extend under the landfill, therefore having no long-term effects on flow or migration of constituents in groundwater.

Supply wells are present to the southwest and west of the active landfill, including nearby wells PW-6 and PW-7. During a pumping test of PW-7 in 2004, in which that well was pumped at a rate of 1001 gpm for a period of 24 hours, significant drawdowns (ranging from 1.3 to 3.4 feet) were produced in nearby monitoring wells MW-18, MW-19 and MW-20. However, in actual operation, this well (like the other onsite supply wells) operates intermittently, and had an average pumping rate of 39 gpm in 2011. The intermittent operation and relatively low flow rates of the onsite pumping wells appear to be insufficient to affect flow directions at significant distances from the pumping centers on a long-term basis. However, during groundwater monitoring in May 2014, it was noted that groundwater flow was being pulled temporarily toward PW-7 due to an unusually high demand and longer-than-normal pump operation in this well. Therefore, temporary flow direction changes could be associated with onsite well operations.

Based on available data, the estimated horizontal average hydraulic gradient (i) beneath the landfill under typical flow conditions is 0.0003 feet/foot, and the hydraulic conductivity (K) is on the order of 500 ft/day. Assuming an effective porosity (n) of 0.20, the average flow velocity (v) through the principal flow zone can be estimated from the Darcy flow equation [v = (Ki)/n] as 0.75 ft/day, or 275 ft/year.

3.2 Uppermost Aquifer

3.2.1 CCR Rule Definition

As defined in the federal CCR Rule (§257.53 Definitions):

- *Aquifer* means a geologic formation, group of formations, or portion of a formation capable of yielding usable quantities of groundwater to wells or springs.
- *Groundwater* means water below the land surface in a zone of saturation.
- *Uppermost aquifer* means the geologic formation nearest the natural ground surface that is an aquifer, as well as lower aquifers that are hydraulically interconnected with this aquifer within the facility's property boundary. Upper limit is measured at a point nearest to the natural ground surface to which the aquifer rises during the wet season.

3.2.2 Identified Onsite Hydrostratigraphic Unit

Consistent with the definition in the CCR Rule, the hydrostratigraphic unit identified as the uppermost aquifer in this case is the saturated granular outwash deposit that underlies the Rockport Plant property including the ash landfill. The top of this unit would be the typical

seasonal high water level of 372 feet, approximately 18 feet below the lowest CCR elevation of 390 feet.

The bottom of the unit would be the top of bedrock. The shale bedrock underlying the granular outwash deposits does not represent a significant groundwater flow zone. The bedrock surface is expected to be irregular, generally sloping to the southeast, and to occur at elevations between 286 feet (at the southern landfill perimeter) and 371 feet (at a localized bedrock high in the vicinity of MW-5). The saturated thickness of this unit, therefore, is expected to range from 1 to 86 feet, thickening to the southeast.

3.3 Review of Existing Monitoring Network

3.3.1 Overview

Monitoring wells have been installed at 19 locations in or close to the landfill over a period of 30 years since the landfill began operations. Of those, two (located in the currently active area) have been abandoned to accommodate landfill expansion. At most locations, more than one well has been installed, most often as separate wells in a vertical cluster to monitor shallow (S), intermediate (I) and deep (D) conditions in the uppermost aquifer. At some locations to the north, northwest and northeast of the landfill, the overburden is thinner, and the saturated thickness is insufficient to accommodate more than one or two vertical levels of groundwater monitoring in the uppermost aquifer.

Well locations are shown on the map in **Figure 3**. The following paragraphs provide a listing of the wells by date of installation, and a summary of current status:

- MW-1S/I/D, MW-2S/I/D, MW-3S/I, MW-4S/I, MW-5S/I, MW-6S, MW-7S/I, MW-8S/I, MW-9S, and MW-10S (a total of 19 wells in 10 locations) were the original wells installed to monitor the landfill in 1984. No logging of subsurface materials was performed at the time of installation. Therefore, at the request of IDEM, stratigraphic borings were drilled near each well cluster in 1999 in order to establish the stratigraphy at each of the original monitoring locations. Of the original 10 well clusters, MW-3S/I and MW-4S/I have been abandoned and replaced with wells to the south. MW-8 is in an upgradient position relative to the other wells. The intermediate level well in the cluster (MW-8I) was added in 1992. The original well (MW-8S) experienced excessive siltation, and was abandoned and replaced with well MW-8SR in 2013. A total of 15 wells in 8 locations remain from this original group.
- MW-11S, MW-12S, MW-13S, MW-14S, MW-15S/I, MW-16S/I/D, and MW-17S/I/D (a total of 11 wells in 7 locations) were installed in 1992, to expand the monitoring network, in the sidegradient (MW-11S, MW-15S/I, MW-16S/I/D, and MW-17S/I/D), upgradient (MW-14S), and remote downgradient (MW-12S, MW-13S) directions.
- MW-18, MW-19, and MW-20 were installed in 2004, primarily for subsurface exploration and to serve as observation wells for the new supply well (PW-7) that was installed at that time. MW-18 is screened near the bottom of the aquifer (deep level), and MW-19 and

MW-20 are screened at the shallow level. They are relatively close together and are treated as a single monitoring location.

- The well cluster MW-21S/I/D was installed in 2009, as a replacement downgradient well location for the MW-3 and MW-4 locations that had to be abandoned due to landfill expansion.

All of these wells are constructed of 2-inch Schedule 40 PVC with factory slotted screens of nominal 10-foot length. Well construction details are summarized in **Table 1**, and well construction logs are provided in **Appendix C**. Well piezometric data are provided in **Appendix D**.

3.3.2 Gaps in Monitoring Network

No gaps have been identified in the existing downgradient monitoring network for the landfill. The following 16 wells at six locations have been designated as downgradient water quality monitoring wells for the landfill going forward: MW-1S/I/D, MW-2S/I/D, MW-15S/I, MW-16S/I/D, MW-17S/I, and MW-21S/I/D. These wells are located closest to the landfill perimeter in sidegradient/downgradient directions, and are spaced 800 to 1,500 feet apart, as approved by IDEM. Based on location and past performance, these wells appear to provide sufficient density of coverage both horizontally and vertically to adequately monitor groundwater passing the waste boundary in the uppermost unit in all potential downgradient flow directions. The other more remote sidegradient and downgradient monitoring wells will continue to be used for piezometric monitoring and preparation of piezometric maps with flow direction arrows.

Currently, AEP uses an intrawell statistical method (approved by IDEM), to establish intrawell prediction limits (IWPLs) for each monitored parameter in each well, and to identify statistically significant increases (SSIs) in concentrations that may occur in individual wells. Using this method, concentration data from upgradient or background wells are not required as part of the analysis. AEP also monitors selected wells (specifically MW-8S, MW-8I and MW-5I) as indicators of water quality in groundwater that is upgradient of, and not impacted by, CCR in the landfill. However, a review of the available monitoring wells in the uppermost aquifer (excluding MW-5S and I, which are screened in bedrock), suggests that the number of upgradient wells available to characterize background groundwater quality could be insufficient for statistical purposes.

4.0 RECOMMENDED MONITORING NETWORK IMPROVEMENTS

4.1 General

In summary, the performance standard for groundwater monitoring systems in the CCR Rule (§257.91) states that the system should consist of a sufficient number of wells, installed at appropriate locations and depths, to yield groundwater samples from the uppermost aquifer that:

- Accurately represent the quality of background groundwater, and
- Accurately represent the quality of the groundwater passing the waste boundary of the CCR unit in the uppermost aquifer, and
- Monitor all potential contaminant pathways.

The following subsections provide recommendations for improvements to the existing monitoring network, to meet the performance standard summarized above.

4.2 Downgradient Monitoring Wells

The existing monitoring wells are located and constructed in a manner appropriate for monitoring groundwater quality at the landfill. As noted above (Section 3.3.2), 16 wells at six locations have been designated as downgradient water quality monitoring wells for the landfill going forward: MW-1S/I/D, MW-2S/I/D, MW-15S/I, MW-16S/I/D, MW-17S/I, and MW-21S/I/D. No new wells are recommended for downgradient monitoring.

4.3 Background Monitoring Wells

The following wells, located in an upgradient direction from the landfill (to the north-northwest) are appropriate wells for monitoring background groundwater quality: MW-8SR, MW-8I and MW-14S. It is recommended that the upgradient monitoring network be augmented with additional wells located to the northeast, MW-6S and MW-11S. Although not directly upgradient, these wells are remote from the CCR in the landfill, and piezometric data indicate they are installed in the principal flow zone. Therefore, the addition of these two wells to the background groundwater monitoring network is appropriate for determining the full range of background concentrations for the parameters required to be monitored under the CCR Rule. Three wells (MW-6S, MW-11S, and MW-14S) were re-developed by AEP in 2016, between March 30 and April 1.

It is recommended that the background monitoring network be expanded to include the four locations (five wells) listed above. No new wells are recommended for upgradient monitoring.

4.4 Vertical Screening Levels

The saturated thickness of the principal flow zone is relatively thin in the upgradient direction from the landfill, which serves to limit the number of wells needed to monitor the vertical dimension of the uppermost flow zone.

The depth to bedrock at the MW-8 location is just under 70 feet (at elevation 323 feet), and the saturated thickness is on the order of 50 feet. Two wells, each with 10 feet of screen, are currently installed at the MW-8 location: MW-8SR (screened approximately between elevations of 351 and 361 feet) and MW-8I (screened approximately between elevations of 327 and 337 feet).

The depth to bedrock at the MW-14 location is even shallower (just under 35 feet BGS, at elevation 358 feet), and the saturated thickness is 8 to 15 feet. One well screen (MW-14S, screened between 361 and 371 feet) is sufficient to monitor the relatively thin flow zone at this location.

The depth to bedrock at the MW-11 location is 49 feet (at elevation 348 feet), and the saturated thickness is 18 to 24 feet. One well, MW-11S (screened approximately between elevations of 359 and 368 feet) monitors this location.

The bedrock elevation at the MW-6S location is estimated to be 310 feet based on Drawing 12-30095 in Appendix B (no lithologic log available). One well is present at this location, screened at the shallow level (between 353 and 363 feet).

4.5 Updated Well Survey

In a review performed in 2015 of the monitoring well construction logs and the data being used by AEP as reference point elevations (the level from which depth-to-water readings are measured) for piezometric monitoring, some discrepancies were noted. AEP surveyors performed a new survey of the ground surface and the reference point elevation at each well on 31 May 2016. **Table 1** is a well construction summary table that has been updated using the 2016 survey data. The well construction logs in **Appendix C** have also been annotated with the 2016 suvey data for the reference points.

5.0 P.E. CERTIFICATION

By means of this certification, I certify that I have reviewed the available documents (discussed in this report) for the groundwater monitoring system at the existing CCR landfill at the AEP Rockport Plant located in Spencer County, Indiana, and have found that it meets the requirements in 40 CFR §257.91.

Nicholas G. Schmitt
Printed Name of Registered Professional Engineer

Signature

191576	Indiana	14 September 2017
Registration No.	Registration State	Date

6.0 REFERENCES

American Electric Power Company (AEP), April 1984. *Application Package for Construction/Operating Permit for Solid Waste Management Facilities for Indiana and Michigan Electric Company's Ash Disposal Landfill for the Rockport Plant*. Submitted to Indiana Environmental Management Board. (AEP 1984).

Grove, Glenn E., May 2006. *Bedrock Aquifer Systems of Spencer County, Indiana.* Indiana Department of Natural Resources (IDNR) map. (Grove, 2006).

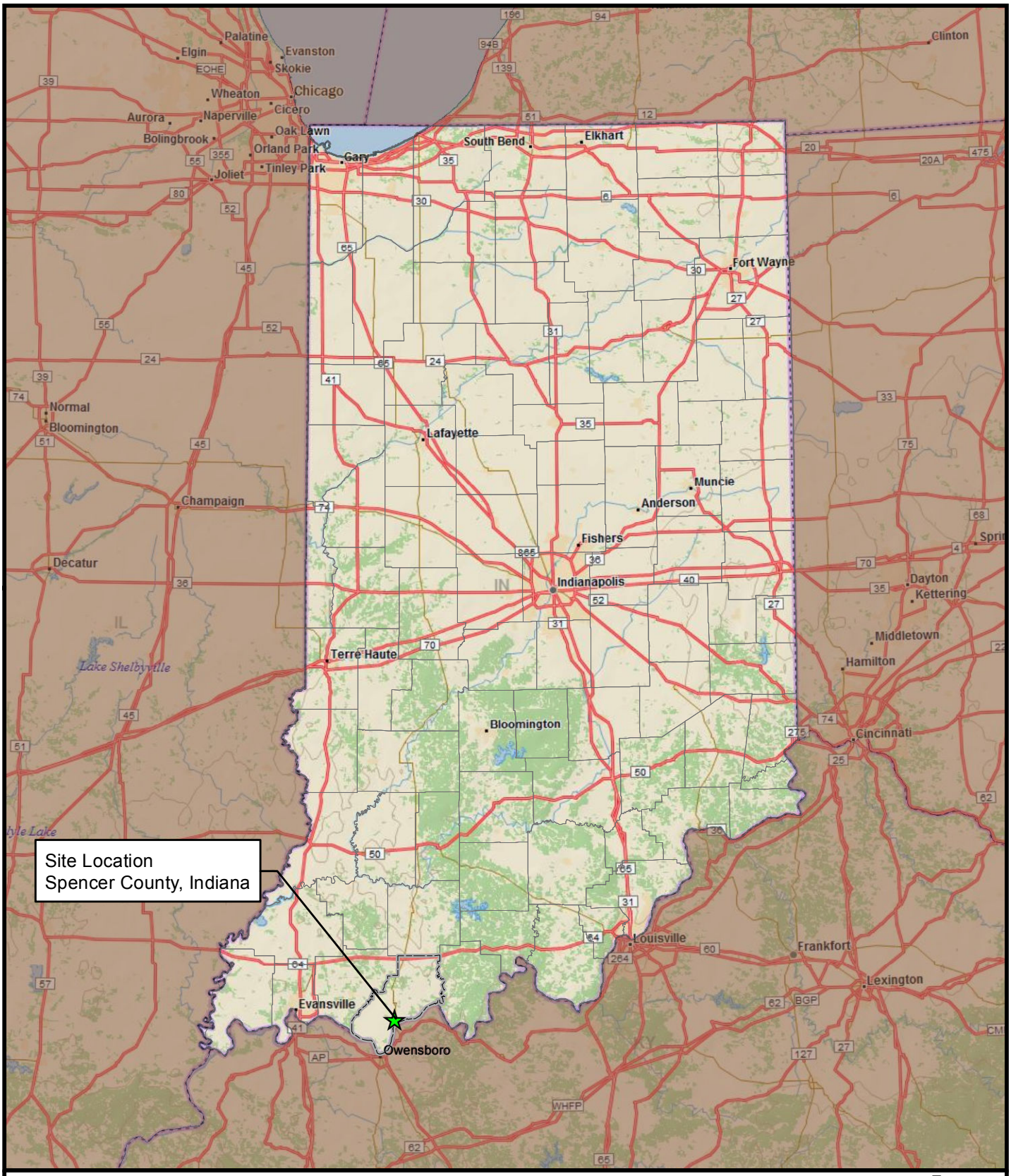
Ray, Louis L., 1965. *Geomorphology and Quaternary Geology of Owensboro Quadrangle, Indiana and Kentucky.* U.S. Geological Survey (USGS) Professional Paper 488, 72 p. (Ray 1965).

Terracon Consulting Engineers and Scientists, February 2012. *Fly Ash Landfill Redesign Construction Drawings, Storage Area 1A, RKP Permit #FP-74-2*. Design drawings prepared for AEP Indiana Michigan Power Company, Rockport Plant. (Terracon 2012).

United States Army Corps of Engineers (USACE), March 2014. *Ohio River Navigation Charts - Cairo, Illinois to Foster, Kentucky*. (USACE 2014)

United States Department of Agriculture–Soil Conservation Service (USDA-SCS), 1973. *Soil Survey of Spencer County, Indiana.* (USDA 1973).

FIGURES



AEP AMERICAN ELECTRIC POWER

Legend

★ Site Location

Service Layer Credits: Copyright:© 2015 DeLorme

0 40

Miles

NORTH

amec foster wheeler

2456 Fortune Drive, Suite 100
Lexington, Kentucky 40509
Phone: (859) 255-3308

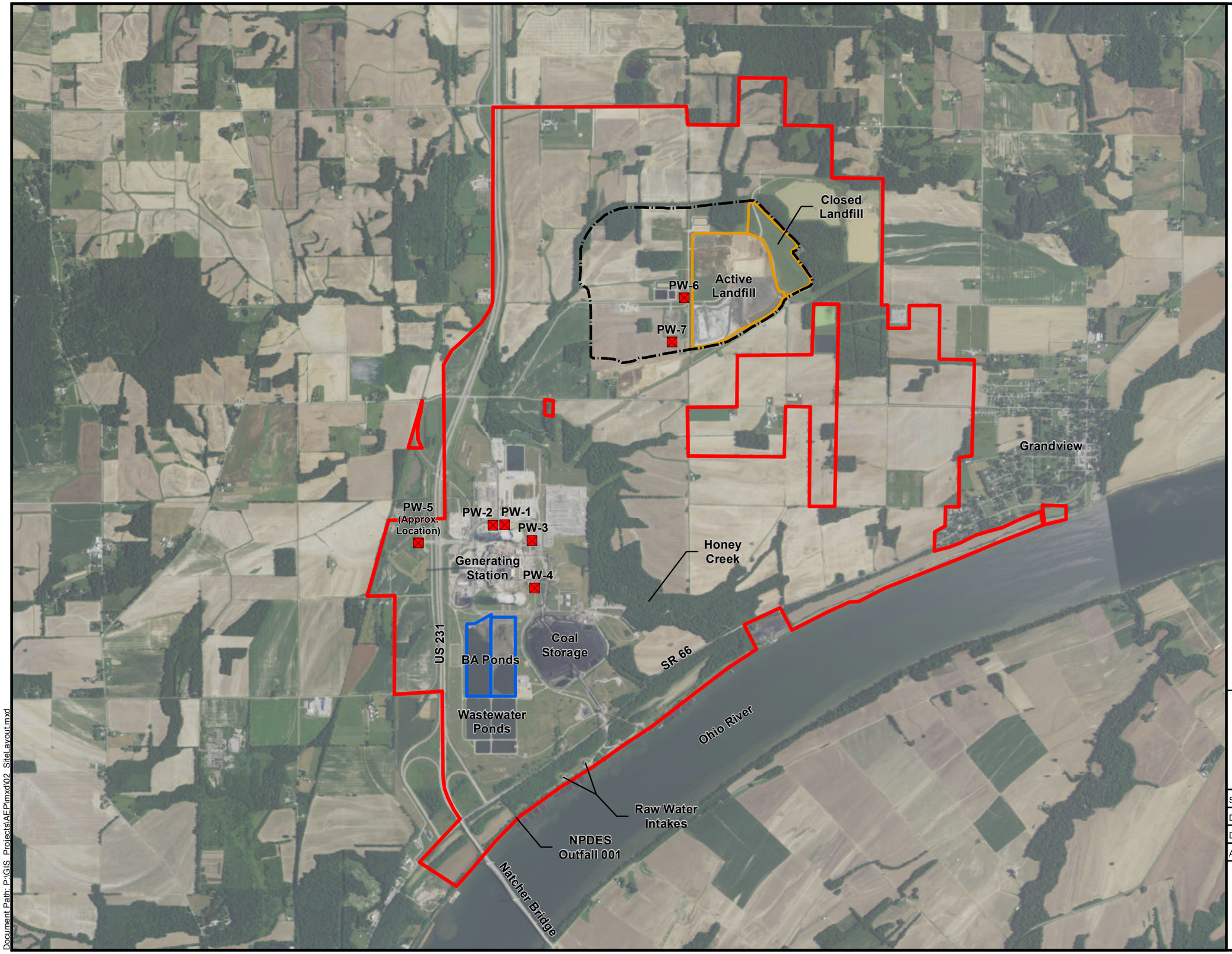
SITE LOCATION MAP

American Electric Power, Rockport Plant
Rockport, Indiana

PROJECT NUMBER: 7382153161

SCALE	1" = 40 miles
DATE	9/11/2015
DRAWN BY	TMR
APPROVED BY	ALD

FIG. 1



Legend

- Property Boundary
- 1984 Landfill Permit Boundary (Area 1)
- Landfill Area 1A (Active and Closed)
- Bottom Ash Pond
- Water Supply Well

Data Sources

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Date of Photography: May-June 2016
Source of Photography: U.S. Department of Agriculture, National Agriculture Imagery Program (NAIP)

0 1,200 2,400
SCALE IN FEET

SITE LAYOUT MAP

AEP - ROCKPORT, IN

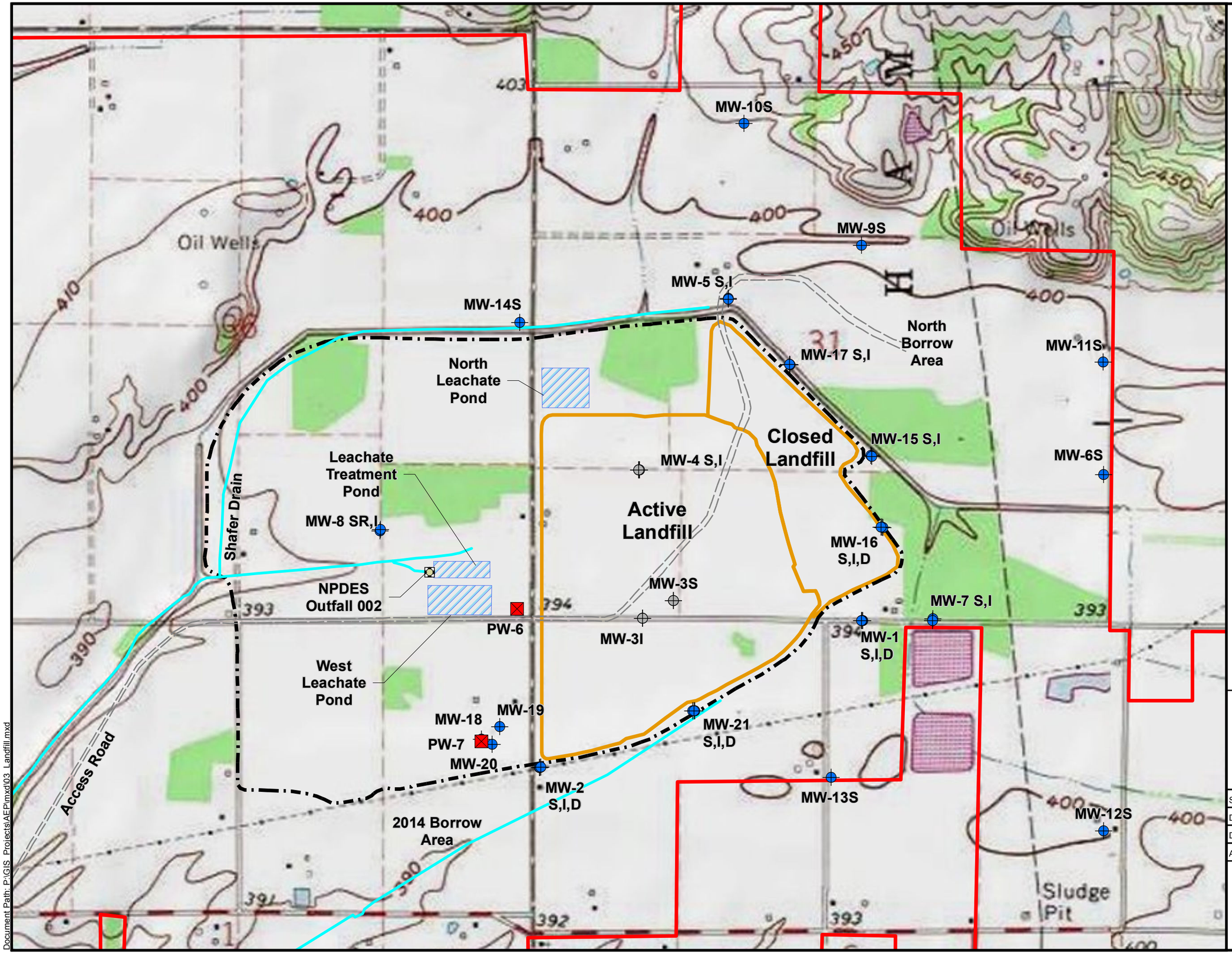
PROJECT NUMBER: 7382153161

SCALE	1" = 2,400'
DATE	9/13/2017
DRAWN BY	TMR
APPROVED BY	ALD

FIG. 2

amec foster wheeler
2456 Fortune Drive, Suite 100
Lexington, Kentucky 40509
Phone: (859) 255-3308

Document Path: P:\GIS_Projects\AEP\mxd\02_SiteLayout.mxd



Legend

- NPDES Outfall 002
- Monitoring Well (Abandoned)
- Monitoring Well
- Water Supply Well
- Access Road
- Drains / Ditches
- Property Boundary
- 1984 Landfill Permit Boundary (Area
- Landfill Area 1A (Active and
- Leachate Ponds

Data Sources

Service Layer Credits: Copyright:© 2013 National Geographic Society, i-cubed

Source: USGS Rockport and Lewisport (IN/KY) Topographic Quadrangle Maps, 1964, photorevised 1982

0 400 800
SCALE IN FEET

LANDFILL LAYOUT

AEP - ROCKPORT, IN

PROJECT NUMBER: 7382153161

SCALE	1" = 800'
DATE	10/5/2015
DRAWN BY	TMR
APPROVED BY	ALD

FIG. 3

amec foster wheeler
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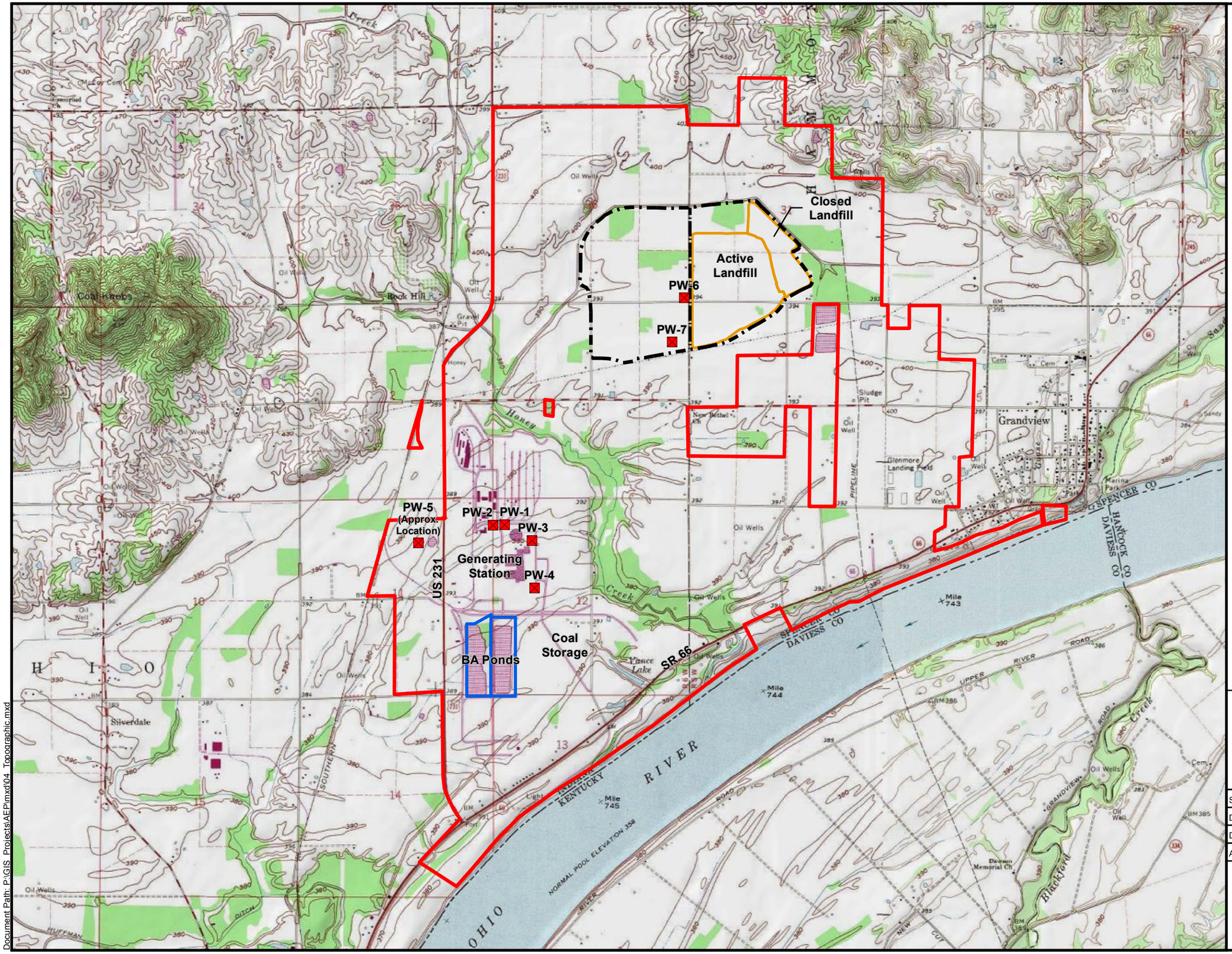
Document Path: P:\GIS Projects\AEP\mxd\03_Landfill.mxd



Legend

- Property Boundary
- 1984 Landfill Permit Boundary (Area 1)
- Landfill Area 1A (Active and Closed)
- Bottom Ash Pond
- Water Supply Well

Data Sources

Service Layer Credits: Copyright:© 2013 National Geographic Society, i-cubed

Source: USGS Rockport and Lewisport (IN/KY) Topographic Quadrangle Maps, 1964, photorevised 1982

0 1,200 2,400

SCALE IN FEET

TOPOGRAPHIC MAP

AEP - ROCKPORT, IN

PROJECT NUMBER: 7382153161

SCALE	1" = 2,400'
DATE	9/13/2017
DRAWN BY	TMR
APPROVED BY	ALD

FIG. 4

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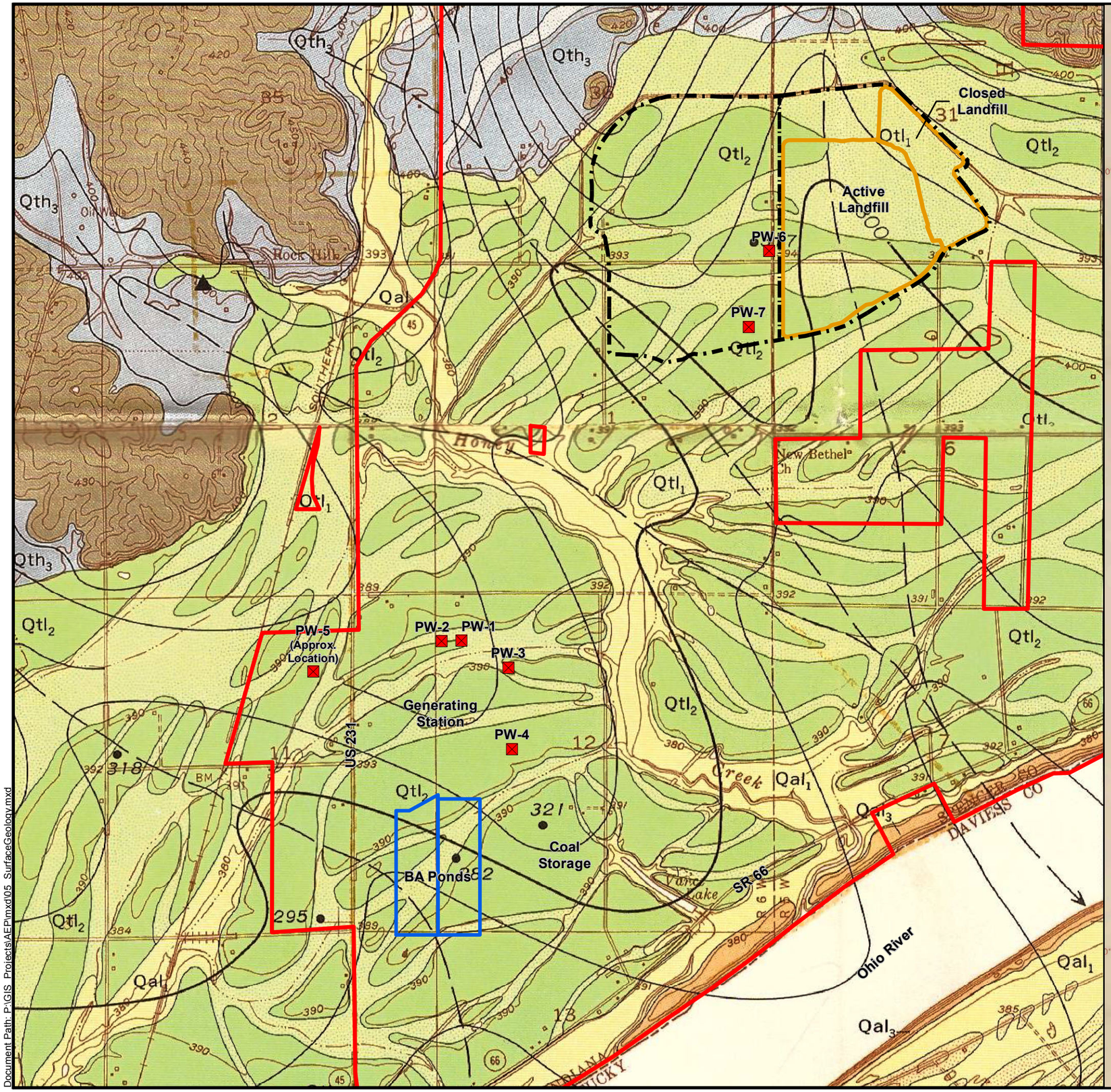
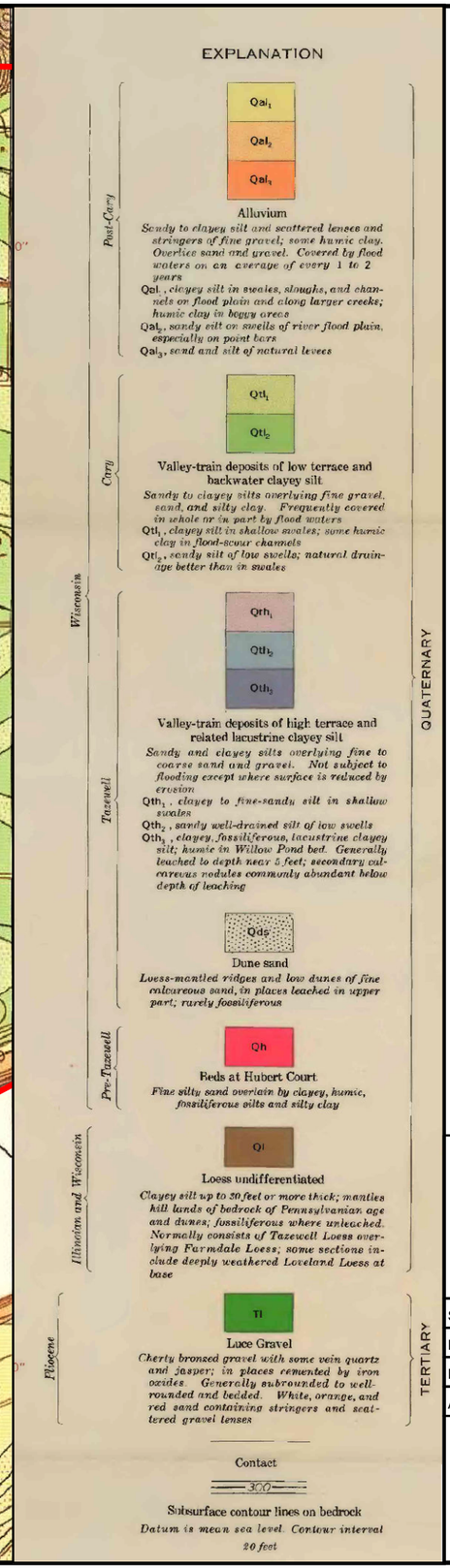
Document Path: P:\GIS_Projects\AEP\mxd\04_Topographic.mxd





Legend

- Property Boundary
- 1984 Landfill Permit Boundary (Area 1)
- Landfill Area 1A (Active and Closed)
- Bottom Ash Pond
- Water Supply Well

Data Sources

Source: Geologic Map of the Owensboro Quadrangle, Indiana and Kentucky, USGS Professional Paper 488, 1965

0 800 1,600

SCALE IN FEET

SURFACE GEOLOGY MAP

AEP - ROCKPORT, IN

PROJECT NUMBER: 7382153161

SCALE	1" = 1,600'
DATE	9/13/2017
DRAWN BY	TMR
APPROVED BY	ALD

FIG. 5

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Document Path: P:\GIS Projects\AEP\mxd\05_SurfaceGeology.mxd

TABLE

Table 1
Monitoring Well Construction Details, Landfill Wells
AEP Rockport Plant, Rockport, Indiana

Well ID	Date Installed	Northing SPCS NAD27 IN West MW Log	Easting SPCS NAD27 IN West MW Log	Original Ground Surface Elevation MW Log	Original Reference Point Elevation MW Log	Current Reference Point Elevation 5/31/2016	Length of Screen MW Log	Type of Screen MW Log	Total Depth of Well MW Log	Total Depth of Boring Litho Log	Depth to Top of Bedrock Litho Log	Top of Screen Elevation MW Log	Bottom of Screen Elevation MW Log	Bottom of Well Elevation MW Log	Bottom of Boring Elevation Litho Log	Bedrock Elevation Litho Log	Comments
		(ft)	(ft)	(ft MSL)	(ft MSL)	(ft MSL)	(ft)	PVC	(ft BGS)	(ft BGS)	(ft BGS)	(ft MSL)	(ft MSL)	(ft MSL)	(ft MSL)	(ft MSL)	
MW-1S	4/25/1984	162107.2	521813.6	394.65	397.25	397.33	9.0	2" x 0.010"	39.5	39.5	---	365.2	356.2	355.2	355.2	---	
MW-1I	4/25/1984	162107.0	521807.6	394.44	397.34	397.45	9.0	2" x 0.010"	63.1	63.1	---	341.3	332.3	331.3	331.3	---	
MW-1D	4/24/1984	162106.6	521802.0	394.68	397.32	397.25	9.0	2" x 0.010"	87.7	110.2	110	317.0	308.0	307.0	284.5	284.7	Lithologic boring log 9901 (drilled in April 1999)
MW-2S	5/16/1984	160790.3	518916.4	397.80	399.24	399.27	9.0	2" x 0.010"	40.0	40.0	---	368.8	359.8	357.8	357.8	---	
MW-2I	5/15/1984	160791.1	518924.0	397.76	399.26	399.42	9.0	2" x 0.010"	63.0	63.0	---	344.8	335.8	334.8	334.8	---	
MW-2D	5/15/1984	160793.0	518930.9	397.25	399.28	399.37	9.0	2" x 0.010"	88.0	107.8	107.8	319.3	310.3	309.3	289.5	289.5	Lithologic boring log 9902 (drilled in April 1999)
MW-3S	5/2/1984	162287.4	520118.1	393.53	396.81	---	9.0	2" x 0.010"	40.0	40.0	---	363.5	354.5	353.5	353.5	---	Closed and grouted
MW-3I	5/16/1984	162125.2	519843.6	395.15	397.05	---	9.0	2" x 0.010"	63.0	105.2	105.0	342.2	333.2	332.2	290.0	290.2	Closed and grouted, litho boring log 9903 (drilled in 1999)
MW-4S	5/9/1984	163459.8	519814.2	394.46	396.58	---	9.0	2" x 0.010"	40.0	40.0	---	364.5	355.5	354.5	354.5	---	Closed and grouted
MW-4I	5/9/1984	163460.0	519805.5	395.01	397.02	---	9.0	2" x 0.010"	63.0	84.8	84.1	342.0	333.0	332.0	310.2	310.9	Closed and grouted, litho boring log 9904 (drilled in 1999)
MW-5S	5/10/1984	164993.0	520610.0	394.28	396.00	396.08	9.0	2" x 0.010"	35.2	35.2	21.0	369.1	360.1	359.1	359.1	371	Lithologic boring log 9909 (drilled in April 1999)
MW-5I	5/22/1984	164987.9	520610.6	392 (est)	---	394.17	10.0	2" x 0.010"	40.0	58.6	21.0	362	352	352	334	371	GSE not shown on MW Log, shown as 392.1 on litho log
MW-6S	5/17/1984	163414.6	523969.1	392.85	394.89	394.72	9.0	2" x 0.010"	40.0	40.0	---	362.8	353.8	352.8	352.8	---	no lithologic log
MW-7S	5/1/1984	162123.6	522443.5	390.81	393.66	393.70	9.0	2" x 0.010"	40.0	40.0	---	360.8	351.8	352.8	350.8	---	
MW-7I	5/24/1984	162104.9	522439.6	392.02	393.62	393.49	9.0	2" x 0.010"	63.0	63.0	---	339.0	330.0	329.0	329.0	---	no lithologic log
MW-8S	5/8/1984	162926.4	517492.5	389.81	391.9	---	9.0	2" x 0.010"	39.8	39.8	---	360.0	351.0	350.0	350.0	---	Closed and grouted
MW-8SR	10/30/2013	162910.5	517492.0	392.15	394.66	394.86	9.6	2" x 0.010"	41.1	42.0	---	361.3	351.7	351.1	350.2	---	
MW-8I	11/14/1992	162921.3	517496.0	391.78	393.71	393.52	9.0	2" x NS	65.7	65.7	69.5	336.1	327.1	326.1	326.1	322.3	Lithologic boring log 9244
MW-9S	5/23/1984	165472.1	521801.1	401.04	403.08	404.35	9.0	2" x 0.010"	24.0	44.9	29.0	387.0	378.0	377.0	356.1	372.0	Lithologic boring log 9909 (drilled in April 1999)
MW-10S	5/23/1984	166560.6	520751.6	406.22	408.41	409.16	9.0	2" x 0.010"	23.6	40.0	24.0	392.6	383.6	384.2	366.2	382.2	Lithologic boring log 9910 (drilled in April 1999)
MW-11S	11/16/1992	164421.0	523964.2	397.60	399.97	400.07	9.0	2" x NS	39.6	47.0	49.3	368.0	359.0	358.0	350.6	348.3	Lithologic boring log 9230
MW-12S	11/15/1992	160224.0	523969.0	401.57	403.45	403.58	9.0	2" x NS	55.1	119.8	---	356.5	347.5	346.5	281.8	---	Lithologic boring log 9231
MW-13S	11/17/1992	160702.3	521529.1	397.92	399.91	399.79	9.0	2" x NS	44.5	111.6	111.5	363.4	354.4	353.4	286.3	286.4	Lithologic boring log 9232
MW-14S	12/8/1992	164779.4	518743.8	392.52	394.45	394.78	9.0	2" x NS	32.0	36.4	34.5	370.5	361.5	360.5	356.3	358.0	Lithologic boring log 9234
MW-15S	11/13/1992	163585.0	521886.9	390.53	392.53	392.46	9.0	2" x NS	40.1	40.1	---	360.4	351.4	350.4	350.4	---	
MW-15I	11/13/1992	163578.2	521892.7	390.46	392.70	392.70	9.0	2" x NS	65.8	67.2	66.5	334.7	325.7	324.7	324.7	323.3	Lithologic boring log 9234
MW-16S	12/11/1992	162944.9	521986.6	392.49	394.38	394.35	9.0	2" x NS	38.9	38.9	---	363.6	354.6	353.6	353.6	---	
MW-16I	12/11/1992	162943.9	521995.5	392.64	394.37	394.26	9.0	2" x NS	67.7	67.7	---	334.9	325.9	324.9	324.9	---	
MW-16D	12/9/1992	162946.3	521978.3	392.53	394.47	394.38	9.0	2" x NS	99.7	102.7	101.6	302.8	293.8	292.8	289.8	290.9	Lithologic boring log 9243
MW-17S	11/1/1992	164398.6	521162.5	393.13	395.46	395.34	9.0	2" x NS	40.5	40.5	---	362.5	353.6	352.6	352.6	---	
MW-17I	11/1/1992	164404.4	521157.2	393.28	395.29	395.40	9.6	2" x NS	67.4	69.4	67.4	336.5	326.9	325.9	323.7	325.7	Lithologic boring log 9245
MW-18	10/26/2004	161048.3	518397.6	397.88	400.38	400.65	9.0	2" x 0.020"	109.2	110.5	110.3	298.18	289.2	288.7	287.4	287.6	Lithologic boring log MW-18
MW-19	11/4/2004	161159.0	518561.3	398.74	401.24	401.44	9.0	2" x 0.020"	50.8	50.8	---	358.4	349.4	348.7	347.9	---	Lithologic boring log MW-19
MW-20	11/3/2004	160996.7	518492.4	398.02	400.52	400.78	9.0	2" x 0.020"	51.0	51.0	---	357.2	348.2	347.5	347.0	---	Lithologic boring log MW-20
MW-21S	1/13/2009	161298.6	520310.8	398.57	400.76	400.77	10.5	2" x 0.020"	39.9	40.0	---	369.8	359.3	358.7	358.6	---	
MW-21I	1/13/2009	161299.5	520291.1	398.52	400.74	400.72	9.5	2" x 0.020"	63.2	63.2	---	345.4	335.9	335.3	335.3	---	
MW-21D	1/13/2009	161298.3	520300.3	398.62	400.78	400.67	9.5	2" x 0.020"	108.3	112.2	111.9	300.42	290.92	290.3	286.4	286.7	Lithologic boring log B-0821

Table 1
Monitoring Well Construction Details, Landfill Wells
AEP Rockport Plant, Rockport, Indiana

Notes:

	Abandoned (closed and grouted) before 2015
	To be used for downgradient monitoring at the landfill.
	To be used for upgradient monitoring at the landfill.

ft =	feet
in =	inches
BGS =	below ground surface
MSL =	above Mean Sea Level, equivalent to the National Geodetic Vertical Datum of 1929 (NGVD29)
NS =	screen slot size not specified

SPCS NAD27 = State Plane Coordinate System, Noth American Datum of 1927

At several well locations, borings were drilled for lithologic definition, and one or more additional borings were drilled for well construction.
Total boring depth/elevation and bedrock depth/elevation for the deepest well in any location are based on the lithologic boring log (Litho Log) for that location.
Original ground surface and reference point elevations are the elevations reported on the AEP monitoring well construction log at the time of well installation (MW Log). Well elevations (top and bottom of screen, bottom of well) are as reported on the MW Log.
In some cases, the wellhead has been modified since installation, usually to install a dedicated pump, and the reference elevation has changed. Current reference point elevation is based on a survey performed by AEP on 5/31/2016.

APPENDICES

APPENDIX A

CURRENT LANDFILL PERMIT (2015)

INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
We Protect Hoosiers and Our Environment.
100 N. Senate Avenue • Indianapolis, IN 46204
(800) 451-6027 • (317) 232-8603 • www.idem.IN.gov
Michael R. Pence, *Governor*
Thomas W. Easterly, *Commissioner*

February 10, 2015

American Electric Power
Attn: Dana Sheets, P.E.
1 Riverside Plaza
Columbus, Ohio 43215

Dear Mr. Sheets:

Re: Solid Waste Land Disposal Facility
Permit Renewal
Rockport Plant RWS I
FP 74-02
Spencer County

American Electric Power's permit renewal for the Rockport Plant restricted waste site (RWS) type I landfill is approved. You, the permittee, must comply with Indiana's rules for solid waste land disposal facilities (329 IAC 10) and the terms of this permit. Your attention to the requirements for managing, containing, and disposing of waste and leachate protects public health and the environment in your community. Please feel free to contact us or your compliance inspector if you have any questions.

This permit will expire on **February 11, 2020**. To operate past this date, you must submit a renewal application on or before **October 14, 2019**.

The facility is a restricted waste site type I (RWS I) with a total of 554 acres. 408 of the acres approved for filling are in Area 1; 146 acres approved for filling are in Area 2. The landfill is located at 2791 N. U.S. Highway 231 near Rockport.

Public records for your facility are available in IDEM's Virtual File Cabinet at www.in.gov/idem. Documents related to this approval include the application dated May 2, 2014 (VFC #70151087).

You can review the Indiana Code (IC) and the Indiana Administrative Code (IAC) references in this document at iga.IN.gov. IC references are under the "Laws" link; IAC references are under the "Publications" link.

This permit does not: convey any property rights of any sort or any exclusive privileges; authorize any injury to any person or private property or invasion of other private rights or any infringement of federal, state, or local laws or regulations; or preempt any duty to comply with other state or local requirements (329 IAC 10-13-4(a)).

Please note, as the owner or operator of this facility, and owner of the land upon which it is located, you are liable for any environmental harm caused by the facility (329 IAC 10-13-4(b)).

If you do not comply with the requirements of this permit, IDEM may modify or revoke this permit (329 IAC 10-13-6) or initiate an enforcement action.

If you wish to appeal this decision you must file a request for administrative review with the Office of Environmental Adjudication within 18 days after the postmark of this letter. The enclosed Notice of Decision and Guide to Appeals Process notifies you of additional important details regarding the appeal process and your rights and responsibilities for filing an adequate and timely appeal.

If you have any questions, please contact Cara Kitchen, the permit manager assigned to your facility. She can be reached by dialing (800) 451-6027 and asking for extension 3-0449, by calling her directly at 317-233-0449, or by e-mail at ckitchen@idem.IN.gov.

Sincerely,

Jeffrey L. Sewell, Chief
Permits Branch
Office of Land Quality

Enclosures: Permit Requirements
Notice of Decision
Guide to Appeals Process
Letter to the The Spencer County Journal-Democrat
Letter to the Spencer County Public Library

cc with enclosures: Gibson County Health Department
Gibson County Commissioners
Gibson County Solid Waste Management District
Director, IDEM Southwest Regional Office
The Honorable Harold Goffinet, Mayor of Rockport
The Honorable Connie Hargis, President, Rockport Town Council

PERMIT REQUIREMENTS

A. General Permit Requirements

B. Construction Requirements

C. Pre-operational Requirements

D. Operational Requirements

E. Ground Water Monitoring Requirements

F. Closure Requirements

G. Post-Closure Requirements

H. Financial Responsibility for Closure and Post-Closure

A. GENERAL PERMIT REQUIREMENTS

A1. The permittee must comply with 329 IAC 10 except where alternative specifications or requirements are noted in approved plans or in this permit.

A2. The permittee must construct, operate, and maintain the facility as described in the approved plans and specifications. The permittee must request approval before modifying the facility or facility operating procedures. The permit modification application requirements are in 329 IAC 10-11. Application forms are available from the permit manager listed below.

Certain insignificant modifications defined in 329 IAC 10-2-97.1 are eligible for the streamlined notification or approval procedures described in 329 IAC 10-3-3.

A3. The permittee must call **(888) 233-7745** (IDEM's emergency response line) as soon as possible after learning of any event that may cause an imminent and substantial endangerment to human health or the environment, such as a reportable spill (327 IAC 2-6.1) or a fire or explosion that requires the response of the local fire department.

The permittee must follow up with a written report to the IDEM contact given in Requirement A4 within 5 business days after the event. The report must describe the event, and actions taken or planned to correct the event and prevent its recurrence.

A4. Unless otherwise noted, submittals must be sent to:

Cara Kitchen, Permit Manager
Indiana Department of Environmental Management
Solid Waste Permits
IGCN 1101
100 North Senate Avenue
Indianapolis, IN 46204-2251

Please provide 3 copies printed double-sided. We greatly appreciate an electronic copy, in Acrobat PDF format on CD or DVD, or email, in place of one of the printed copies.

Submittals must be signed as specified in 329 IAC 10-11-3.

A5. The permittee must submit quarterly tonnage reports (329 IAC 10-14-1) to the following address:

Regulatory Reporting Section
Indiana Department of Environmental Management
IGCN 1101
100 North Senate Avenue
Indianapolis, IN 46204-2251

B. CONSTRUCTION REQUIREMENTS

B1. The permittee must notify IDEM in writing at least 15 days before beginning construction of a new area.

B2. The permittee must install boundary markers to identify the limits of construction of each new area.

B3. The permittee must verify and document in a Construction Certification Report (CCR) submitted as specified in Requirement C1 that all leachate collection pipes and sumps are free of obstructions before placing waste in a newly constructed area.

B4. The permittee must construct the base grades for the type I liner as shown on DWG. No.12-30404-A (sheet 5 of 37), titled "Type I Liner sub base Grades," dated March 22, 2012 (VFC #66674065).

B5. Upon selecting the specific materials for the composite liner system, the permittee must test the materials to verify that the interface friction values meet or exceed the values in the approved design. If the tests show that the interface friction values do not achieve the minimum factor of safety assumed in the approved plans, the permittee must select and test alternate materials and rerun the slope stability analysis. The results of the interface friction tests and any new slope stability analyses must be included in the CCR.

B6. The permittee must test and install all liner and final cover components as specified in the approved Construction Quality Assurance and Construction Quality Control (CQA/CQC) Plan, Attachment 8, dated March 21, 2012 (VFC #66690329, pages 48-75), and revised in June 5, 2013 (VFC#68406443, pages 3-28), and revised on May 22, 2014 (VFC #70087597).

B7. The permittee must submit a permit modification application and receive IDEM's approval before beginning modifications to the western half of Area 1 to accommodate for AK Steel power line transmission corridor and upgrade the landfill design to Type I standards.

B8. The permittee is approved to convert approximately 110 of the 408 acres in landfill Area 1 from a restricted waste site (RWS) type II landfill to an RWS type I landfill with the following requirements:

a. The permittee must implement the conversion as specified in the minor modification application dated March 27, 2012 (VFC #6660329), including the Engineering Report by Terracon Consultants, Inc., dated March 22, 2012 (VFC #66690329, pages 77-325), and supplemental information dated June 29, 2012 (VFC #66357542) and dated August 14, 2012 (VFC #66675686). The following VFC document numbers are plan sheets dated March 22, 2012, related to the minor modification application dated March 27, 2012:

66674284	66674171	66674187	66674069
66674283	66674184	66674215	66674269
66674112	66674213	66674040	66674271
66674169	66674064	66674038	66674072
66674170	66674237	66674060	66674236
66674067	66674201	66674202	66674198
66674065	66674173	66674172	66674285
66674248	66674125	66674272	66674270
66674113	66674186	66674158	
66674124	66674214	66674156	

b. The permittee must install a composite liner system (combination of soil and geomembrane) and a leachate collection system as shown on DWG. NO. 12-30436-A (sheet 7 of 37), dated March 22, 2012 (VFC #66674069).

c. The permittee must construct the composite liner system as listed below, starting from the bottom up:

a. 5 feet of in-situ soil and/or compacted soil with a hydraulic conductivity of 1×10^{-6} cm/sec;
b. Type II ash (thickness varies depending on the desired grade for the construction of the composite liner);
c. 2 feet of compacted soil liner with a hydraulic conductivity of 1×10^{-7} cm/sec;
d. 30 mil PVC geomembrane;
e. 10 oz. /sq., nonwoven geotextile as a cushion layer;
f. 1 foot of bottom ash with a hydraulic conductivity of 1×10^{-2} cm/sec as a drainage layer; and
g. 1 foot of bottom ash with a hydraulic conductivity of 1×10^{-3} cm/sec as a protective layer.

C. PRE-OPERATIONAL REQUIREMENTS

C1. The permittee must submit a CCR at least 21 days before placing waste in any newly constructed area. An Indiana registered professional engineer must certify that the construction is in compliance with approved plans and specifications. The report must indicate the boundaries of the certified area and include the results of all tests conducted during construction.

Unless notified otherwise by IDEM, the permittee may begin to accept waste in a newly constructed area 21 days after IDEM receives the documents listed above.

D. OPERATIONAL REQUIREMENTS

D1. The permittee must comply with 329 IAC 10-28 (Operational Requirements).

D2. The following wastes generated by American Electric Power-Rockport Plant are approved for disposal in the Restricted Waste Site Type I landfill:

a. Coal combustion wastes that are exempt from the restricted waste classification process according to 329 IAC 10-9-4(d), including:
   (1) fly ash
   (2) bottom ash
   (3) Flue gas desulfurization (FGD) byproducts

b. Wastes that have a valid Type I through Type IV classification under 329 IAC 10-9-4.

The permittee must not dispose of any other wastes in this landfill.

This facility manages coal combustion wastes that are exempt from regulation as hazardous waste under the Bevill Amendment to RCRA (see 329 IAC 3.1-1-7 and 40 CFR 261.4(b)(4)). Bevill exempt wastes are excluded from the hazardous waste characterization process. The wastes listed in Requirement D2.a above are also exempt from the restricted waste classification process according to 329 IAC 10-9-4(d). Bevill wastes not listed in D2.a must have a valid Type I through Type IV waste classification under 329 IAC 10-9-4.

D3. The permittee must maintain permanent, visible facility and solid waste boundary markers for the life of the facility.

D4. The permittee must limit solid waste disposal to the areas delineated by the permitted landfill limits shown on DWG. NO. 12-30405-A (sheet 6 of 37), entitled "Type I Liner Top of Clay Grades," dated March 22, 2012 (VFC #66674067).

D5. The permittee must maintain the site benchmark throughout the entire life and post-closure care period of the facility.

D6. The permittee must control public access to the facility and prevent unauthorized vehicular traffic and illegal dumping.

D7. The permittee must inspect the site monthly for compliance with 329 IAC 10 and this permit. The inspections must evaluate the following: landfill cover, run-off control structures, erosion control structures, drainage ditches, monitoring wells and sumps, dust controls, and the leachate collection system. The permittee must keep the inspection records at the facility office for at least 3 years.

D8. The permittee must manage surface water as shown on DWG. No. 12-30423-A, 12-30424-A and 12-30425-A (sheets 33-35 of 37), titled "Surface Water Ponds and Details," dated March 22, 2012 (VFC#66674270, 66674271 and 66674272) and as specified in the minor modification application referenced in Requirement B8.

The permittee must also meet the following requirements:

a. Divert surface water from the active fill area to minimize surface water contact with the waste and interference with daily operations.
b. Properly maintain drainage ditches and the sedimentation basin to prevent off-site deposition of sediment. Remove waste deposits from drainage ditches as necessary to properly convey storm water.
c. Construct temporary run-off structures in areas which are unable to drain to the sedimentation basin.

D9. The permittee is approved to use other provisions for cover as provided for in 329 IAC 10-28-11(b), based on the site design, dust controls, and variance request dated August 22, 2014 (VFC #70405282).

The permittee must comply with these additional requirements:

a. Apply dust control agents or apply 6 inches of cover soil if facility employees observe fugitive dust or conditions that may lead to fugitive dust.
b. Minimize the working face of the landfill as follows:
    i. Install final cover as specified in Requirement F3 on all areas of the landfill filled to the approved elevations.
    ii. Cover with 6" of clay type soil as an intermediate cover on all other areas that have not received waste for one year.

D10. The permittee must manage waste that generates fugitive dust or fugitive particulate matter in a way that does not violate the rules for fugitive dust (326 IAC 6-4) or fugitive particulate matter (326 IAC 6-5), including 326 IAC 6-5-4(g) for solid waste handling control measures (329 IAC 10-8.2-2).

D11. The permittee must grade intermediate cover to promote surface water drainage and prevent ponding of water, and implement erosion and sediment control measures within 15 days after placement. The erosion/sedimentation control measures may include the following: establishing vegetation, using alternative/synthetic covers or liners, and/or using other applicable erosion and sedimentation control measures.

D12. If the permittee notices changes to the physical appearance of the cover soil or uses borrow sites other than those specified in the application, the permittee must, at a minimum, conduct gradation and Atterberg Limits tests on 3 representative samples of the new cover soil. The permittee must submit the results to IDEM within 15 days after such testing and before using the new soil as cover.

D13. The permittee must meet the following requirements regarding leachate storage at the facility:

a. Maintain an adequate leachate storage capacity in the leachate ponds during the landfill operation and the post-closure period to ensure proper operation of the leachate collection system and compliance with 329 IAC 10-28-16 (Leachate Disposal).
b. Maintain the leachate level in the sumps and manhole at or below the liner system to a maximum of 1 foot head.
c. Operate leachate storage in an environmentally safe manner.

D14. The permittee must meet the following requirements regarding leachate sampling, analysis, and reporting:

c. Conduct leachate sampling and analysis as required by the wastewater treatment plant or other leachate disposal facility, as applicable, and maintain the results in the facility's operating record
d. On or before March 1 of each year, the permittee must submit to IDEM a report for the leachate generated the previous year using the enclosed "Leachate Generation and Recirculation Report" or a similar report developed by the permittee.

D15. The permittee is approved to temporarily store bottom ash as follows:

a. Within subcells 4A and 4B of cell 4 as specified in the approval letter dated May 3, 2013 (VFC#68052917). The permittee must route surface water runoff from the temporary storage areas to the North Pond.
b. Within the approved solid waste boundary for RWS II as specified in the approval letter dated July 12, 2013 (VFC#68545528). The permittee must comply with the following:
(1) Store a maximum of 300,000 cubic yards of bottom ash in this area.
(2) Remove the bottom ash from this area before July 12, 2017
(3) Route surface water runoff from this area to the West Pond.
(4) Maintain the berms to prevent waste migration.
(5) Prevent waste migration via wind dispersion.

E. GROUND WATER MONITORING REQUIREMENTS

E1. The permittee must comply with 329 IAC 10-29 (Ground Water Monitoring and Corrective Action).

E2. The permittee must label each ground water monitoring well and each piezometer with a permanent and unique identification. When reporting well and piezometer information, the permittee must include the identification for each well or piezometer.

E3. When abandoning a well or piezometer that is part of the facility's approved ground water monitoring system, the permittee must:

a. Submit a written proposal for approval explaining the reasons for and detailing the method of abandonment.
b. Use methods that comply with Indiana Department of Natural Resources (IDNR) regulation 312 IAC 13-10-2.
c. Notify the IDEM Geology Section by phone, e-mail, or letter at least 10 days before the date the abandonment work will occur.
d. Provide written notification of abandonment to IDEM and IDNR within 30 days after plugging is complete. (IDNR (312 IAC 13-10-2(f)) requires written notice).

E4. The permittee must secure and maintain the access ways to monitoring wells and piezometers to prevent unauthorized access, and assure they are passable year round.

E5. The permittee must maintain all ground water monitoring wells and piezometers as follows:

a. Complete necessary repairs, other than replacement (see Requirement E6), within 10 days after discovery.
b. Keep the monitoring wells securely capped and locked when not in use.
c. Repair all cracks in and around the casings.
d. Repair cracks in concrete pads.
e. Control vegetation height.
f. Redevelop the monitoring wells as needed.

E6. The permittee must notify IDEM by phone, e-mail, or letter within 10 days after discovering that a ground water monitoring well or piezometer has been destroyed or is not functioning properly. The permittee must repair the well or piezometer if possible. If the well or piezometer cannot be repaired, then within 30 days after discovery, the permittee must submit a proposal for abandoning and replacing the well.

E7. The permittee must submit ground water potentiometric-surface maps or flow maps with each semiannual ground water monitoring report. The maps must

contain the following:

a. Location and identification of each ground water monitoring well and piezometer.
b. Static water level relative to mean sea level for each well and piezometer. The permittee must measure all elevations on the same day and as close in time as possible before the purging and sampling event.
c. Date and time of static water level measurement for each well and piezometer.
d. Ground-surface elevation at each well and piezometer.
e. Facility property boundaries.
f. Identification of the aquifer represented, either by a name or elevation.
g. Solid waste fill boundaries.
h. Facility name and county.
i. Map scale, north arrow, ground water flow direction arrows, and potentiometric-surface contour intervals.
j. Indications of which monitoring wells are considered background, upgradient, downgradient, or intrawell.
k. Locations and elevations of all site benchmarks.

E8. If a ground water potentiometric-surface map or flow map indicates that the ground water flow direction is other than that anticipated in the design of the monitoring well system, the permittee must notify IDEM of the difference in the ground water monitoring report submitted for Requirement E12. The notification must include either of the following: information demonstrating that the monitoring well system still complies with 329 IAC 10-29-1(b); or a proposal to revise the monitoring system design for approval.

If design changes to the existing ground water monitoring system listed in Requirement E11 are necessary, the permittee must make the changes within 30 days after receiving approval of the revised design.

E9. The permittee must follow the Sampling and Analysis Plan (SAP) and the Quality Assurance Project Plan (QAPjP), dated November 12, 1999 (VFC #52713207).

If IDEM requests a revision, the permittee must submit a revised SAP and QAPjP for approval. The permittee must submit the revision within 60 days after receiving the request. This submittal must include 1 original paper copy and 1 PDF formatted electronic file.

If the permittee makes design changes to the existing ground water monitoring system listed in Requirement E11, the permittee must submit a revised SAP and QAPjP for approval. The permittee must submit the revision within 30 days after completing all field activities associated with the changes. This submittal must include 1 original paper copy and 1 PDF formatted electronic file.

E10. The permittee must follow the Statistical Evaluation Plan (StEP), dated December 3, 2009 (VFC # 54047681).

If IDEM requests a revision, the permittee must submit a revised StEP for approval. The permittee must submit the revision within 60 days after the request. This submittal must include 1 original paper copy and 1 PDF formatted electronic file. The permittee must not implement a revised StEP before receiving approval.

In the StEP, the permittee must present the data distribution assumptions. The statistical procedures must be appropriate for the data distribution and provide a balance between the probability of falsely identifying a significant difference and the probability of failing to identify a significant difference. To achieve the balance, the permittee should consider the background sample sizes, the number of individual statistical tests performed, and the specific verification resampling method.

If the permittee makes design changes to the existing ground water monitoring system listed in Requirement E11, the permittee must submit a revised StEP for approval. The permittee must submit the revision within 30 days after completing all field activities associated with the changes. This submittal must include 1 original paper copy and 1 PDF formatted electronic file. The permittee must not implement the revised StEP before receiving approval.

E11. The permittee must sample the facility's ground water monitoring well system during May and November of each year. The monitoring well system includes the following wells: MW-1S, MW-1I, MW-1D, MW-15S, MW-15I, MW-16I, MW-16D, MW-17S, MW-17I, MW-21S, MW-21I, and MW-21D. Each sample must be analyzed for the following Phase I parameters:

a. Field pH
b. Field specific conductance
c. Barium (dissolved)
d. Boron (dissolved)
e. Chromium (dissolved)
f. Selenium (dissolved)
g. Sulfate

E12. No later than 60 days after each ground water monitoring event completed for Requirement E11, the permittee must submit the information in a ground water monitoring report to the IDEM Solid Waste Permits Section in 1 unbound paper copy and in 1 electronic version in PDF format. The report must include the following:

a. One original, unbound, laboratory-certified report with analytical and field parameters results, field sheets, and chain-of-custody forms. The laboratory-certified report must include the following: detection limit for each chemical parameter, date samples collected, date the laboratory received the samples, date the laboratory analyzed the samples, date the laboratory prepared the report, method of analysis the laboratory used for each parameter, sample identification number for each sample, and

results of all sample analyses.

b. All information specified in Requirement E7 and a table summarizing the static water level for each well.

c. Comments regarding ground water quality, recent notifications of any compliance issues related to a problematic well or piezometer (see Requirement E6), special field observations and procedures, and deviations from the SAP.

d. One original unbound copy of the statistical evaluation report (see Requirement E17).

The permittee may mail the PDF copy and electronic data file specified in Requirement E13 on a CD-ROM or DVD. The permittee must clearly label the PDF copy and data file with the facility name and a brief description of the file. Alternatively, the permittee may e-mail the PDF copy and electronic data file to the IDEM Solid Waste Permit Manager listed in Requirement A4 and carbon copy olqdata@idem.IN.gov. The e-mail must include the facility name and a brief description typed in the e-mail's subject heading.

E13. The permittee must submit 1 electronic data file of the analytical and field parameters results formatted as an ASCII, tab-delimited text file. The electronic data file must contain the facility's name, permit number, and the name of the analytical laboratory. Additionally, the file must include the fields listed below for the analytical results and the following field parameters: pH, specific conductance, temperature, well depth, depth to water, and static water elevation.

a. SamplingDate: Month, day, and year (mm/dd/yyyy). Value should be formatted as a date if possible.

b. SamplePointName: Names of monitoring wells, piezometers, leachate wells, surface water collection points, etc.

c. LaboratorySample ID: ID assigned to the sample by the laboratory.

d. SampleType: Regular, duplicate(s), trip blank(s), equipment blank(s), field blank(s), verification re-sample(s), and replicate(s).

e. SpeciesName: Chloride, sodium, ammonia, field pH, etc. The order of parameters is not critical. However, it is best to reflect the order that is on the laboratory-data sheets and keep all field data grouped together. Metals should indicate "dissolved" phase or "total" phase. Associated static water levels do not have their own header, but must be entered as "GW WaterLevel" under the header "SpeciesName." The actual elevations must be entered under the header "Concentration."

f. Concentration (results): The entry must be a number. Please do not enter text, such as "NA," "ND," or "<."

g. ConcentrationUnits: mg/l, ug/l, standard units for pH, degrees Celsius (°C) or degrees Fahrenheit (°F) for temperature, and umhos/cm for specific conductance.

h. Detected: Yes or no.

i. DetectionLimit.

j. AnalyticalMethods.

k. EstimatedValue: Indicate "Yes" if the reported concentration is an

estimated value. If a value recorded was not estimated, enter "No." If a concentration is estimated, use the "Comment" field to explain why the concentration was estimated.

l. Comment: Analytical laboratory and/or field personnel comments regarding the reported results.

m. SampleMedium: Ground water, leachate, surface water, etc.

n. ProgramArea: Solid Waste.

Additional guidance on electronic data file submittals is available on IDEM's website at www.in.gov/idem/5384.htm or by e-mailing questions to olqdata@idem.IN.gov.

E14. The permittee must retain laboratory quality assurance/quality control (QA/QC) documentation from valid analyses of ground water samples for at least 3 years.

Upon IDEM request, the permittee must submit the laboratory QA/QC for a specified ground water monitoring data package, in 1 paper copy and 1 electronic copy in PDF format, within 60 days after receiving the request. The "Solid & Hazardous Waste Programs, Analytical Data Deliverable Requirements: Supplemental Guidance" provides additional information about laboratory QA/QC. The guidance is available on IDEM's website at www.in.gov/idem/4673.htm.

E15. The permittee must conduct ground water monitoring throughout the active life and the post-closure care period of the facility (329 IAC 10-29-3). IDEM may extend the post-closure care period if ground water monitoring results show that the facility has not stabilized (329 IAC 10-31-4).

E16. The permittee must determine the background ground water quality for any background wells added to the facility's ground water monitoring system by sampling each new well for 4 consecutive quarters within 1 year after their installation. The permittee must establish background ground water quality for the following:

a. The Phase I parameters in Requirement E11.

b. The secondary standards in 329 IAC 10-29-7(c).

c. The ground water protection standard in 329 IAC 10-29-10.

E17. The permittee must apply the StEP in Requirement E10 to determine whether there is a statistically significant increase (or pH decrease) over the background for each Phase I or Phase II parameter, except for field temperature. The statistical determination must include the value obtained during each semiannual analysis with the established background (329 IAC 10-29-5).

E18. If the permittee determines there is a statistically significant increase (or pH decrease) over background for 2 or more of the Phase I parameters at any of the downgradient monitoring wells, the permittee must comply with the following requirements:

a. Notify IDEM in writing within 14 days after the finding. The notification must state which Phase I parameters showed statistically significant increases (or pH decrease) over background levels, and which downgradient monitoring well(s) showed the elevated concentrations.
b. Collect and analyze the ground water from all monitoring wells for the parameters in Requirement E11 and the parameters determined from 329 IAC 10-29-7(d). The permittee must submit the results to IDEM within 60 days after determining the statistically significant increases.
c. Establish a Phase II monitoring program based on the results obtained from Requirement E18.b and consult with the IDEM Geology Section within 30 days after completing Requirement E18.b.

The permittee must continue the scheduled Phase I monitoring as described in Requirement E11 and 329 IAC 10-29 throughout the establishment and implementation of a Phase II monitoring program.

E19. In lieu of Requirements E18.b and E18.c, the permittee may attempt to demonstrate that a source other than the solid waste facility caused the increase (or pH decrease) or that the increase (or pH decrease) resulted from error in sampling, analysis, or evaluation. For IDEM to approve the demonstration, the permittee must comply with the following requirements:

a. Notify IDEM in writing of the intent to make a demonstration. The permittee must submit the notification within 7 days after determining a statistically significant increase (or pH decrease).
b. Submit a report to IDEM within 90 days after determining a statistically significant increase (or pH decrease). The report must demonstrate that a source other than the solid waste facility caused the increase (or pH decrease), or that the increase (or pH decrease) resulted from error in sampling, analysis, or evaluation. The report must state what efforts the permittee will take to prevent these errors from recurring.
c. Continue to monitor ground water at all monitoring wells according to the scheduled Phase I monitoring established under 329 IAC 10-29-6.

If a demonstration is not acceptable to IDEM, the permittee must continue with Requirements E18.b and E18.c.

E20. If necessary, the permittee must implement a corrective action program as required under 329 IAC 10-29-9. The corrective action program is complete when ground water protection standards have been met at all points of the plume beyond the monitoring boundary for a period of 3 consecutive years using the statistical procedures outlined in 329 IAC 10-29-5 and procedures approved through this permit.

E21. The permittee must analyze the following constituents in accordance with the sampling schedule specified in Requirement E11 for samples collected from the ground water monitoring wells of the monitoring well system.

a. Alkalinity, bicarbonate (HCO_3)
b. Alkalinity, total (CaCO3)
c. Aluminum (dissolved)
d. Arsenic (dissolved)
e. Cadmium (dissolved)
f. Calcium (dissolved)
g. Chloride
h. Fluoride
i. Iron (dissolved)
j. Lead (dissolved)
k. Magnesium (dissolved)
l. Manganese (dissolved)
m. Molybdenum
n. Mercury (dissolved)
o. Potassium (dissolved)
p. Nitrate (NO_3)
q. Sodium (dissolved)
r. Silver (dissolved)
s. Total Dissolved Solids

The permittee must include the sampling results in the ground water monitoring report (Requirement E12).

The permittee must complete a statistical evaluation or a geochemical evaluation on the constituents identified in this Requirement (E21) when the IDEM Geology Section deems an evaluation is necessary. Until the IDEM Geology Section requests an evaluation, the permittee must include a nonstatistical, qualitative review of the concentrations for these constituents in each statistical evaluation report.

E22. The permittee must include static water levels from the following monitoring wells to develop potentiometric maps required for each ground water submittal (Requirement E7).

MW-2(S, I, and D)
MW-5(S and I)
MW-6(S)
MW-7(S and I)
MW-8(S, R, and I)
MW-9(S)
MW-10(S)
MW-11(S)
MW-12(S)
MW-13(S)
MW-14(S)

E23. The permittee must include time series plots (time vs. concentration) of the facility's ground water data when the IDEM Geology Section requests the plots to be included in the statistical evaluation report (Requirement E12.d).

F. CLOSURE REQUIREMENTS

F1. The permittee must comply with 329 IAC 10-30 (Closure Requirements for Restricted Waste Site Type I Landfill) and follow the facility's approved closure plan dated December 19, 2007 (VFC #27473581, Appendix B, Attachment 17, p. 31-41 of 64), and revisions dated March 27, 2012 (VFC#66690329, p. 21-47 of 325).

F2. The permittee must notify IDEM in writing at least 60 days before the intended date to begin closure of each area.

F3. The permittee must construct the final cover as specified in the approved final grading plan as shown on DWG. NO. 12-30429-A (sheet 10 of 37), titled "Top of Final Cover Grades," dated March 22, 2012 (VFC #66674113), and the applicable requirements of 329 IAC 10-30-2 and 10-28-11. Grading and stabilization of final cover must comply with 329 IAC 10-28-14.

G. POST-CLOSURE REQUIREMENTS

G1. The permittee must perform post-closure monitoring and maintenance as specified in the facility post-closure plan in the permit application dated December 19, 2007 (VFC #27473581, Appendix B, Attachment 17, p. 42-49 of 64), and revisions dated March 27, 2012 (VFC#66690329, p. 21-47 of 325), and the applicable requirements of 329 IAC 10-31.

H. FINANCIAL RESPONSIBILITY FOR CLOSURE AND POST-CLOSURE

H1. The permittee must maintain a financial assurance mechanism for the costs of closure and post-closure using one of the financial assurance mechanisms and the estimating standards described in 329 IAC 10-39. The permittee must submit signed originals of the financial assurance mechanism and updates used to meet this requirement.

H2. The permittee must submit a financial responsibility update by June 15 of each year. The annual update must address the following items as detailed in 329 IAC 10-39-2(c) and (d), and 329 IAC 10-39-3(c):

a. The permittee must adjust the closure and post-closure cost estimates for inflation.

b. The permittee must revise the cost estimates to account for changes which increase the cost of closure or post-closure.

c. The permittee may revise the cost estimates to account for changes which reduce the cost of closure or post-closure. The permittee must provide documentation supporting reduced cost-estimates, for example: letters and maps documenting areas certified as closed.

d. The permittee must submit an existing contour map showing the approved solid waste land disposal facility that delineates the boundaries of all areas into which waste has been placed, and the boundaries of areas certified as closed. The map must be certified by a professional engineer or a registered land surveyor.

e. The permittee must submit documentation showing that the financial assurance mechanism is current and adequate to cover the estimated costs of closure and post-closure. The permittee must submit signed originals of the financial assurance mechanism and updates used to meet this requirement.

APPENDIX B

MAPS AND CROSS-SECTIONS
1983 LANDFILL SITE INVESTIGATION

DR. NO. 12-30090

INDIANA

OHIO

KENTUCKY

RIVER

HONEY CREEK

OHIO TOWNSHIP
GRASS TOWNSHIP

OHIO TOWNSHIP
HAMMOND TOWNSHIP

HAMMOND TOWNSHIP

GRASS TOWNSHIP

CROSS SECTION no. 1

CROSS SECTION no. 2

CROSS SECTION no. 3

CROSS SECTION no. 4

CROSS SECTION no. 5

SECTION A-A

SECTION B-B

PROPOSED BORROW AREA

PROPOSED BORROW AREA

STORAGE AREA 1

STORAGE AREA 2

MILE 745

MILE 744

NORMAL POOL EL 358'

LW 344.5'
HW 398.4'

PROPOSED 765 KV RELOCATED TRANSMISSION LINE

765 KV TRANSMISSION LINE

138 KV TRANSMISSION LINE

UNDERGROUND PIPELINE

UNDERGROUND GAS PIPELINE

R.R. SPUR LINE

LEGEND

- INDEX CONTOUR — 400
- INTERMEDIATE CONTOUR — 400
- SPOT ELEVATION — x 399.4
- ROADS — CO. RD. 600; STATE RD. 45; U.S. HWY. 231
- ROCKPORT PLANT PROPERTY LINE
- POWER TRANSMISSION LINE
- GAS LINE OR PIPE LINE
- GRADE LINE
- EXISTING WATERBODY
- BUILDINGS
- MARSH
- WOODLAND
- FENCE OR FIELD LINE
- SECTION CORNER
- TOWNSHIP LINE — T6S T5S
- BOREHOLE LOCATION SITES
  - DRILLED IN 1983-84 — ⊙ BI
  - DRILLED IN 1980 — ⊡ PTH I
  - DRILLED IN 1973 — △ BH I

REVISIONS

DATE	NO.	DESCRIPTION	APPD.

NOTE:
GRADE ELEVATION HAS BEEN ESTABLISHED AS ELEVATION 100'-0". TO CONVERT TO PLANT DATUM ADD 492'-0" TO ELEVATIONS SHOWN.

INDIANA & MICHIGAN ELECTRIC CO.
ROCKPORT PLANT
ROCKPORT, INDIANA

ASH DISPOSAL AREAS
SITE INVESTIGATION PLAN

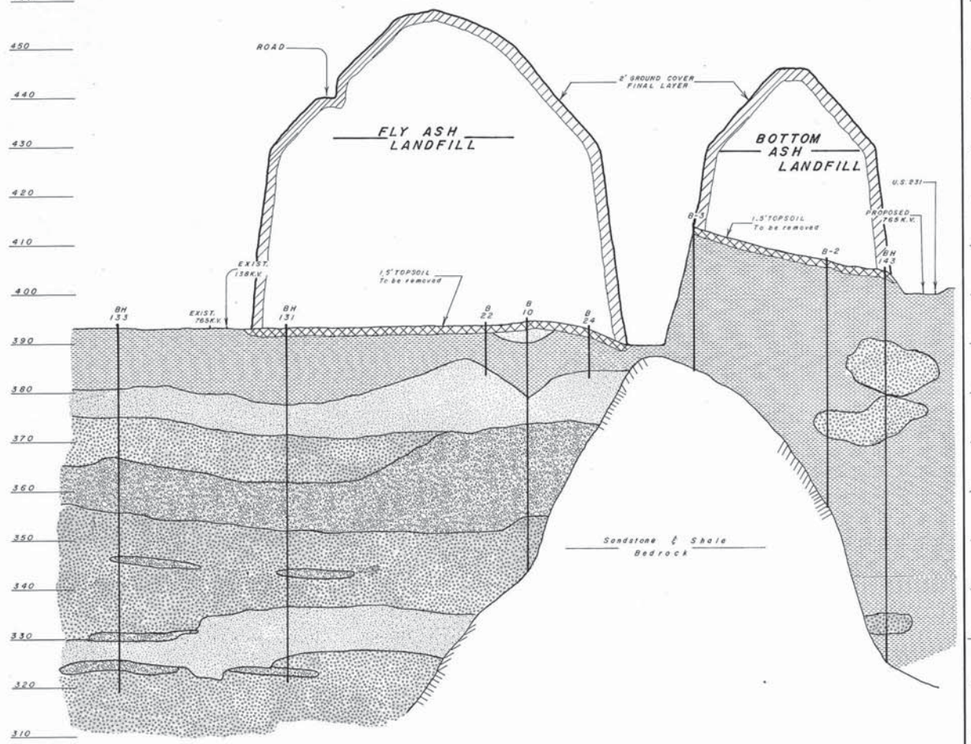
DR. NO. 12-30090

ARCH. – ELEC. – MECH. – STR. –
SCALE: 1"= 600'
DR. J. DEEMS
CH. J. M.-N.
DES. LDR. T.S.
DATE: 3-27-84
APPROVED BY
ENGINEERING DIV.
DESIGN DIV.

AMERICAN ELECTRIC POWER SERVICE CORP.

DR. No. 12-30091

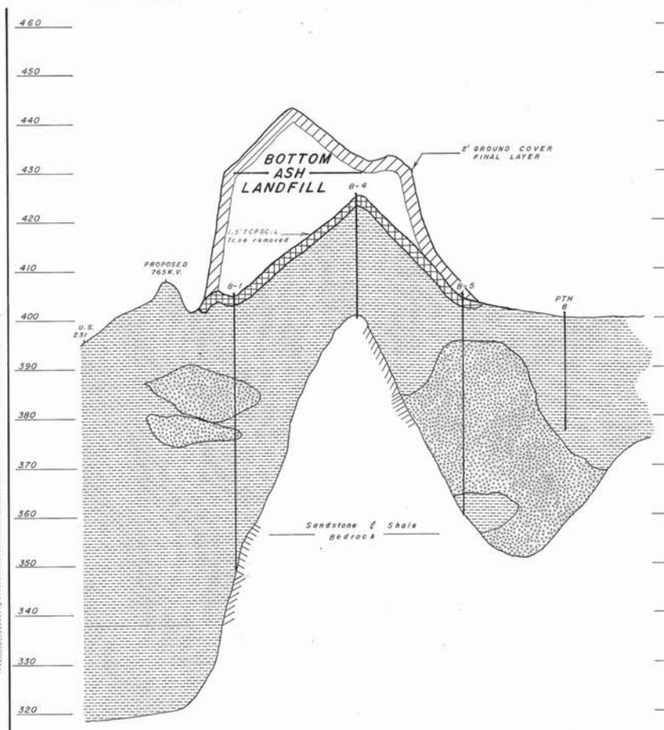
SOUTHEAST



NORTHWEST

CROSS SECTION no. 2

SOUTHWEST



NORTHEAST

CROSS SECTION no. 1

LEGEND

- GROUND COVER
- TOP SOIL
- SILTY SANDY CLAY
- FINE SAND
- SAND
- SAND & GRAVEL

SCALE:
Horizontal 1" = 600'
Vertical 1" = 10'

DATE	NO.	DESCRIPTION	APPD.

REVISIONS

INDIANA & MICHIGAN ELECTRIC CO.
ROCKPORT PLANT
ROCKPORT, INDIANA

ASH DISPOSAL AREAS
GEOLOGIC X-SECTIONS
Nº 1 & Nº 2

DR. NO. 12-30091

ARCH.	–	ELEC.	–	MECH.	–	STR.	–

SCALE: As Shown
DR. J. DOMBI
CH. J.M.H.
SQ. LOR T.S.
DATE: 3-27-84
ENGINEER IN CH. [signature]
SECTION CH. [signature]

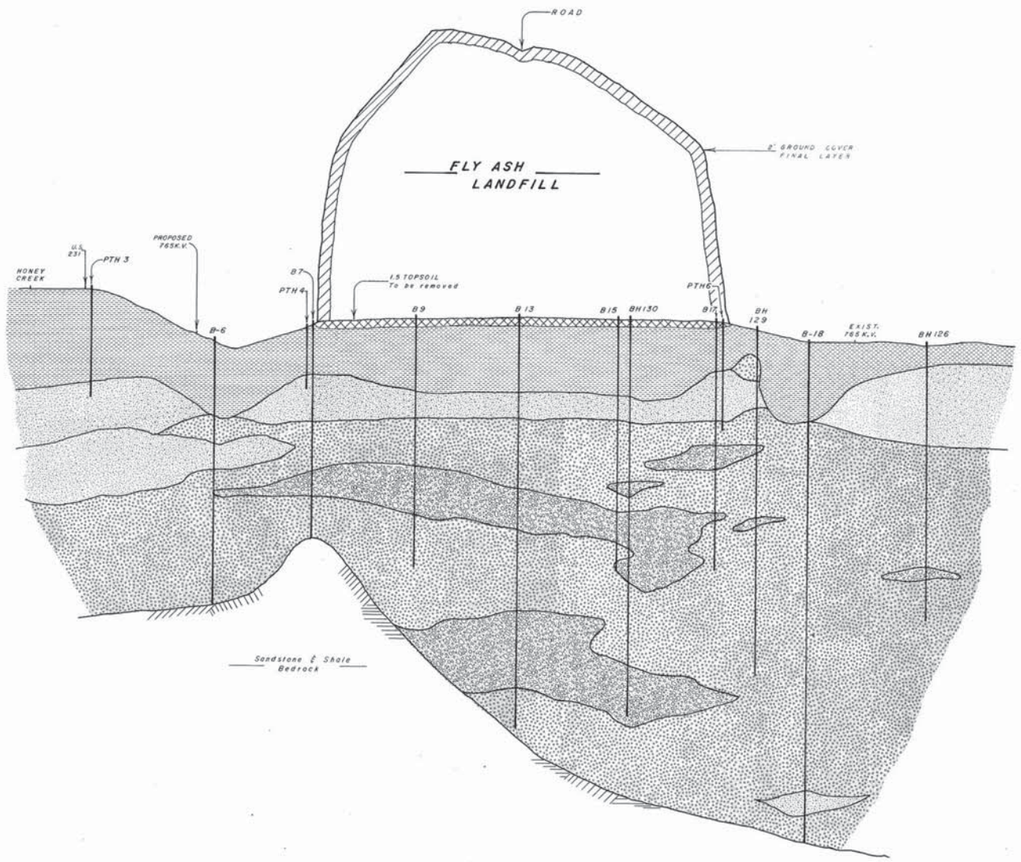
AMERICAN ELECTRIC POWER SERVICE CORP.

AEP5046KY

DR. No. 12-30092

WEST

EAST



460 450 440 430 420 410 400 390 380 370 360 350 340 330 320 310 300 290 280

CROSS SECTION no. 3

SCALE:
Horizontal 1" = 600'
Vertical 1" = 10'

LEGEND

- GROUND COVER
- TOP SOIL
- SILTY SANDY CLAY
- FINE SAND
- SAND
- SAND & GRAVEL

DATE	NO.	DESCRIPTION	APPD.

REVISIONS

INDIANA & MICHIGAN ELECTRIC CO
ROCKPORT PLANT
ROCKPORT, INDIANA

ASH DISPOSAL AREAS
GEOLOGIC X-SECTION
Nº 3

DR. NO. 12-30092

ARCH. – ELEC. – MECH. – STR. –

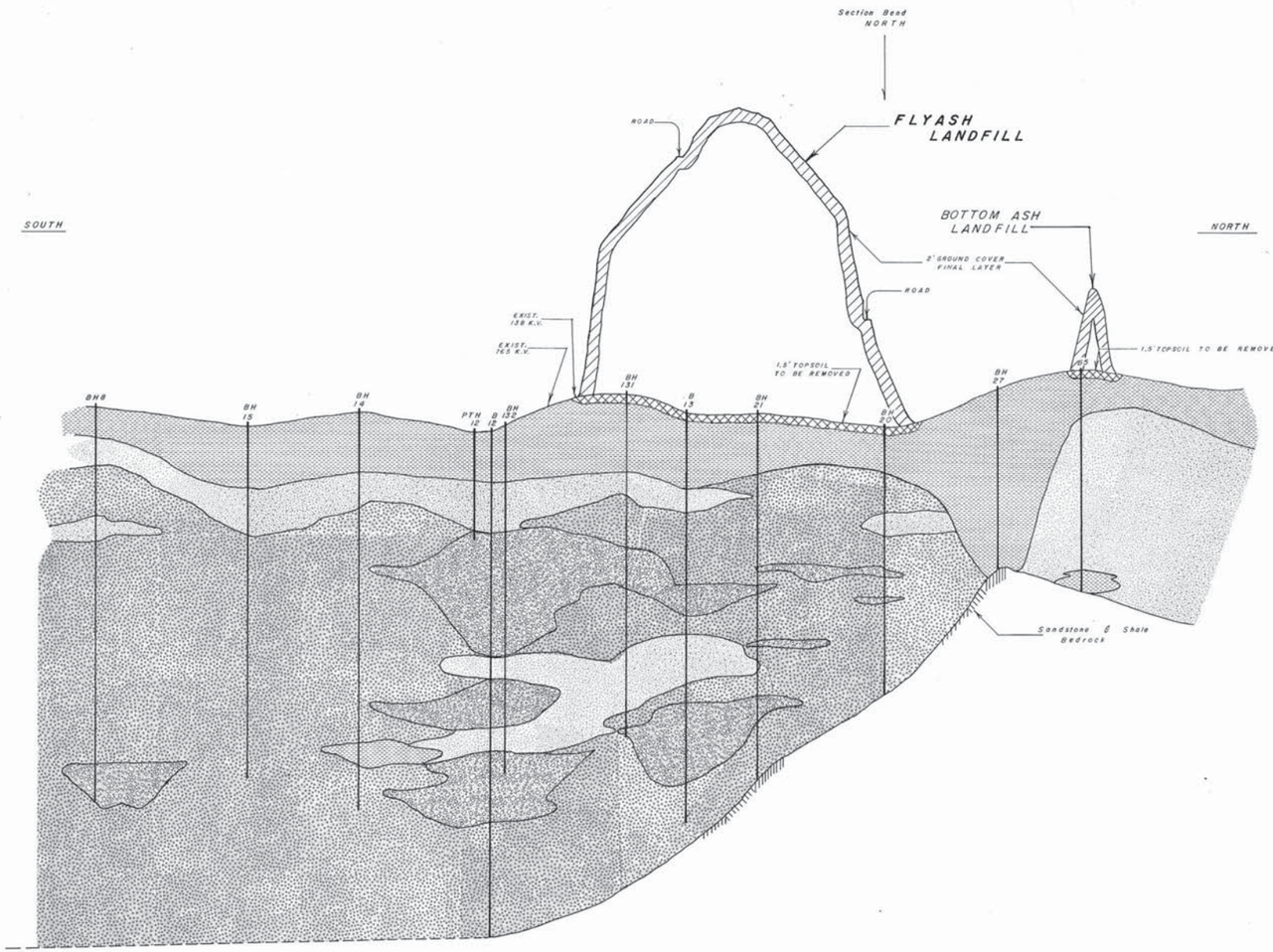
SCALE: AS NOTED
DR. J. Deeby
CH. J.M.-N.
EQ. LDR T.S.
DATE 5-17-84

ENGINEERING BY
DESIGN BY

AMERICAN ELECTRIC POWER SERVICE CORP.

AEP3046KY

DR. No. 12-30093



SCALE:
Horizontal 1" = 600'
Vertical 1" = 10'

CROSS SECTION no. 4

LEGEND

- GROUND COVER
- TOP SOIL
- SILTY SANDY CLAY
- FINE SAND
- SAND
- SAND & GRAVEL

DATE	NO.	DESCRIPTION	APPD.

REVISIONS

INDIANA & MICHIGAN ELECTRIC CO.
ROCKPORT PLANT
ROCKPORT, INDIANA

ASH DISPOSAL AREAS
GEOLOGIC X-SECTION
No 4

DR. NO. 12-30093

ARCH. | ELEC | – | MECH. | – | STR. | –

SCALE: As Shown
DR. J. Deeds
CH. J.M.-N.
SQ. LOW T.S.
DATE: 3-17-84

APPROVED BY
ENGINEERING DIV.
DESIGN DIV.

AMERICAN ELECTRIC POWER SERVICE CORP.

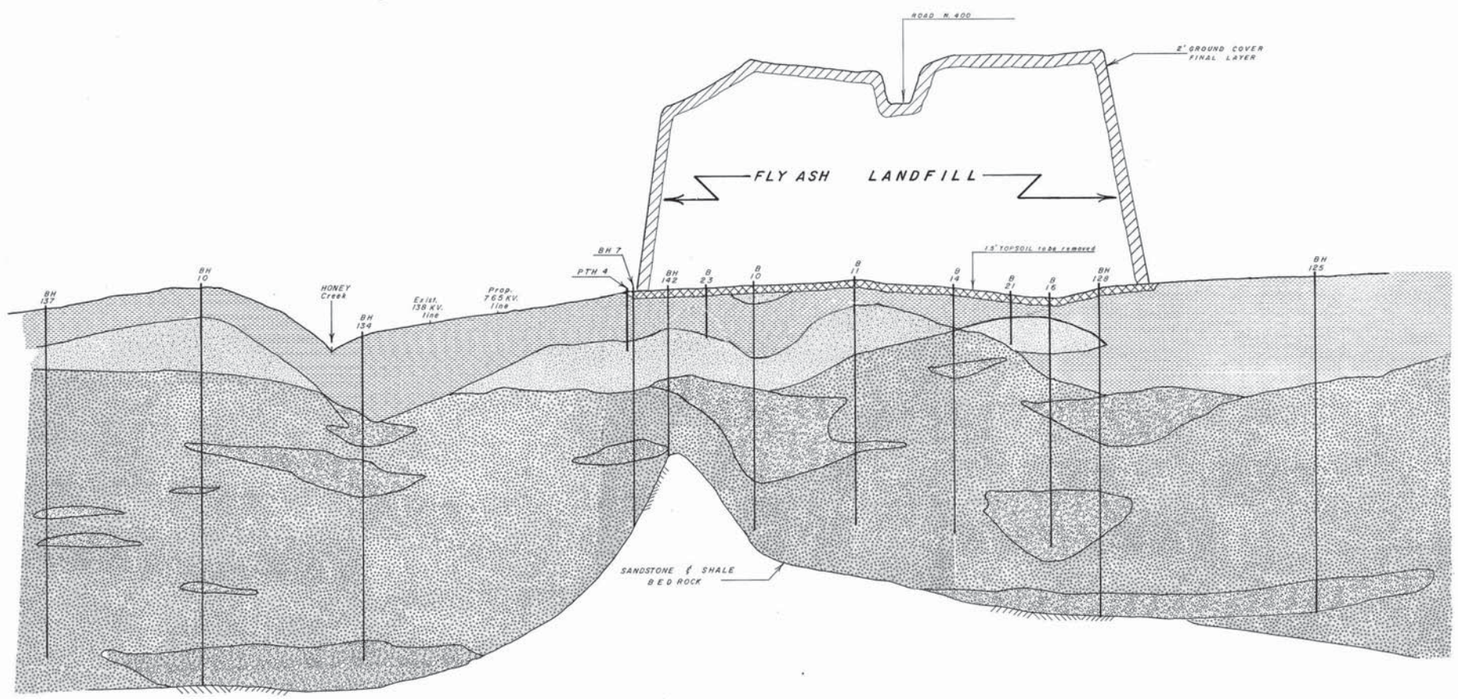
AEPSO4KEY

DR. NO. 12-30094

SECTION BEND WEST

SOUTHWEST

EAST



450 440 430 420 410 400 390 380 370 360 350 340 330 320 310 300 290

CROSS SECTION no. 5

SCALE:
Horizontal 1" = 600'
Vertical 1" = 10'

LEGEND

- GROUND COVER
- TOP SOIL
- SILTY SANDY CLAY
- FINE SAND
- SAND
- SAND & GRAVEL

DATE	NO.	DESCRIPTION	APPD.

REVISIONS

INDIANA & MICHIGAN ELECTRIC CO.
ROCKPORT PLANT
ROCKPORT, INDIANA

ASH DISPOSAL AREAS
GEOLOGIC X-SECTION
Nº 5

DR. NO. 12-30094

ARCH.	ELEC	MECH.	STR.
SCALE: AS SHOWN	ENGINEERED BY:		
DR. J. DEEMS	CHECKED BY:		
CH. J.M.-K	DESIGN BY:		
SQ. LOA T.S.			
DATE 3-27-86			

AMERICAN ELECTRIC POWER SERVICE CORP.

AEP30468Y

DR. No. 12-30095

INDIANA

OHIO

KENTUCKY

RIVER

OHIO TOWNSHIP
HAMMOND TOWNSHIP
HAMMOND TOWNSHIP
GRASS TOWNSHIP

HONEY CREEK

MILE 745
MILE 744

NORMAL POOL EL 359'

LW 344.5'
HW 398.4'

STORAGE AREA 1

STORAGE AREA 2

SECTION A-A

SECTION B-B

SECTION C-C

SECTION D-D

PROPOSED RAILROAD SPUR

R.R. SPUR LINE

UNDERGROUND PIPELINE

RGW RS & W BH131 12-30095

LEGEND

- INDEX CONTOUR — 400
- INTERMEDIATE CONTOUR — 400½
- SPOT ELEVATION — × 399.4
- BEDROCK CONTOUR (10' INTERVAL) — 400
- ROADS — CO. RD. STATE RD. U.S. HWY. (45) 231
- ROCKPORT PLANT PROPERTY LINE
- POWER TRANSMISSION LINE
- GAS LINE OR PIPE LINE
- GRADE LINE
- EXISTING WATERBODY
- BUILDINGS
- MARSH
- WOODLAND
- FENCE OR FIELD LINE
- SECTION CORNER — ALUM. CAP 1957
- TOWNSHIP LINE — TWP. TWP.

BOREHOLE LOCATION SITES

- DRILLED IN 1983-84 — ○ B1
- DRILLED IN 1980 — □ PTH 1
- DRILLED IN 1973 — △ BH 1

DATE	No.	DESCRIPTION	APPD.

REVISIONS

NOTE:
GRADE ELEVATION HAS BEEN ESTABLISHED AS ELEVATION 100'-0". TO CONVERT TO PLANT DATUM ADD 492'-0" TO ELEVATIONS SHOWN.

INDIANA & MICHIGAN ELECTRIC CO.
ROCKPORT PLANT
ROCKPORT, INDIANA

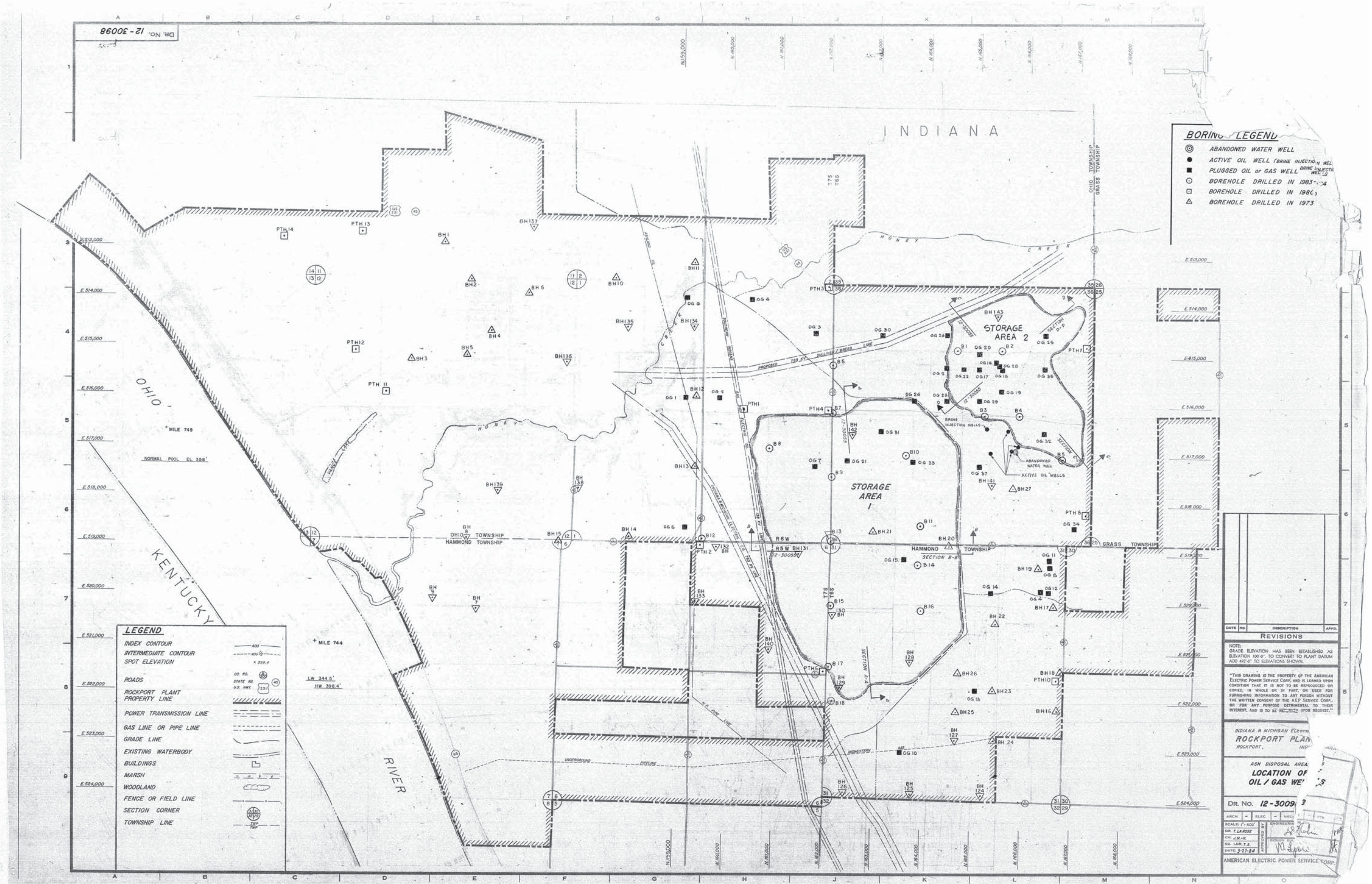
ASH DISPOSAL AREAS

BEDROCK TOPOGRAPHY

DR. No. 12-30095

ARCH. –	ELEC. –	MECH. –	STR.
SCALE: 1"=800'	ENGINEERING		
DR. T. LA ROSE	APPROVED BY		
CH. J.M.-H.			
SQ. LOR. T.S.	DESIGN DIV.		
DATE: 3-27-84			

AMERICAN ELECTRIC POWER SERVICE CORP.



DR. NO. 12-30098
INDIANA
KENTUCKY
OHIO
RIVER
STORAGE AREA 1
STORAGE AREA 2
OHIO TOWNSHIP
HAMMOND TOWNSHIP
GRASS TOWNSHIP
BORING LEGEND
ABANDONED WATER WELL
ACTIVE OIL WELL (BRINE INJECTION WELL)
PLUGGED OIL or GAS WELL
BOREHOLE DRILLED IN 1983-84
BOREHOLE DRILLED IN 1980
BOREHOLE DRILLED IN 1973
LEGEND
INDEX CONTOUR
INTERMEDIATE CONTOUR
SPOT ELEVATION
ROADS
ROCKPORT PLANT PROPERTY LINE
POWER TRANSMISSION LINE
GAS LINE OR PIPE LINE
GRADE LINE
EXISTING WATERBODY
BUILDINGS
MARSH
WOODLAND
FENCE OR FIELD LINE
SECTION CORNER
TOWNSHIP LINE
MILE 745
MILE 744
NORMAL POOL EL. 358'
LW 344.5'
HW 398.4'
BRINE INJECTION WELLS
ABANDONED WATER WELL
ACTIVE OIL WELLS
DATE
NO.
DESCRIPTION
APPD.
REVISIONS
NOTE:
GRADE ELEVATION HAS BEEN ESTABLISHED AS ELEVATION 100'-0". TO CONVERT TO PLANT DATUM ADD 492'-0" TO ELEVATIONS SHOWN.
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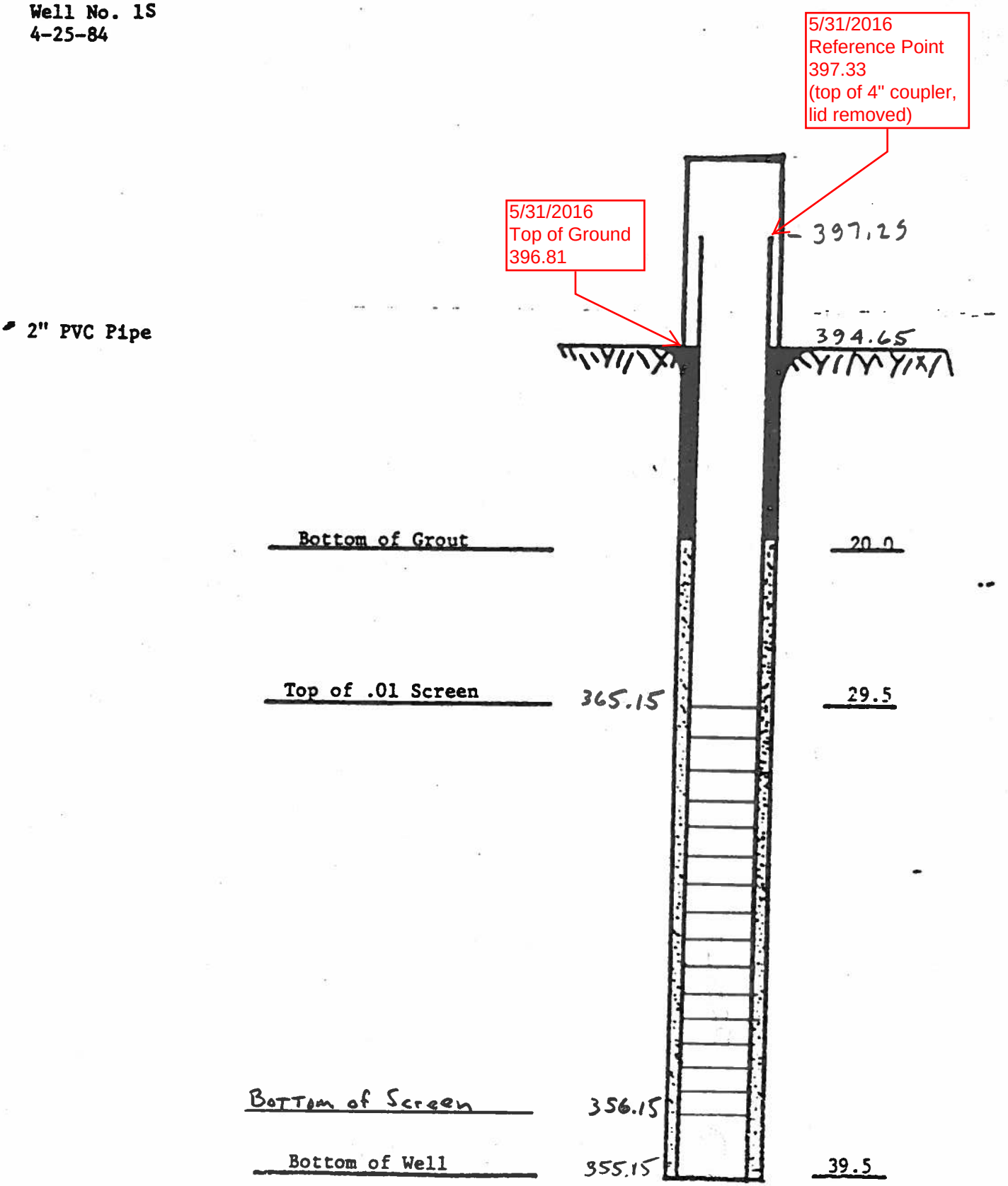
INDIANA & MICHIGAN ELECTRIC
ROCKPORT PLANT
ROCKPORT, INDIANA
ASH DISPOSAL AREA
LOCATION OF OIL / GAS WELLS
DR. NO. 12-30098
SCALE: 1" = 600'
DR. T. LAROSE
CH. J.M.-H.
SQ. LDR. T.S.
DATE: 3-27-84
APPROVED BY
ENGINEERING DIV.
DESIGN DIV.
AMERICAN ELECTRIC POWER SERVICE CORP.

APPENDIX C

WELL CONSTRUCTION AND LITHOLOGIC LOGS
LANDFILL MONITORING WELLS

I & M
Rockport Plant
Ash Storage Area
Well No. 1S
4-25-84

MW-1S



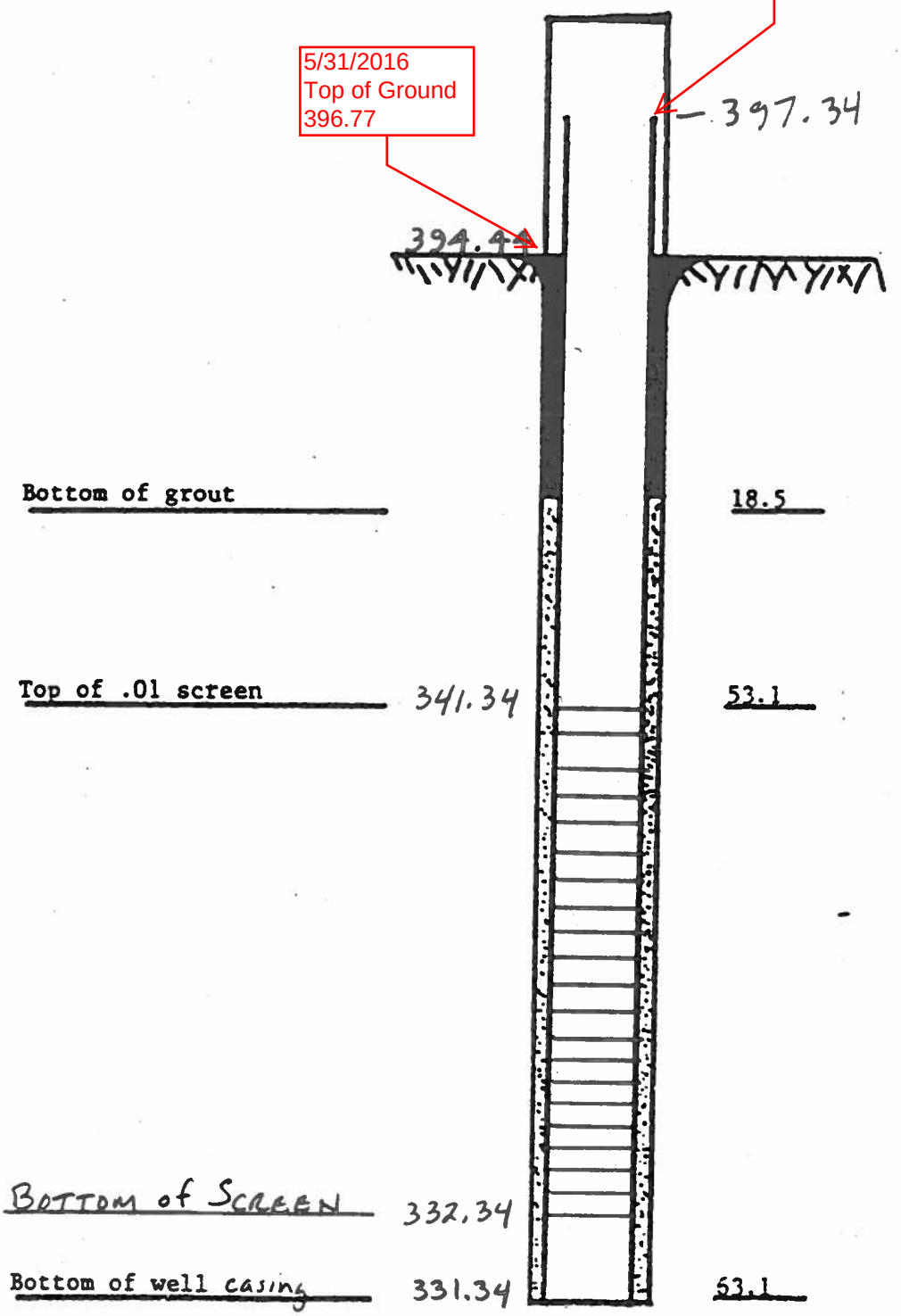
I & M.
Rockport Plant
Ash Storage Area
Well No. 1-M
4-25-84

MW-1I

5/31/2016
Reference Point
397.45
(top of 4" coupler, lid removed)

5/31/2016
Top of Ground
396.77

2" PVC Pipe



I & M
Rockport Plant
Ash Storage Area
Well No. 1-D
4-24-84

MW-1D

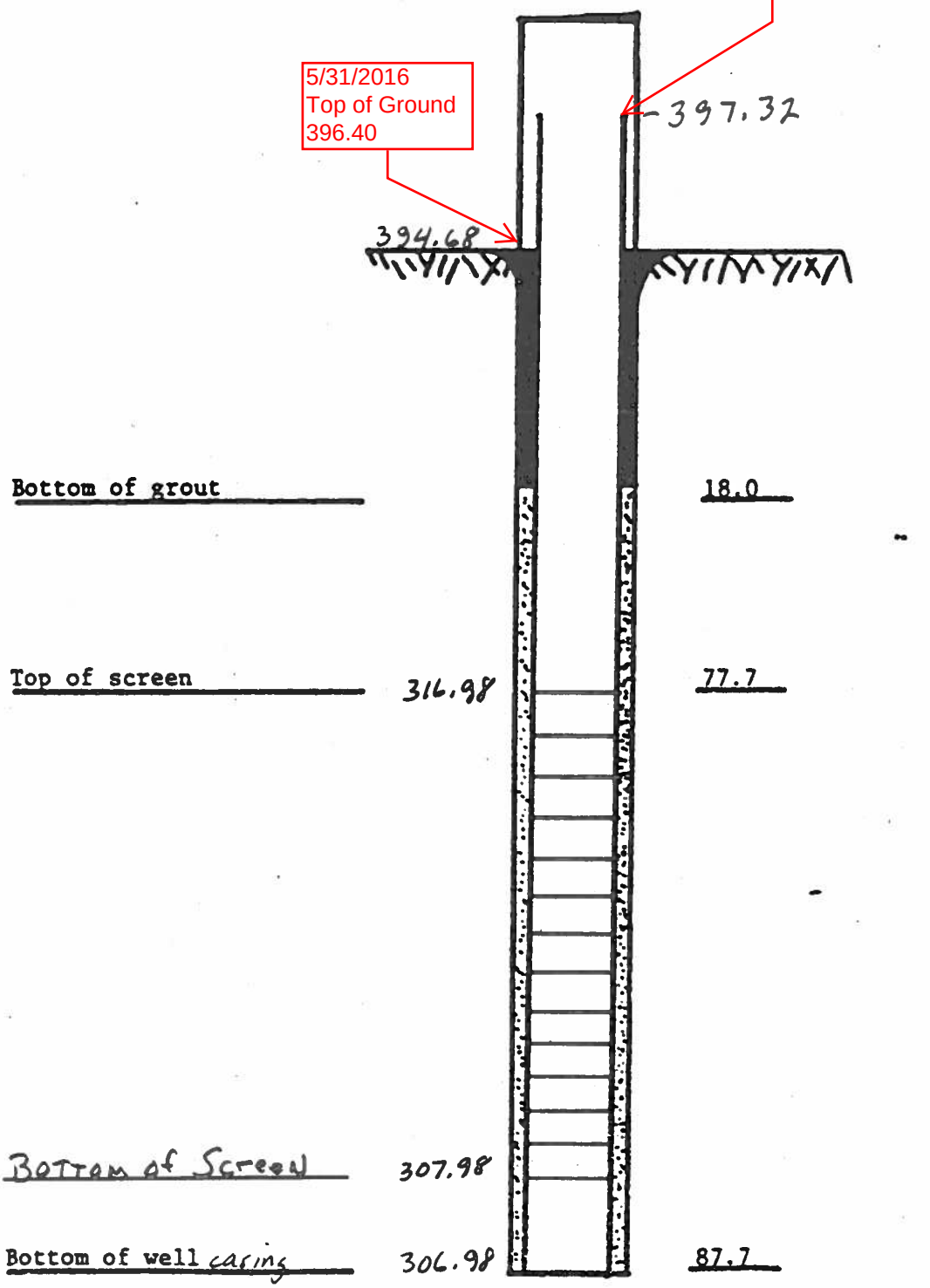
5/31/2016
Reference Point
397.25
(top of 2" PVC pipe)

5/31/2016
Top of Ground
396.40

397.32

394.68

2" PVC Pipe



AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY INDIANA MICHIGAN POWER COMPANY

PROJECT ROCKPORT PLANT

COORDINATES N 162,107.2 E 521,813.6

GROUND ELEVATION 395.2 SYSTEM _____

WATER LEVEL	▽	▼	▼
TIME			
DATE			

BORING NO. 9901 (MW-1) DATE 4/27/99 SHEET 1 OF 3

BORING START 1/18/99 BORING FINISH 1/28/99

PIEZOMETER TYPE _____ WELL TYPE OW

HGT. RISER ABOVE GROUND _____ DIA _____

DEPTH TO TOP OF WELL SCREEN _____ BOTTOM _____

WELL DEVELOPMENT _____ BACKFILL Grout

FIELD PARTY MCR-DLB RIG BK-81

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
1	SS	0.0	1.5	1-2-2	1.4				CL	**BROWN SILTY CLAY** With organic in top 0.8'; moist		Water for drilling came from fire protection well at the plant.
2	SS	1.5	3.0	2-2-3	1.3				CL	**BROWN SILTY CLAY** Moist		
3	SS	3.0	4.5	3-4-6	1.5				CL	**BROWNISH GRAY SILTY CLAY** Dry		
~~4~~	~~SS~~	~~4.5~~	~~6.0~~	~~5-7-7~~	~~1.5~~		5					Used approx. 300 gallons of mud to drill boring - 3 bags.
5	SS	6.0	7.5	5-7-6	1.5				SP	**REDDISH BROWN SAND** Medium grain; dry.		
6	SS	7.5	9.0	2-4-5	1.5				CL	**BROWN SILTY CLAY** Wet		
7	SS	9.0	10.5	3-4-6	1.5		10		CL	**BROWN SILTY CLAY** Dry		
8	SS	10.5	12.0	4-6-7	1.5				SP	**BROWN SAND** Medium grain; dry.		Used approx. 125 gallons of grout with 5 bags. Grouted from 110.2' to grade.
9	SS	12.0	13.5	3-6-8	1.5							
10	SS	13.5	15.0	3-3-4	1.5		15		SP	**BROWN SAND** Medium grain with pea size gravel; dry.		
11	SS	15.0	16.5	4-4-4	1.5							
12	SS	16.5	18.0	3-6-6	1.5							
13	SS	18.0	19.5	6-6-8	1.5							
~~14~~	~~SS~~	~~19.5~~	~~21.0~~	~~6-10-10~~	~~1.5~~		20					
15	SS	21.0	22.5	7-9-11	1.5							
16	SS	22.5	24.0	7-8-8	1.5				SP	**BROWN SAND** With BB to 1/2" gravel; dry.		
17	SS	24.0	25.5	7-8-12	1.5		25					
18	SS	26.9	28.4	5-5-10	1.5				SP	**BROWN SAND** With BB to 1/2" gravel; wet.		
~~19~~	~~SS~~	~~29.5~~	~~31.0~~	~~3-5-9~~	~~1.5~~		30					
20	SS	31.0	32.5	4-5-6	1.5							
21	SS	32.5	34.0	4-8-9	1.5							
22	SS	34.0	35.5	3-3-3	1.5							
23	SS	35.5	37.0	6-8-11	1.5		35		SP	**SAND** Medium grain with pea size gravel; wet.		
24	SS	37.0	38.5	5-12-12	1.5				SP	**SAND** Medium grain with pea to 1/2" gravel; wet.		
25	SS	38.5	40.0	8-6-6	1.5							

TYPE OF CASING USED

	NQ-2 ROCK CORE	
X	6" x 3.25 HSA	
	9" x 6.25 HSA	
	HW CASING ADVANCER	4"
	NW CASING	3"
	SW CASING	6"
	AIR HAMMER	8"

Continued Next Page

PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC

WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON

RECORDER DLB

AEP RKPT.GPJ AEP_FULL.GDT 4/27/99

AME AN ELECTRIC POWER SERVICE COF RATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY INDIANA MICHIGAN POWER COMPANY BORING NO. 9901 DATE 4/27/99 SHEET 2 OF 3

PROJECT ROCKPORT PLANT BORING START 1/18/99 BORING FINISH 1/28/99

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
26	SS	41.9	43.4	9-12-14	1.5							
27	SS	46.9	48.4	8-8-8	1.5		45					
28	SS	51.9	53.4	4-8-11	1.5							
29	SS	53.4	54.9	5-10-12	1.5		50					
30	SS	54.9	56.4	4-7-9	1.3							
31	SS	56.4	57.9	10-9-10	1.4				SP	LIGHT BROWN POORLY GRADED SAND With fine to 3/4" gravel; wet.		
32	SS	57.9	59.4	7-14-12	1.5				SP	SAND Medium grain with few pea size gravel; wet.		
33	SS	59.4	60.9	6-10-13	1.5		55		SP	SAND Medium grain with pea to 3/4" gravel; wet.		
34	SS	60.9	62.4	9-13-12	1.5				SW	POORLY GRADED SAND Wet.		
35	SS	62.4	63.9	7-7-10	1.5					LIGHT BROWN WELL GRADED SAND Medium grain; wet.		
36	SS	66.9	68.4	7-11-16	1.5		60					
37	SS	71.9	73.4	7-7-10	1.5				SP	LIGHT BROWN POORLY GRADED SAND Fine to medium grained; wet.		
38	SS	76.9	78.4	4-5-5	1.5		65					
39	SS	78.4	80.4	4-4-5-7	1.9				SP	POORLY GRADED SAND With pea size gravel; wet.		Started SPT on 2.0' centers at 78.4'.
40	SS	80.4	82.4	3-4-5-6	1.8		70					
41	SS	82.4	84.4	2-3-5-5	2.0				SW	LIGHT BROWN WELL GRADED SAND		
42	SS	84.4	86.4	1-3-4-6	2.0				SP	Medium grain; wet. LIGHT BROWN POORLY GRADED SAND Wet.		
43	SS	86.4	88.4	3-4-9-10	2.0		75		SP	POORLY GRADED SAND With fine gravel; wet.		
									SP	SAND Medium grain with few 1/2" gravel; wet.		
							80					
							85					
							90					

RECEIVED
JUN 28 1999
DEPARTMENT OF
ENVIRONMENTAL MANAGEMENT
SOLID & HAZARDOUS WASTE MANAGEMENT

Continued Next Page

AEP RKPT.GPJ AEP_FULL.GDT 4/27/99

AME AN ELECTRIC POWER SERVICE COF RATION

AEP CIVIL ENGINEERING LABORATORY

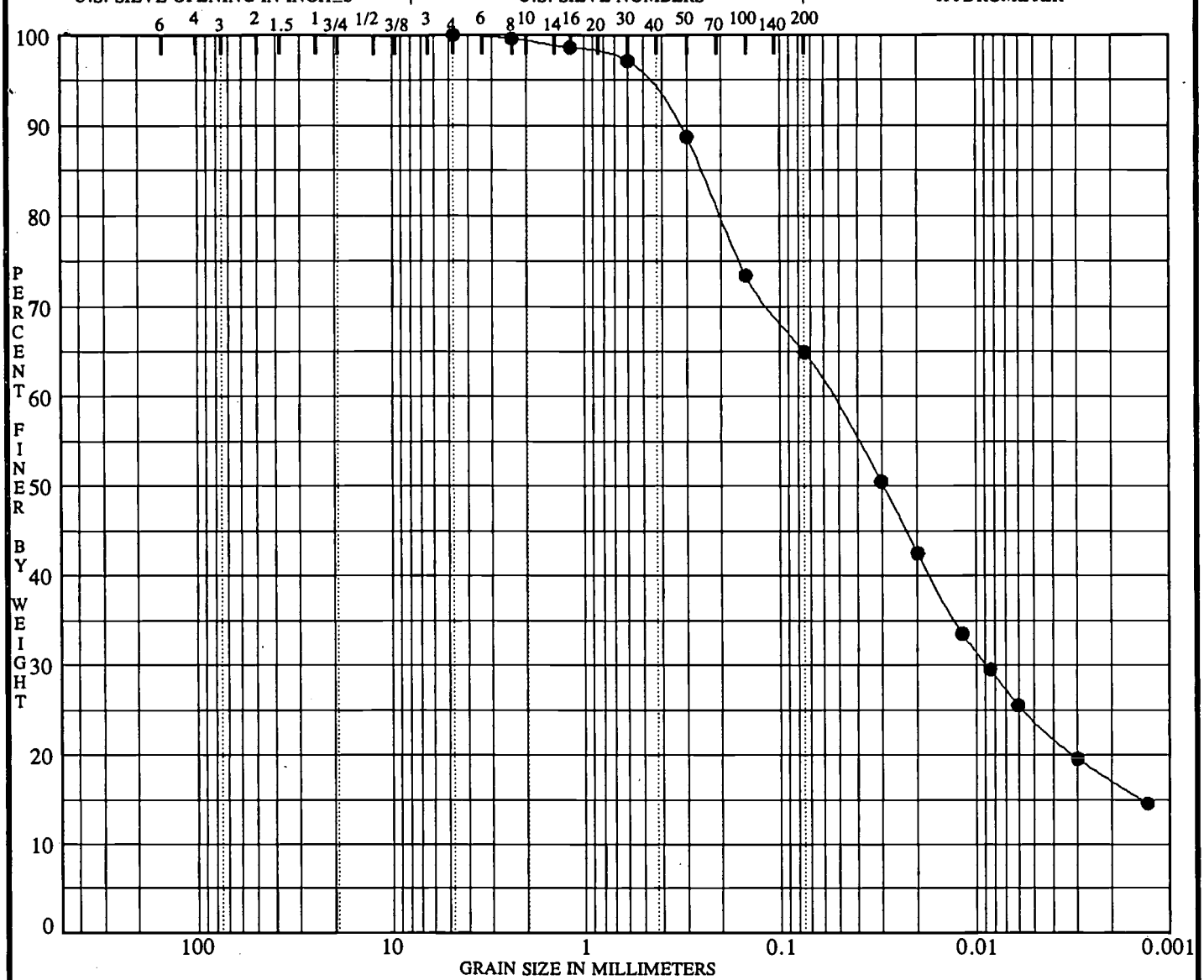
LOG OF BORING

JOB NUMBER _____

COMPANY **INDIANA MICHIGAN POWER COMPANY** BORING NO. **9901** DATE **4/27/99** SHEET **3** OF **3**

PROJECT **ROCKPORT PLANT** BORING START **1/18/99** BORING FINISH **1/28/99**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
44	SS	91.9	93.9	9-10-14-13	2.0		95					
45	SS	96.9	98.9	5-9-14-20	2.0		100					
46	SS	101.9	103.4	11-12-15	1.5		105		SP	**SAND** Medium grained with few 1/2" gravel; wet.		
47	SS	106.9	108.4	3-14-20	1.4				CL	**SANDY CLAY** With 3/4" gravel.		
~~48~~	~~SS~~	~~109.5~~	~~110.1~~	~~30-50/1~~	~~0.5~~		110			**COAL**		Spoon refusal at 110.1' Auger refusal at 110.2'



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification		Classification	MC%	LL	PL	PI	Sp.Gr.
● 9901	1.5			26.0	15.9	10.1	
		SANDY LEAN CLAY CL					
		COMPOSITE 1.5'-6.0'					

Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Fines	% < .002
● 9901	1.5	4.750	0.055	0.009		0.0	35.1	64.9	17.2

PROJECT ROCKPORT PLANT - ROCKPORT, INDIANA

JOB NO. WO#SC3750

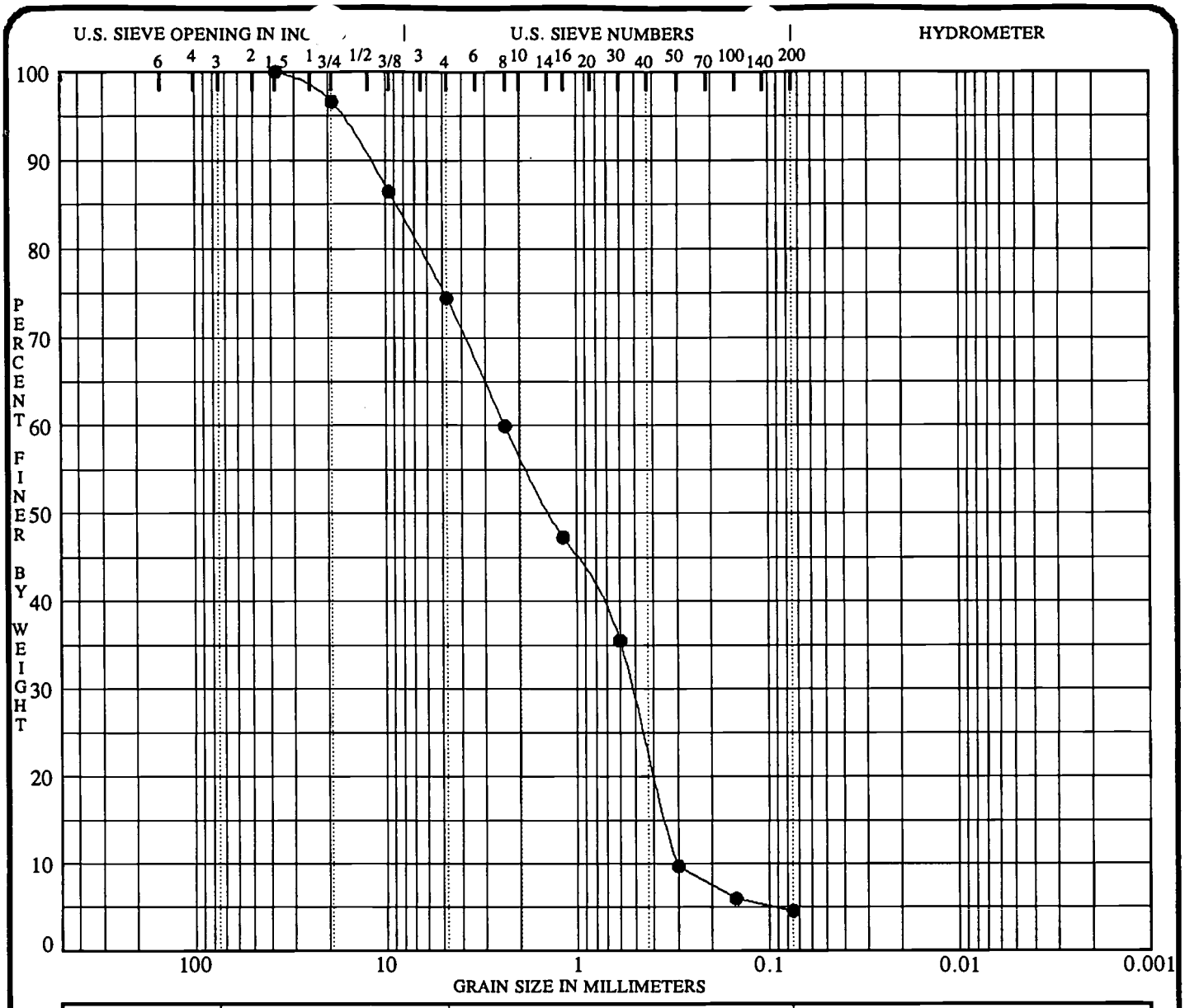
DATE 06/01/99

GRADATION CURVES

American Electric Power Service Corp.

Groveport, Ohio

AEP



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	MC%	LL	PL	PI	Sp.Gr.
●	9901	29.5			NP	NP	NP	
			POORLY GRADED SAND with SILT and GRAVEL SP-SM					
			WELL #1-S COMPOSITE SAMPLE 29.5'-40.0'					

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Fines	% < .002
●	9901	29.5	37.500	2.371	0.518	0.302	25.6	69.8	4.6	

PROJECT ROCKPORT PLANT - ROCKPORT, INDIANA

JOB NO. WO#1352

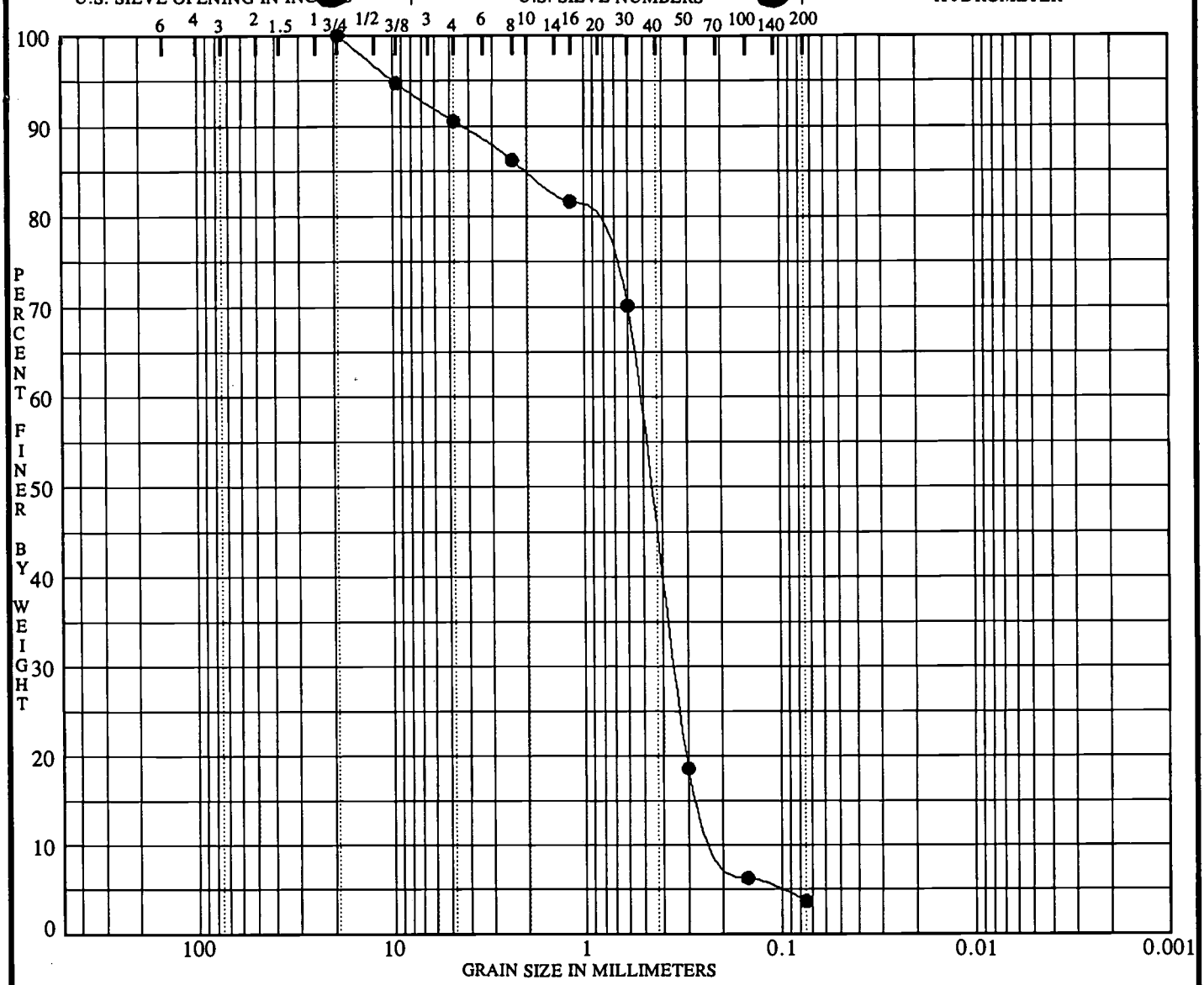
DATE 04/22/99

GRADATION CURVES

American Electric Power Service Corp.

Groveport, Ohio

AEP



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

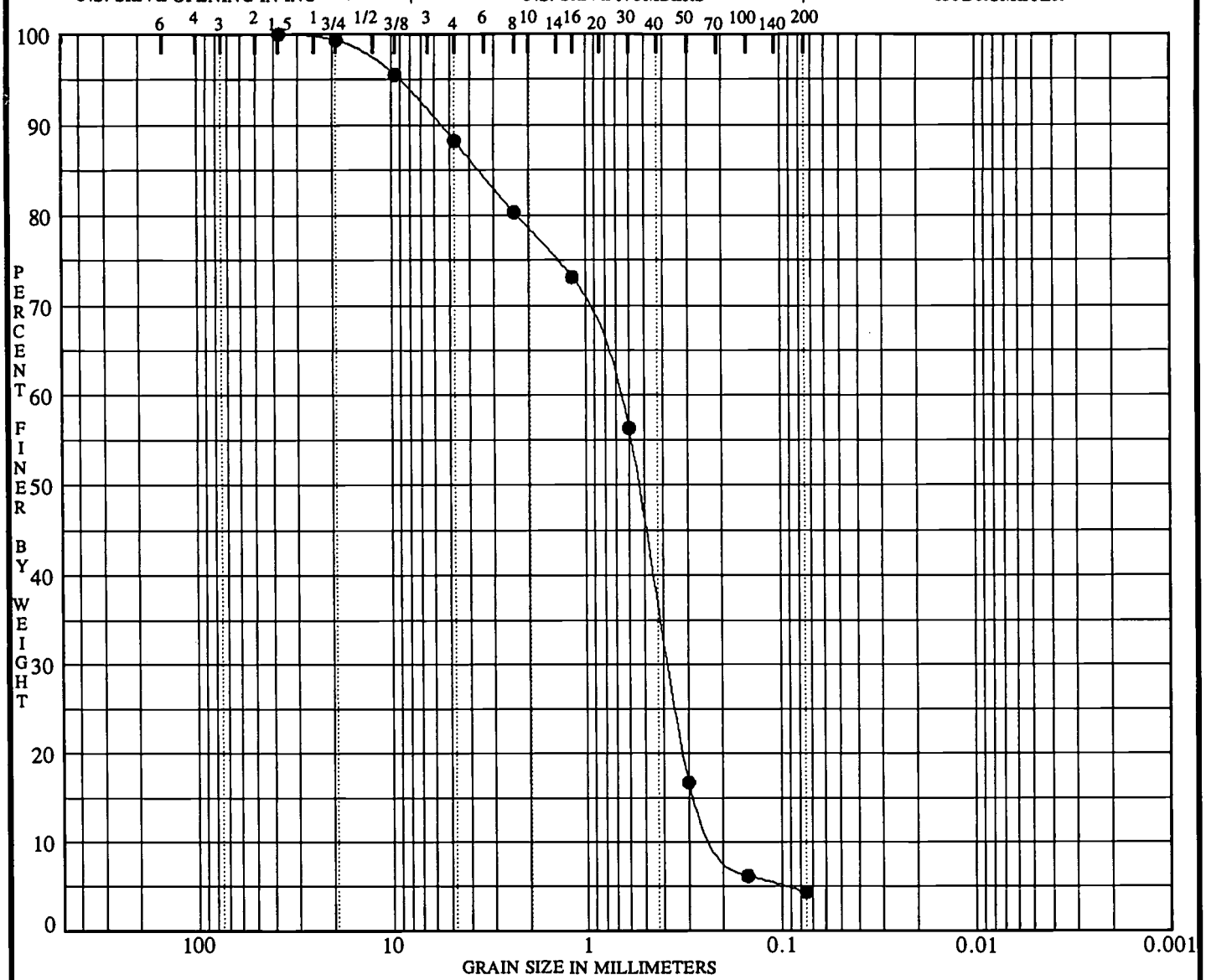
	Specimen Identification		Classification	MC%	LL	PL	PI	Sp.Gr.
●	9901	51.9			NP	NP	NP	
			POORLY GRADED SAND SP					
			WELL #1-I COMPOSITE SAMPLE 51.9'-63.9'					

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Fines	% < .002
●	9901	51.9	19.000	0.524	0.350	0.185	9.5	86.8	3.7	

PROJECT ROCKPORT PLANT - ROCKPORT, INDIANA JOB NO. WO#1352
DATE 04/22/99

GRADATION CURVES

American Electric Power Service Corp.
Groveport, Ohio



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification		Classification	MC%	LL	PL	PI	Sp.Gr.
● 9901	76.9			NP	NP	NP	
		POORLY GRADED SAND SP					
		WELL #1-D COMPOSITE SAMPLE 76.9'-88.4'					

Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Fines	% < .002
● 9901	76.9	37.500	0.696	0.379	0.193	11.8	83.8	4.4	

PROJECT ROCKPORT PLANT - ROCKPORT, INDIANA JOB NO. WO#1352
DATE 04/22/99

GRADATION CURVES

American Electric Power Service Corp.
Groveport, Ohio

I & M
Rockport Plant
Ash Storage Area
Well No. 2S
5-16-84

MW-2S

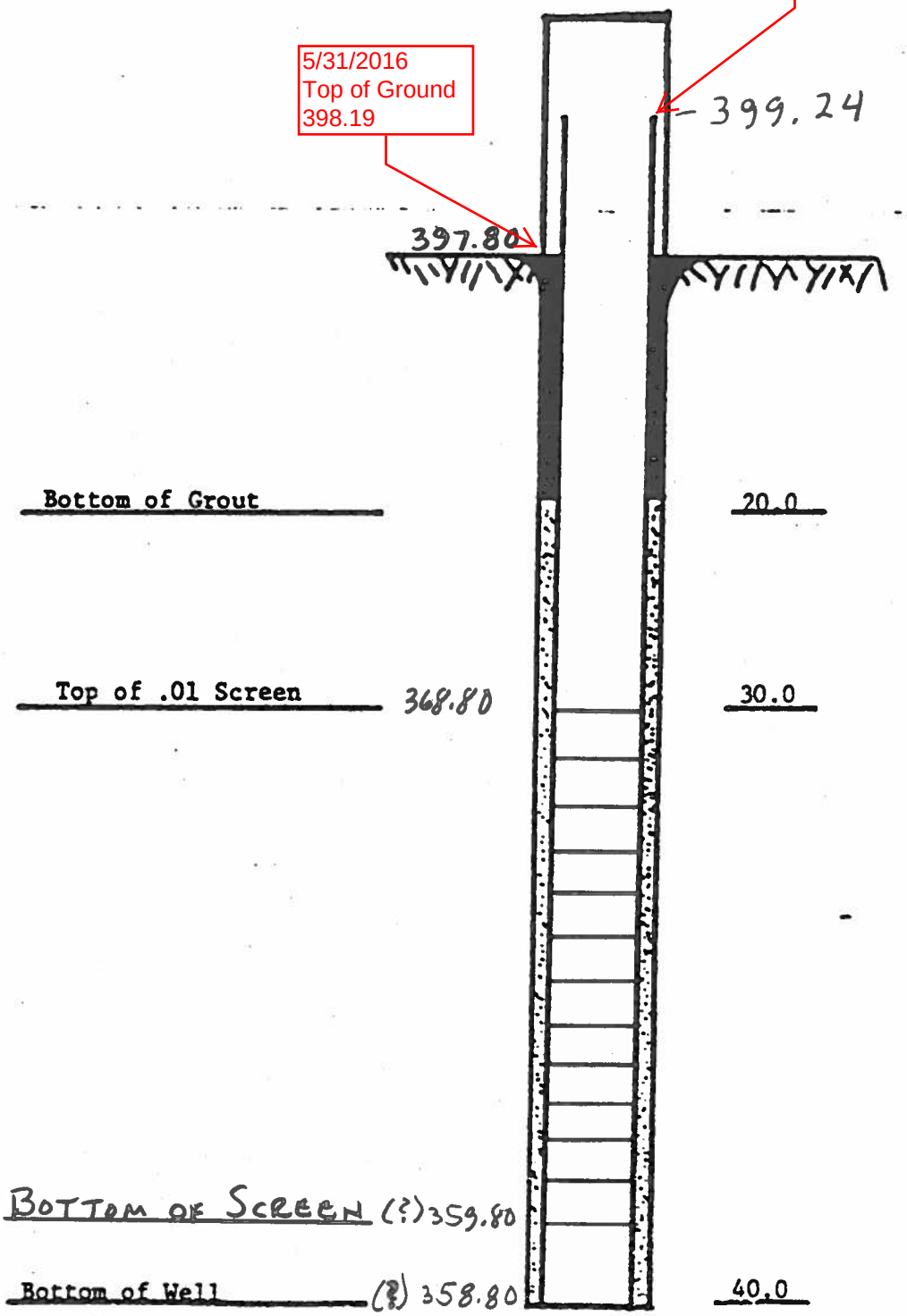
5/31/2016
Reference Point
399.27
(top of 4" coupler, lid removed)

5/31/2016
Top of Ground
398.19

399.24

397.80

2" PVC Pipe



I & M
Rockport Plant
Ash Storage Area
Well No. 2I
5-15-84

MW-2I

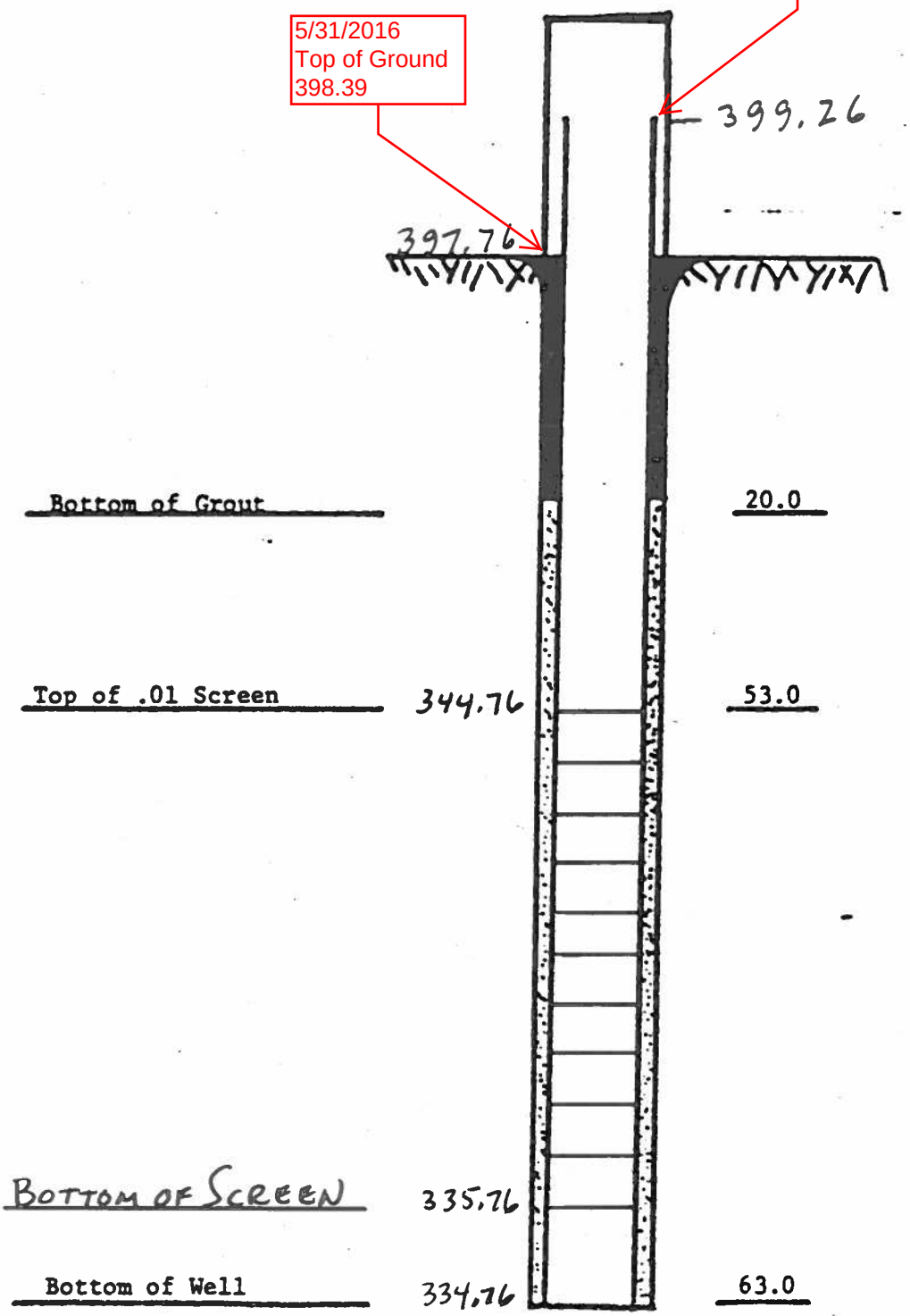
5/31/2016
Reference Point
399.42
(top of 4" coupler, lid removed)

5/31/2016
Top of Ground
398.39

399.26

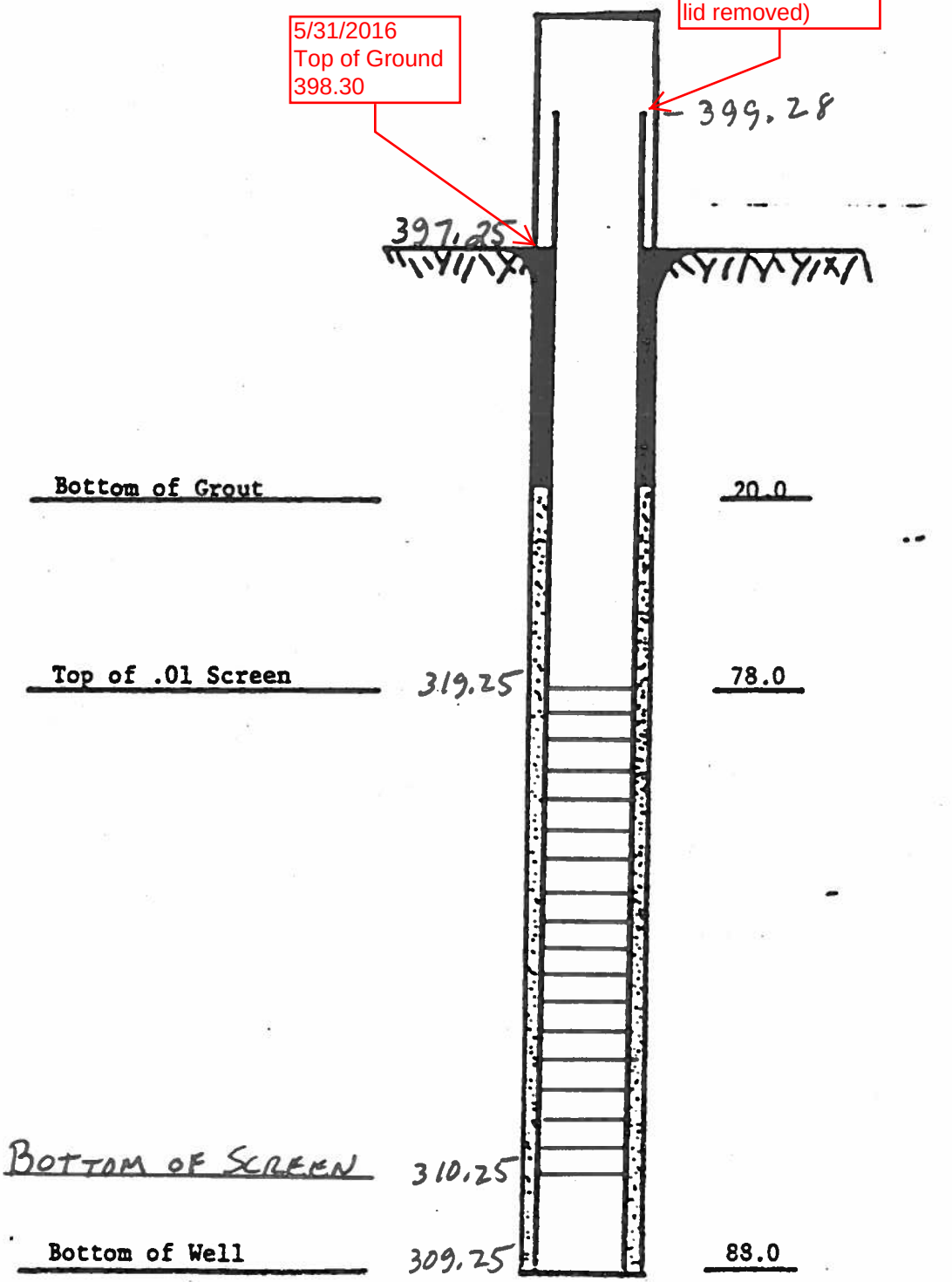
397.76

2" PVC Pipe



I & M
Rockport Plant
Ash Storage Area
Well No. 2D
5-15-84

MW-2D



AME :AN ELECTRIC POWER SERVICE COI RATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

MW-2

COMPANY INDIANA MICHIGAN POWER COMPANY — BORING NO. 9902 — DATE 4/27/99 — SHEET 1 OF 3

PROJECT ROCKPORT PLANT — BORING START 1/14/99 — BORING FINISH 1/15/99

COORDINATES N 160,790.3 E 518,916.4 — PIEZOMETER TYPE _____ — WELL TYPE OW

GROUND ELEVATION 397.3 — SYSTEM _____ — HGT. RISER ABOVE GROUND _____ — DIA _____

DEPTH TO TOP OF WELL SCREEN _____ — BOTTOM _____

WELL DEVELOPMENT _____ — BACKFILL Grout

FIELD PARTY MCR-DLB — RIG BK-81

WATER LEVEL	▽	▼	⧩
TIME			
DATE			

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
1	SS	0.0	1.5	1-2-3	1.0				CL	LIGHT BROWN FINE GRAIN SANDY CLAY Dry		Water for drilling and grouting from fire protection well at Rockport Plant.
2	SS	1.5	3.0	1-2-2	1.0							
3	SS	3.0	4.5	3-4-5	1.5							
4	SS	4.5	6.0	4-6-6	1.5		5		SP	DARK BROWN MEDIUM GRAIN SAND Dry		
5	SS	6.0	7.5	3-6-4	1.5				CL	BROWN SANDY CLAY		Grouted from 107.8' to grade; used approx. 100 gallons (4 bags).
6	SS	7.5	9.0	2-3-3	1.5				SP	Moist		
7	SS	9.0	10.5	3-3-5	1.5				CL	BROWN MEDIUM GRAIN SAND Moist		
8	SS	10.5	12.0	3-5-6	1.5		10			BROWN SILTY CLAY Moist		
9	SS	12.0	13.5	3-5-7	1.5				SP	BROWN MEDIUM GRAIN SAND		Used approx. 150 gallons (3 bags) drill mud while drilling hole.
10	SS	13.5	15.0	6-12-13	1.3				CL	BROWN SILTY CLAY		
11	SS	15.0	16.5	7-10-10	1.5				SP	LIGHT BROWN MEDIUM GRAIN SAND Dry		
12	SS	16.5	18.0	5-5-5	1.5		15		CL	BROWN SILTY CLAY		
13	SS	18.0	19.5	4-5-7	1.5				SP	MEDIUM GRAIN BROWN SAND Dry		
14	SS	19.5	21.0	5-5-8	1.5							
15	SS	21.0	22.5	5-7-9	1.5		20					
16	SS	22.5	24.0	4-5-6	1.3							
17	SS	24.0	25.5	3-5-7	1.5							
18	SS	26.4	27.9	8-8-6	1.3		25		SP	BROWN MEDIUM GRAIN SAND With BB size gravel, dry.		
									SP	BROWN MEDIUM GRAIN SAND With pea size gravel, dry.		
19	SS	30.0	31.5	5-9-12	1.5		30		SP	BROWN SAND With pea to 1/2" gravel, wet.		Water on A-rods at 30.5'
20	SS	31.5	33.0	6-6-8	1.5							
21	SS	33.0	34.5	4-5-5	1.3							Started using drill mud to prevent heaving sands at 33.0'.
22	SS	34.5	36.0	4-5-5	1.5		35					
23	SS	36.0	37.5	5-4-7	1.5							
24	SS	37.5	39.0	3-4-6	1.5							

TYPE OF CASING USED

	NQ-2 ROCK CORE
X	6" x 3.25 HSA
	9" x 6.25 HSA
	HW CASING ADVANCER 4"
	NW CASING 3"
	SW CASING 6"
	AIR HAMMER 8"

Continued Next Page

PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC

WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON

RECORDER DLB

AEP RKPT.GPJ AEP_FULL.GDT 4/27/99

AME CAN ELECTRIC POWER SERVICE CO RATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY INDIANA MICHIGAN POWER COMPANY BORING NO. 9902 DATE 4/27/99 SHEET 2 OF 3

PROJECT ROCKPORT PLANT BORING START 1/14/99 BORING FINISH 1/15/99

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
25	SS	39.0	40.5	8-8-8	1.5							
26	SS	41.4	42.9	4-7-17	1.5							
27	SS	46.4	47.9	3-8-7	1.5		45					
28	SS	51.4	52.9	10-10-13	1.5		50					
29	SS	53.0	54.5	5-5-7	1.5				SP	FINE SAND		
30	SS	54.5	56.0	4-5-7	1.5				SP	With BB size gravel,wet.		
31	SS	56.0	57.5	8-7-8	1.5		55			BROWN MEDIUM GRAIN SAND		
32	SS	57.5	59.0	4-6-8	1.5					With pea to 1/2" gravel, wet.		
33	SS	59.0	60.5	4-6-8	1.5				SP	MEDIUM GRAIN SAND		
34	SS	60.5	62.0	4-6-8	1.5					With pea size gravel, wet.		
35	SS	62.0	63.5	4-7-8	1.5				SP	FINE GRAIN SAND		
36	SS	66.9	68.4	6-6-8	1.5		60			With BB size gravel, wet.		
37	SS	71.9	73.4	5-6-8	1.5		65					
38	SS	76.9	78.4	7-5-4	1.5				SP	MEDIUM GRAIN SAND		
39	SS	78.4	79.9	3-3-3	1.5					With pea to 1/2" gravel, wet.		
40	SS	79.9	81.4	3-5-6	1.5		70					
41	SS	81.4	82.9	4-6-6	1.5				CL	GRAY SILTY CLAY		
42	SS	82.9	84.4	5-4-6	1.5					Moist		
43	SS	84.9	85.9	4-4-5	1.5		75					
44	SS	85.9	87.4	2-4-6	1.5							
45	SS	87.4	88.9	4-5-6	1.5				SP	BROWN MEDIUM GRAIN SAND		
							80			With pea size gravel, wet.		
							85					
									SP	BROWN FINE GRAIN SAND		
										With BB size gravel, wet.		
							90					

Continued Next Page

AEP RKPT.GPJ AEP_FULL.GDT 4/27/99

AME CAN ELECTRIC POWER SERVICE COI RATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

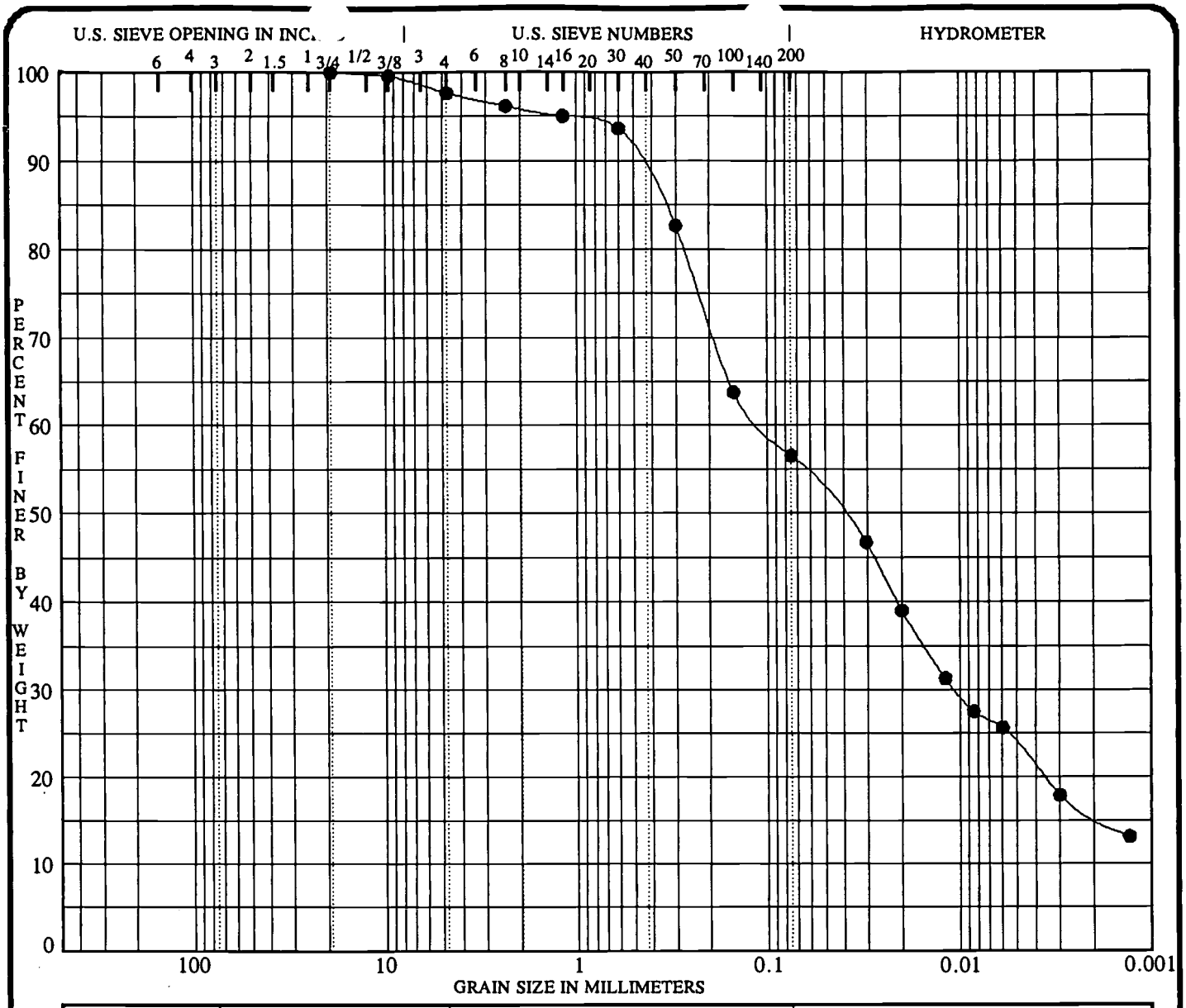
JOB NUMBER _____

COMPANY INDIANA MICHIGAN POWER COMPANY BORING NO. 9902 DATE 4/27/99 SHEET 3 OF 3

PROJECT ROCKPORT PLANT BORING START 1/14/99 BORING FINISH 1/15/99

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
46	SS	91.4	92.9	5-5-6	1.5		95					
47	SS	96.4	97.9	5-5-5	1.5		100		SP	**MEDIUM GRAIN SAND** With BB to pea size gravel, wet.		
48	SS	101.4	102.9	6-7-8	1.5		105		SP	**BROWN MEDIUM GRAIN SAND** With pea to 1/2" gravel, wet.		
49	SS	106.4	107.8	4-6-50/4	1.3				SP	**BROWN MEDIUM GRAIN SAND** With BB to pea size gravel, wet. **SHALE**		Spoon refusal at 107.8' Stopped boring at 107.8'

AEP RKPT.GPJ AEP_FULL.GDT 4/27/99



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	MC%	LL	PL	PI	Sp.Gr.
●	9902	1.5			24.3	15.8	8.5	
			SANDY LEAN CLAY CL					
			COMPOSITE 1.5'-4.5'					

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Fines	% < .002
●	9902	1.5	19.000	0.105	0.011		2.4	41.1	56.5	15.6

PROJECT ROCKPORT PLANT - ROCKPORT, INDIANA

JOB NO. WO#SC3750

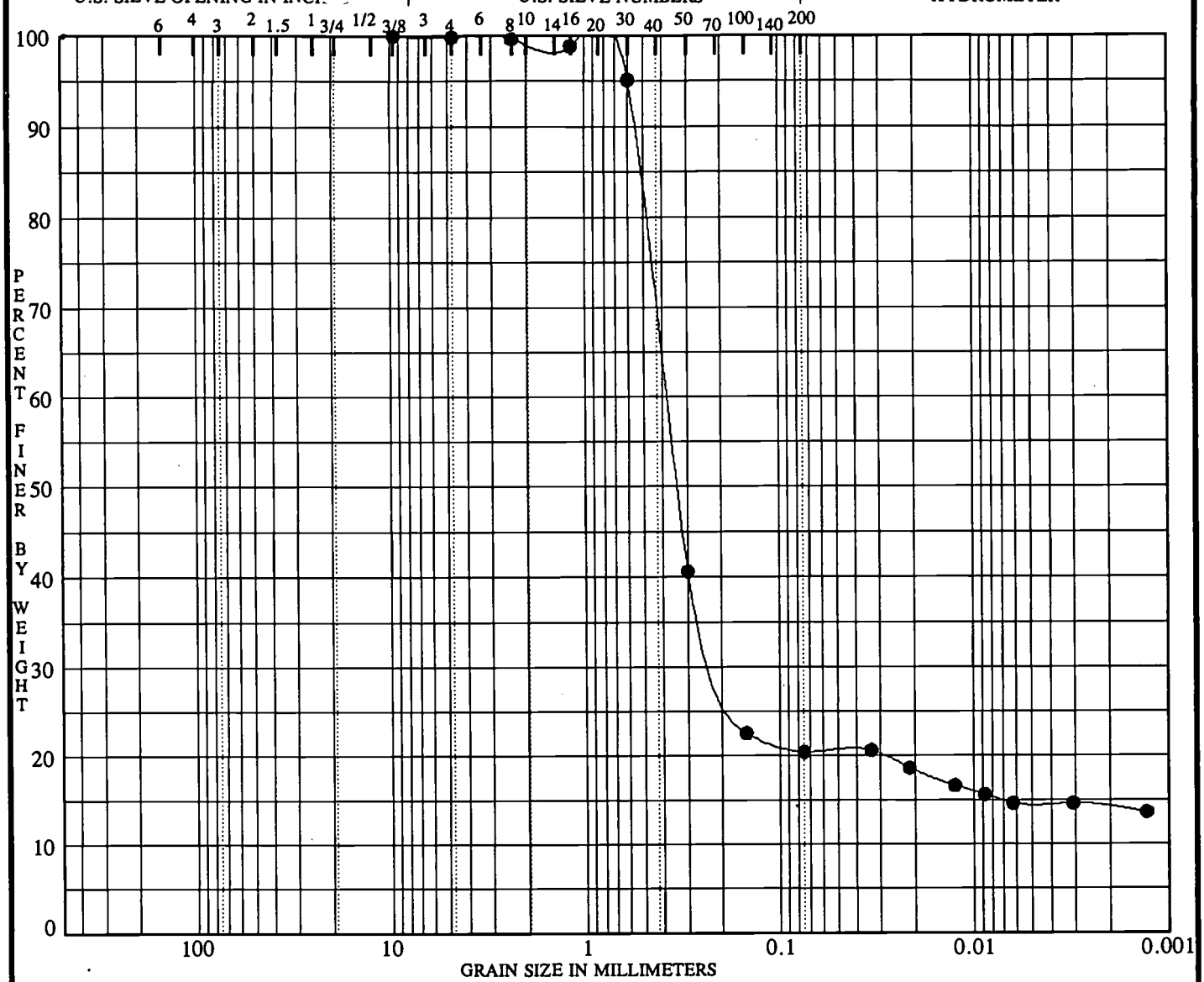
DATE 06/01/99

GRADATION CURVES

American Electric Power Service Corp.

Groveport, Ohio

AEP



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	MC%	LL	PL	PI	Sp.Gr.
●	9902	4.5			NP	NP	NP	
			SILTY SAND SM					
			SAMPLE 4 - 4.5'-6.0'					

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Fines	% < .002
●	9902	4.5	9.500	0.384	0.200		0.2	79.4	20.4	14.1

PROJECT ROCKPORT PLANT - ROCKPORT, INDIANA

JOB NO. WO#SC3750

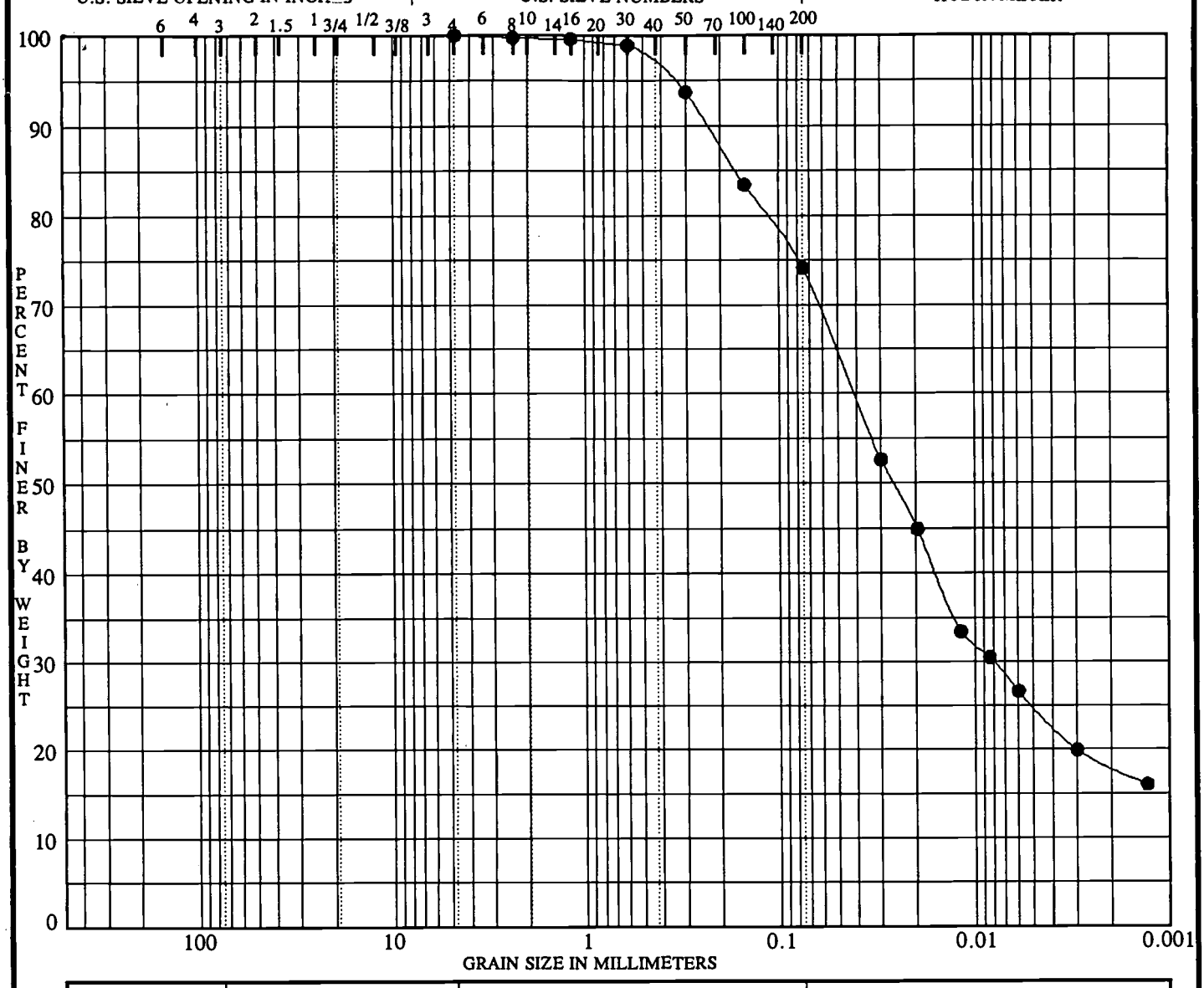
DATE 06/01/99

GRADATION CURVES

American Electric Power Service Corp.

Groveport, Ohio

AEP



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	MC%	LL	PL	PI	Sp.Gr.
●	9902	6.0			27.1	16.6	10.5	
			LEAN CLAY with SAND CL					
			COMPOSITE 6.0'-13.5'					

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Fines	% < .002
●	9902	6.0	4.750	0.041	0.008		0.0	25.9	74.1	18.0

PROJECT ROCKPORT PLANT - ROCKPORT, INDIANA

JOB NO. WO#SC3750

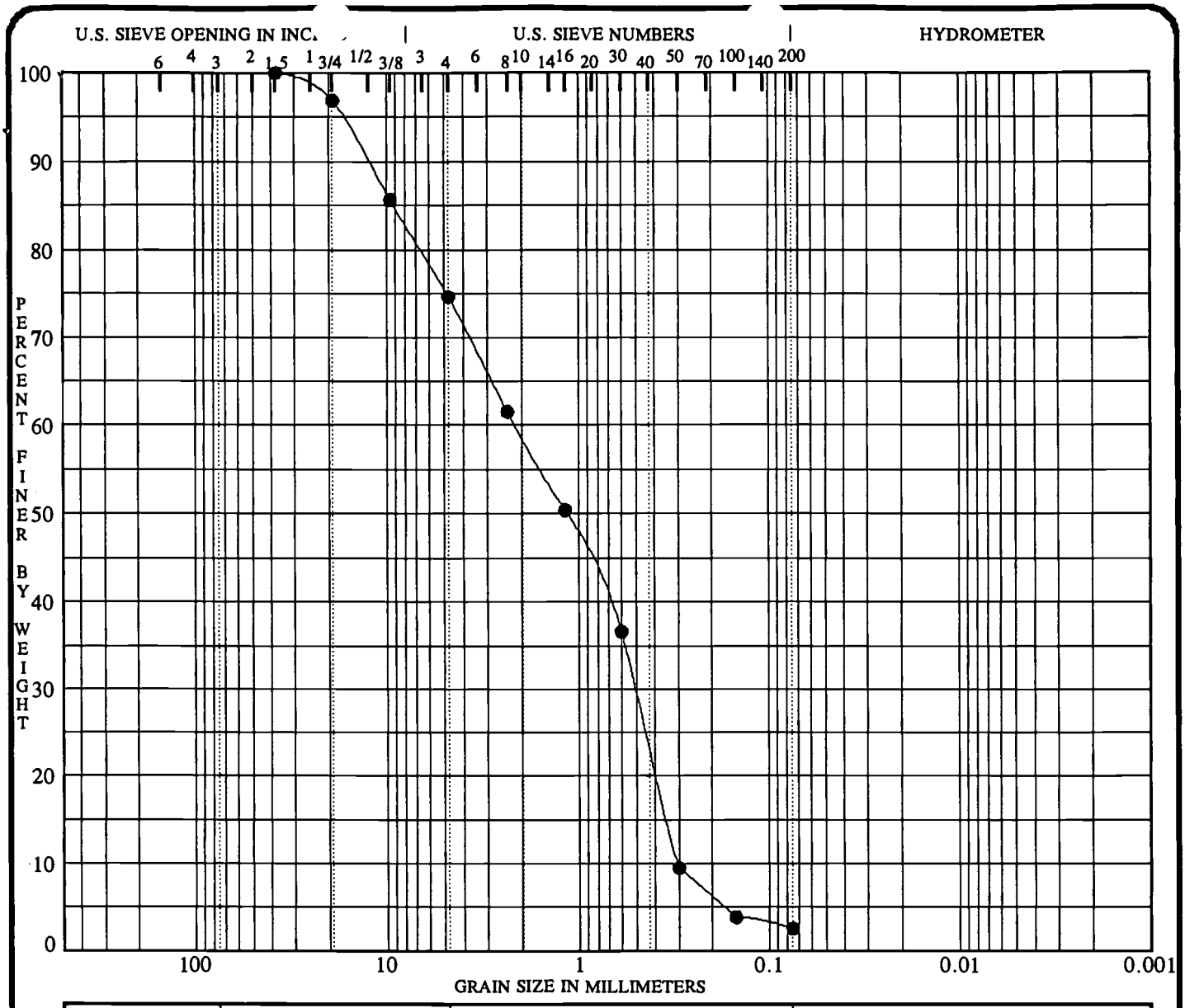
DATE 06/01/99

GRADATION CURVES

American Electric Power Service Corp.

Groveport, Ohio

AEP



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	MC%	LL	PL	PI	Sp.Gr.
●	9902	30.0			NP	NP	NP	
			POORLY GRADED SAND with GRAVEL SP					
			WELL #2-S COMPOSITE SAMPLE 30.0'-40.5'					

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Fines	% < .002
●	9902	30.0	37.500	2.149	0.507	0.304	25.4	72.0	2.6	

PROJECT ROCKPORT PLANT - ROCKPORT, INDIANA

JOB NO. WO#1352

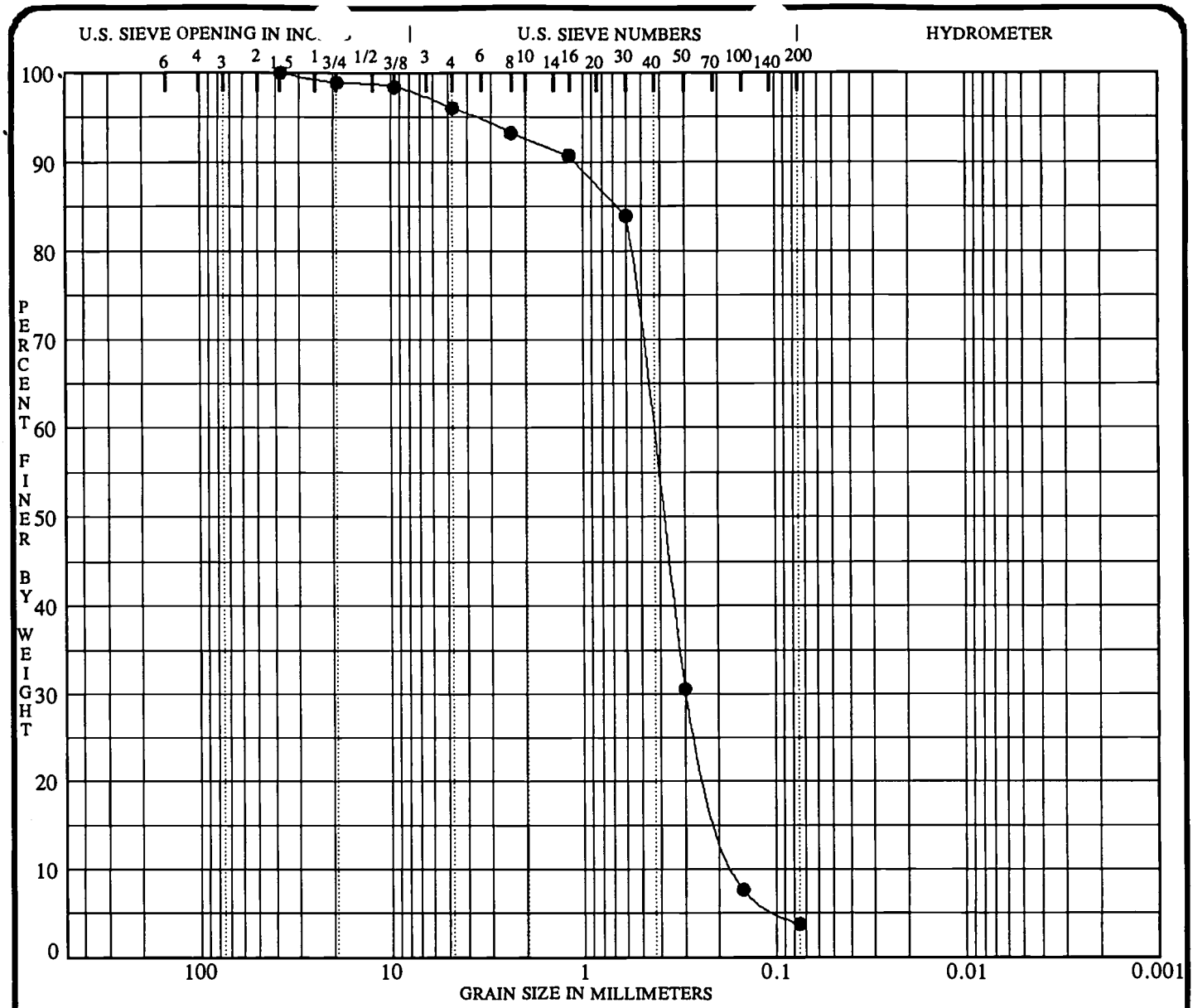
DATE 04/22/99

GRADATION CURVES

American Electric Power Service Corp.

Groveport, Ohio

AEP



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	MC%	LL	PL	PI	Sp.Gr.
●	9902	53.0			NP	NP	NP	
			POORLY GRADED SAND SP					
			WELL #2-I COMPOSITE SAMPLE 53.0'-63.5'					

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Fines	%<.002
●	9902	53.0	37.500	0.440	0.295	0.161	4.0	92.2	3.8	

PROJECT ROCKPORT PLANT - ROCKPORT, INDIANA

JOB NO. WO#1352

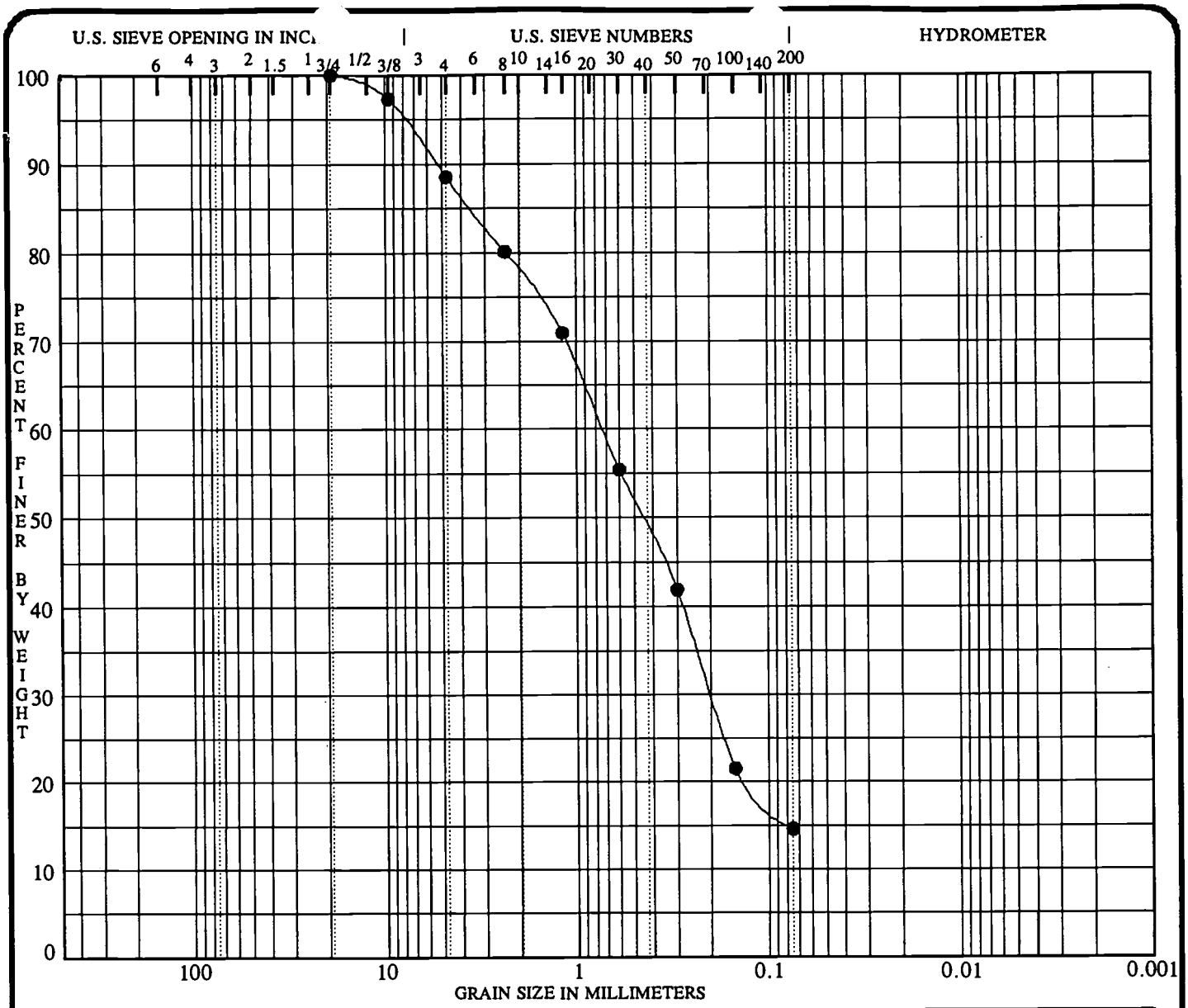
DATE 04/22/99

GRADATION CURVES

American Electric Power Service Corp.

Groveport, Ohio

AEP



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification		Classification	MC%	LL	PL	PI	Sp.Gr.
● 9902	76.9			NP	NP	NP	
		SILTY SAND SM					
		WELL #2-D COMPOSITE SAMPLE 76.9'-88.9'					

Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Fines	% < .002
● 9902	76.9	19.000	0.733	0.200		11.5	73.9	14.6	

PROJECT ROCKPORT PLANT - ROCKPORT, INDIANA

JOB NO. WO#1352

DATE 04/22/99

GRADATION CURVES

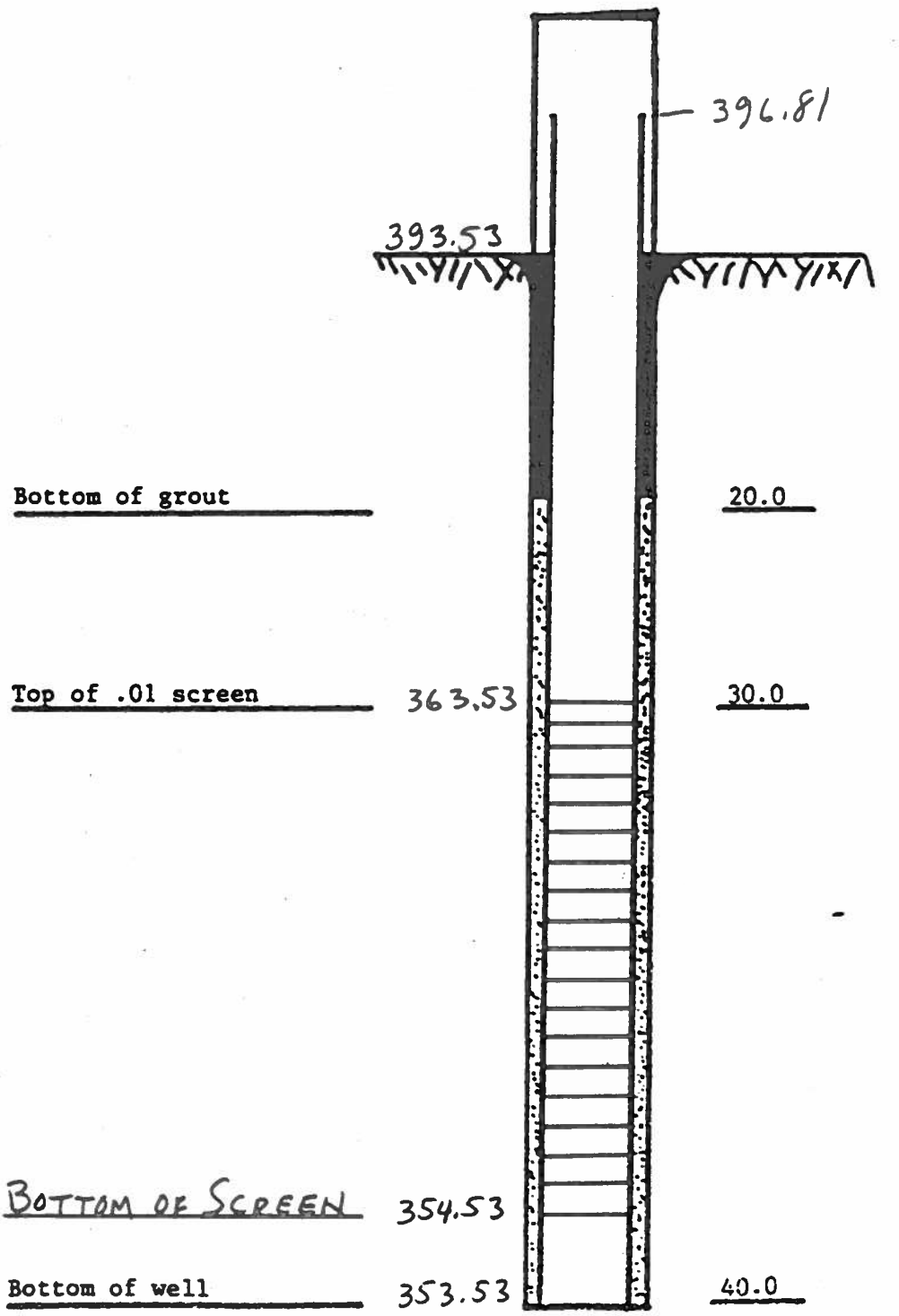
American Electric Power Service Corp.

Groveport, Ohio

I & M
Rockport Plant
Ash Storage Area
Well No. 3-S
5-2-84

MW-3S (Abandoned)

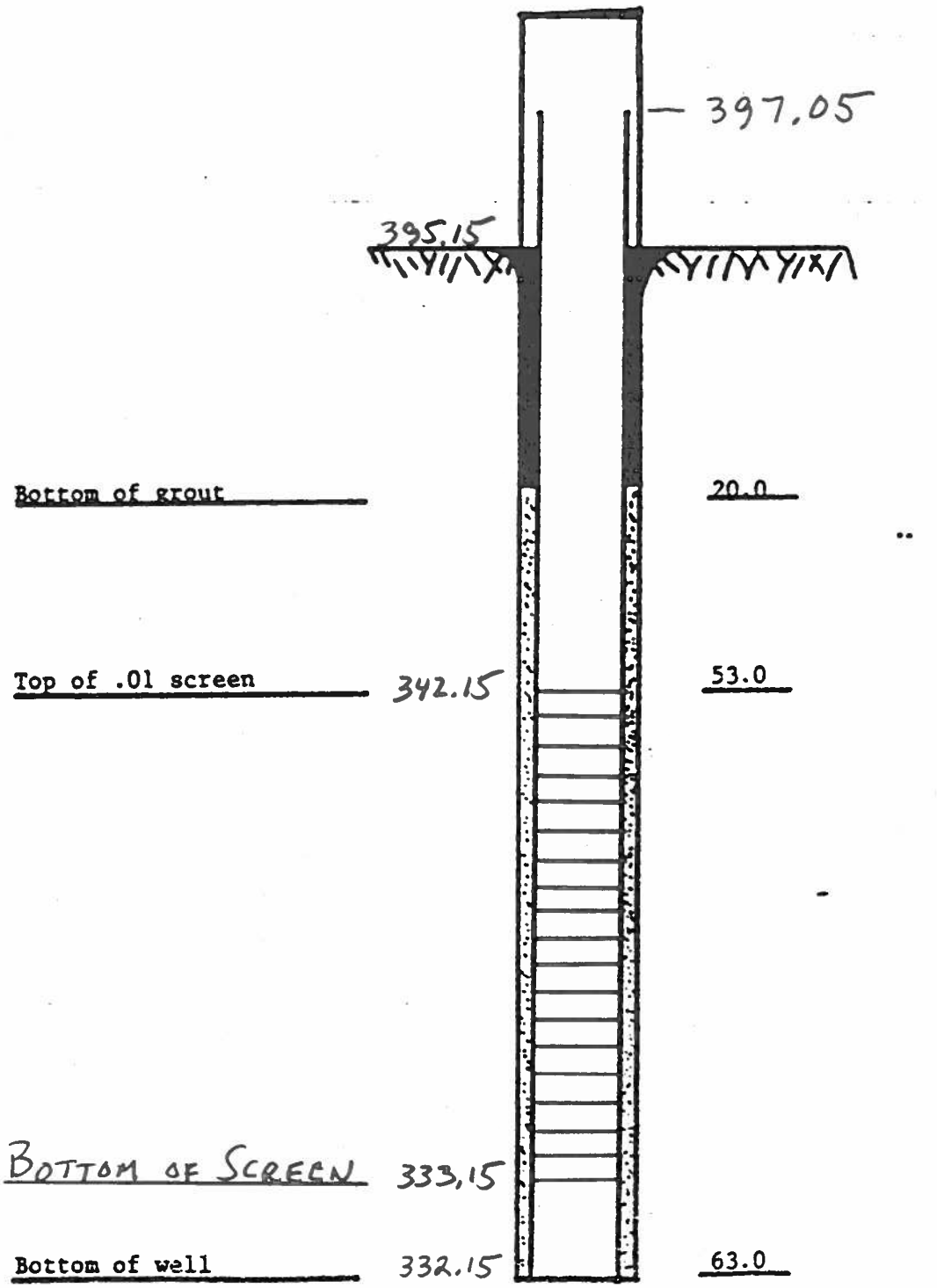
2" PVC Pipe



I & M
Rockport Plant
Ash Storage Area
Well No. 3-I
5-16-84

MW-3I (Abandoned)

2" PVC Pipe



AME AN ELECTRIC POWER SERVICE COI RATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY INDIANA MICHIGAN POWER COMPANY

PROJECT ROCKPORT PLANT

COORDINATES N 162,287.4 E 520,118.1

GROUND ELEVATION 394.7 SYSTEM _____

WATER LEVEL	▽	▼	▼
TIME			
DATE			

MW-3

BORING NO. 9903 DATE 4/27/99 SHEET 1 OF 3

BORING START 1/15/99 BORING FINISH 1/16/99

PIEZOMETER TYPE _____ WELL TYPE OW

HGT. RISER ABOVE GROUND _____ DIA _____

DEPTH TO TOP OF WELL SCREEN _____ BOTTOM _____

WELL DEVELOPMENT _____ BACKFILL Grout

FIELD PARTY MCR-DLB RIG BK-81

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
1	SS	0.0	1.5	1-1-2	1.3				CL	BROWNISH GRAY CLAY		Water for drilling and grouting from fire protection well at Rockport Plant.
2	SS	1.5	3.0	2-2-3	1.5				CL	With organic, moist.		
3	SS	3.0	4.5	3-5-8	1.5					BROWNISH GRAY CLAY		
~~4~~	~~SS~~	~~4.5~~	~~6.0~~	~~6-8-10~~	~~1.5~~				CL	Moist		
5	SS	6.0	7.5	4-3-4	1.5		5			REDDISH BROWN CLAY		
6	SS	7.5	9.0	1-3-4	1.5				CL	Stiff, dry.		
7	SS	9.0	10.5	3-5-8	1.5					REDDISH BROWN SANDY CLAY		Grouted from 105.2' to grade; used approx. 100 gallons (4 bags).
8	SS	10.5	12.0	3-5-8	1.5				CL	Dry		
9	SS	12.0	13.5	3-4-5	1.5		10			REDDISH BROWN SILTY CLAY		
10	SS	13.5	15.0	2-3-5	1.5				CL	Dry		
11	SS	15.0	16.5	5-10-10	1.5					REDDISH BROWN SILTY CLAY		
12	SS	16.5	18.0	6-9-10	1.5				CL	With vertical strip of gray clay, dry.		
13	SS	18.0	19.5	7-10-12	1.5					REDDISH BROWN SILTY CLAY		
~~14~~	~~SS~~	~~19.5~~	~~21.0~~	~~7-8-9~~	~~1.5~~				CL	Dry		
15	SS	21.0	22.5	8-10-13	1.5		15			REDDISH BROWN SANDY CLAY		Used approx. 200 gallons drill mud (2 bags) while drilling hole.
16	SS	22.5	24.0	8-10-12	1.5				CL	Dry		
17	SS	24.0	25.5	10-10-11	1.5					REDDISH BROWN SILTY CLAY		
18	SS	27.0	28.5	5-5-5	1.5				SP	Dry		
19	SS	30.0	31.5	4-4-4	1.5					BROWN MEDIUM GRAIN SAND		
20	SS	31.5	33.0	2-3-4	1.5		20			Dry		
21	SS	33.0	34.5	2-3-4	1.5							
~~22~~	~~SS~~	~~34.5~~	~~36.0~~	~~8-13-20~~	~~1.5~~							
23	SS	36.0	37.5	5-8-9	1.5							
24	SS	37.5	39.0	6-9-15	1.5		25					
							30					Water on A-rods at 27.5'.
							35		SP	MEDIUM GRAIN SAND		
										With pea to 1/2" gravel, wet		Started using drill mud to prevent heaving sands at 34.5'.

Continued Next Page

TYPE OF CASING USED

	NQ-2 ROCK CORE	
X	6" x 3.25 HSA	
	9" x 6.25 HSA	
	HW CASING ADVANCER	4"
	NW CASING	3"
	SW CASING	6"
	AIR HAMMER	8"

PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC

WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON

RECORDER DLB

AEP RKPT.GPJ AEP_FULL.GDT 4/27/99

AME AN ELECTRIC POWER SERVICE COF RATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY **INDIANA MICHIGAN POWER COMPANY** BORING NO. **9903** DATE **4/27/99** SHEET **2** OF **3**

PROJECT **ROCKPORT PLANT** BORING START **1/15/99** BORING FINISH **1/16/99**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
25	SS	39.0	40.5	5-6-6	1.5							
26	SS	42.0	43.5	10-11-9	1.5		45		SP	**MEDIUM GRAIN SAND** With pea to 1/2" gravel and small bits of wood,wet		
27	SS	47.0	48.5	3-6-7	1.5		50		SP	**MEDIUM GRAIN SAND** With pea size gravel, wet		
28	SS	52.0	53.5	6-8-9	1.5				SP	**BROWN MEDIUM GRAIN SAND** With pea to 1/2" gravel, wet		
29	SS	57.0	58.5	5-6-7	1.5		55					
30	SS	62.0	63.5	8-9-8	1.5		60					
31	SS	67.0	68.5	7-7-12	1.5		65					
32	SS	72.0	73.5	10-10-12	1.5		70					
33	SS	77.0	78.5	3-4-7	1.5		75					
34	SS	82.0	83.5	5-6-6	1.5		80					
35	SS	87.0	88.5	4-5-8	1.5		85		SP	**BROWN MEDIUM GRAIN SAND** With pea size gravel, wet		
							90					

Continued Next Page

AME AN ELECTRIC POWER SERVICE COR RATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

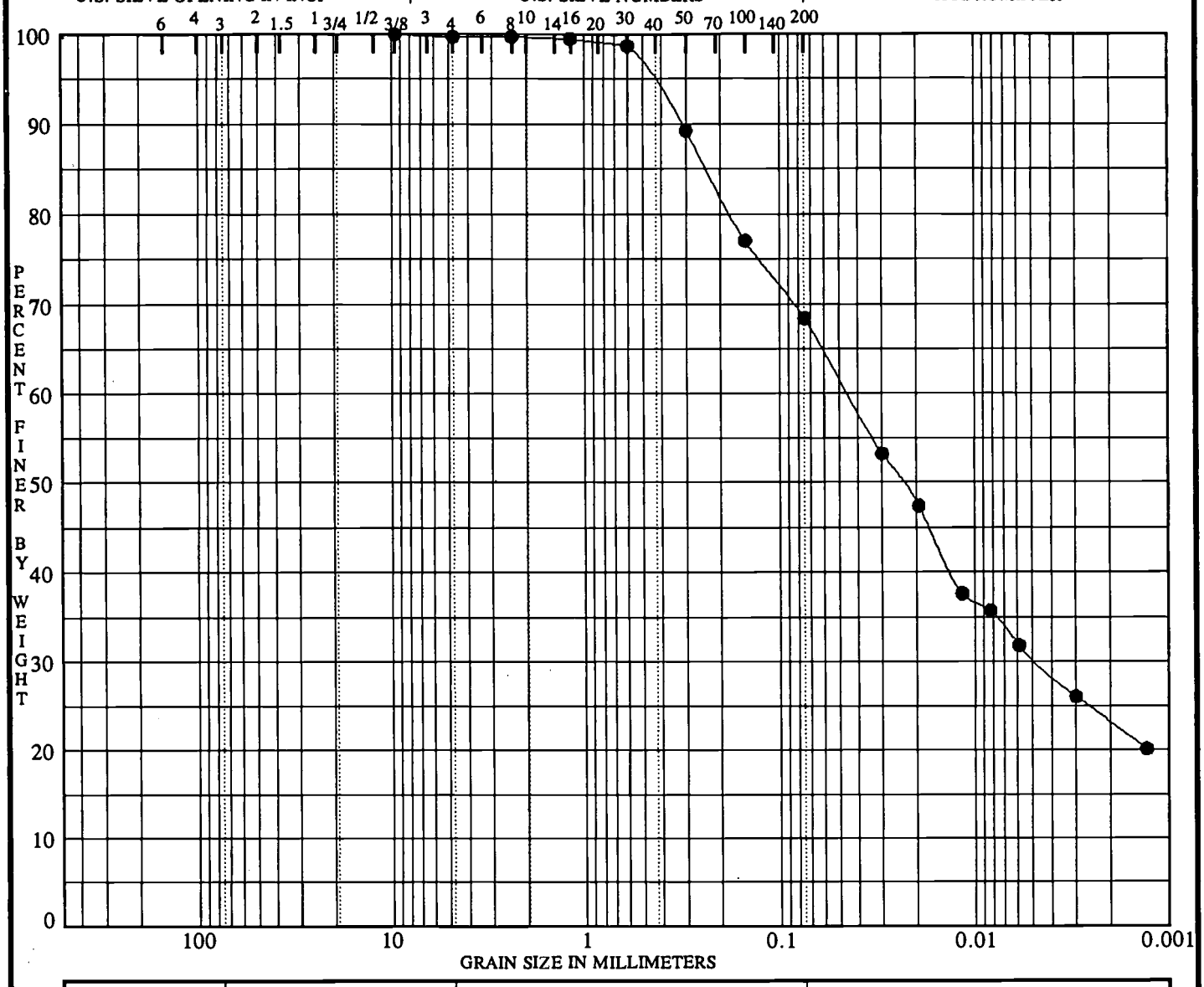
JOB NUMBER _____

COMPANY INDIANA MICHIGAN POWER COMPANY BORING NO. 9903 DATE 4/27/99 SHEET 3 OF 3

PROJECT ROCKPORT PLANT BORING START 1/15/99 BORING FINISH 1/16/99

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
36	SS	92.0	93.5	4-6-6	1.5				SP	**BROWN FINE SAND** Wet		
									GP	**PEA SIZE GRAVEL** Wet		
							95					
37	SS	97.0	98.5	5-7-6	1.5				SP	**MEDIUM GRAIN SAND** With pea size gravel, wet.		
							100					
38	SS	102.0	103.5	8-10-11	1.5				SP	**MEDIUM GRAIN SAND** With pea to 3/4" gravel, wet		
							105					
39	SS	105.0	105.2	50/2	.2					**GRAY FINE GRAIN SANDY CLAY SHALE**		Auger refusal at 105.0' Spoon refusal at 105.2' Stopped boring at 105.2'

AEP RKPT.GPJ AEP_FULL.GDT 4/27/99



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	MC%	LL	PL	PI	Sp.Gr.
●	9903	1.5			27.7	15.6	12.1	
			SANDY LEAN CLAY CL					
			COMPOSITE 1.5'-15.0'					

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Fines	% < .002
●	9903	1.5	9.500	0.045	0.005		0.3	31.3	68.4	23.1

PROJECT ROCKPORT PLANT - ROCKPORT, INDIANA

JOB NO. WO#SC3750

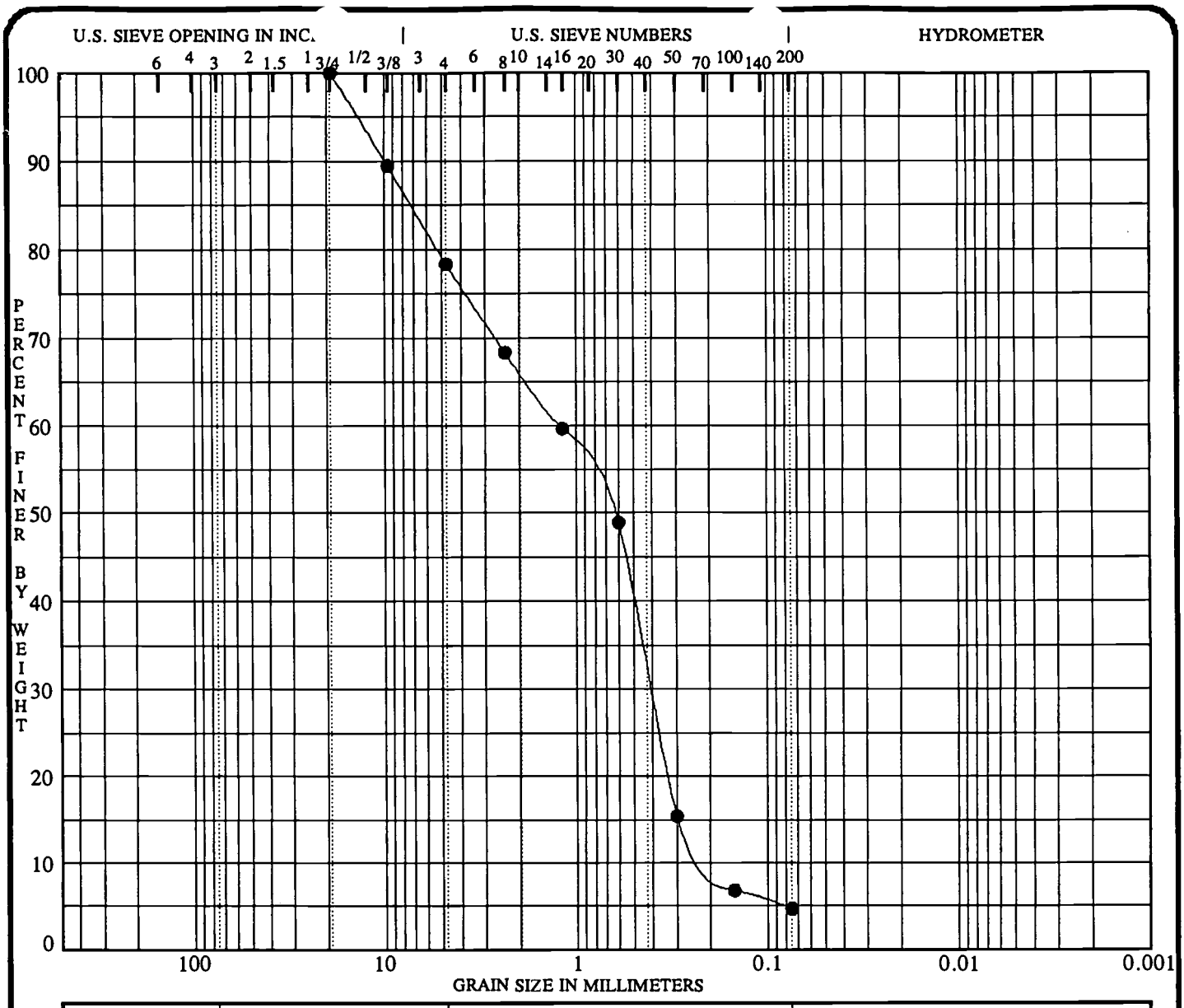
DATE 06/01/99

GRADATION CURVES

American Electric Power Service Corp.

Groveport, Ohio

AEP



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	MC%	LL	PL	PI	Sp.Gr.
●	9903	30.0			NP	NP	NP	
			POORLY GRADED SAND with SILT and GRAVEL SP-SM					
			WELL #3-S COMPOSITE SAMPLE 30.0'-40.5'					

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Fines	% < .002
●	9903	30.0	19.000	1.209	0.406	0.194	21.7	73.6	4.7	

PROJECT ROCKPORT PLANT - ROCKPORT, INDIANA

JOB NO. WO#1352

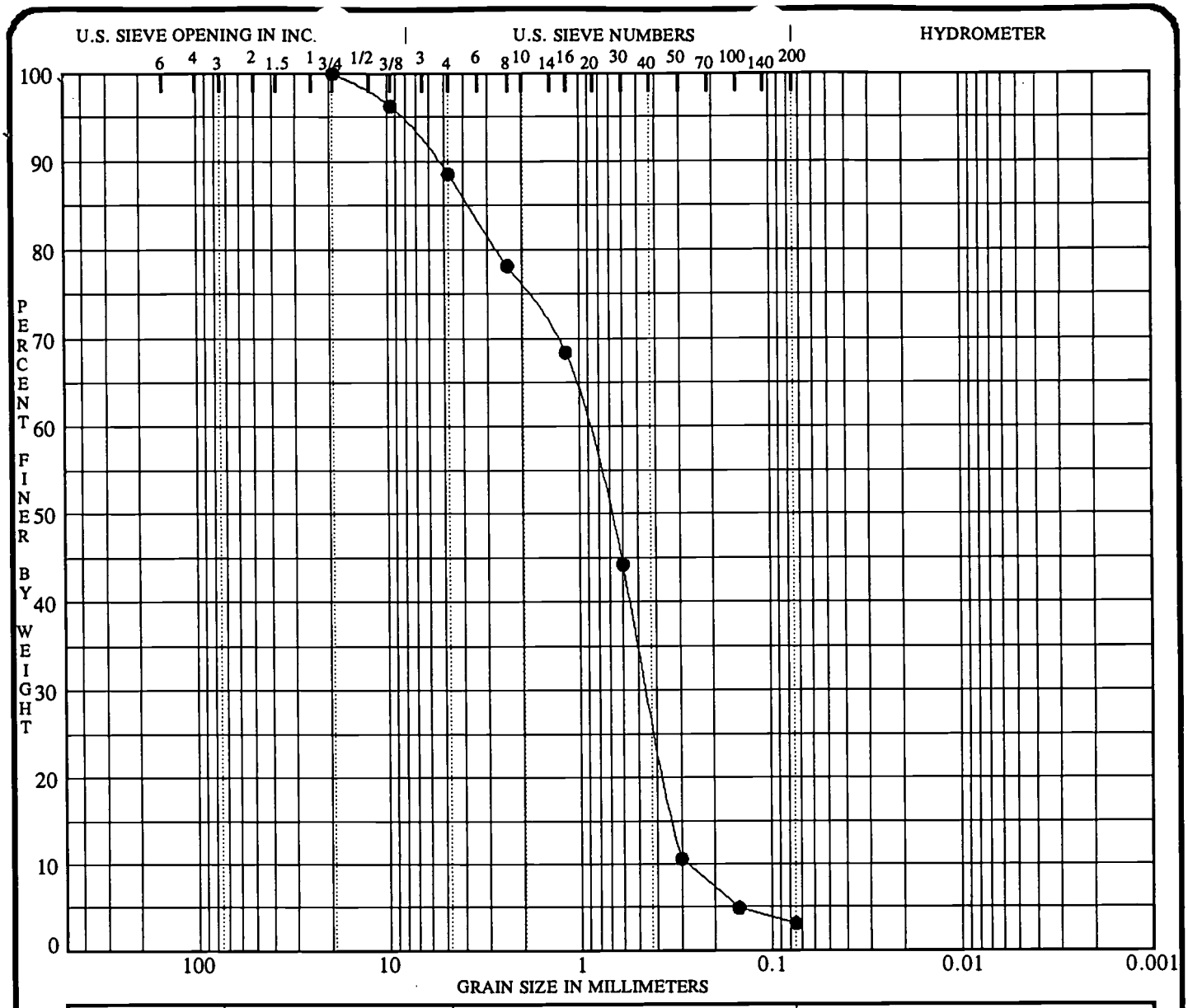
DATE 04/22/99

GRADATION CURVES

American Electric Power Service Corp.

Groveport, Ohio

AEP



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	MC%	LL	PL	PI	Sp.Gr.
●	9903	52.0			NP	NP	NP	
			POORLY GRADED SAND SP					
			WELL #3-I COMPOSITE SAMPLE 52.0'-63.5'					

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Fines	% < .002
●	9903	52.0	19.000	0.933	0.448	0.279	11.5	85.4	3.1	

PROJECT ROCKPORT PLANT - ROCKPORT, INDIANA

JOB NO. WO#1352

DATE 04/22/99

GRADATION CURVES

American Electric Power Service Corp.

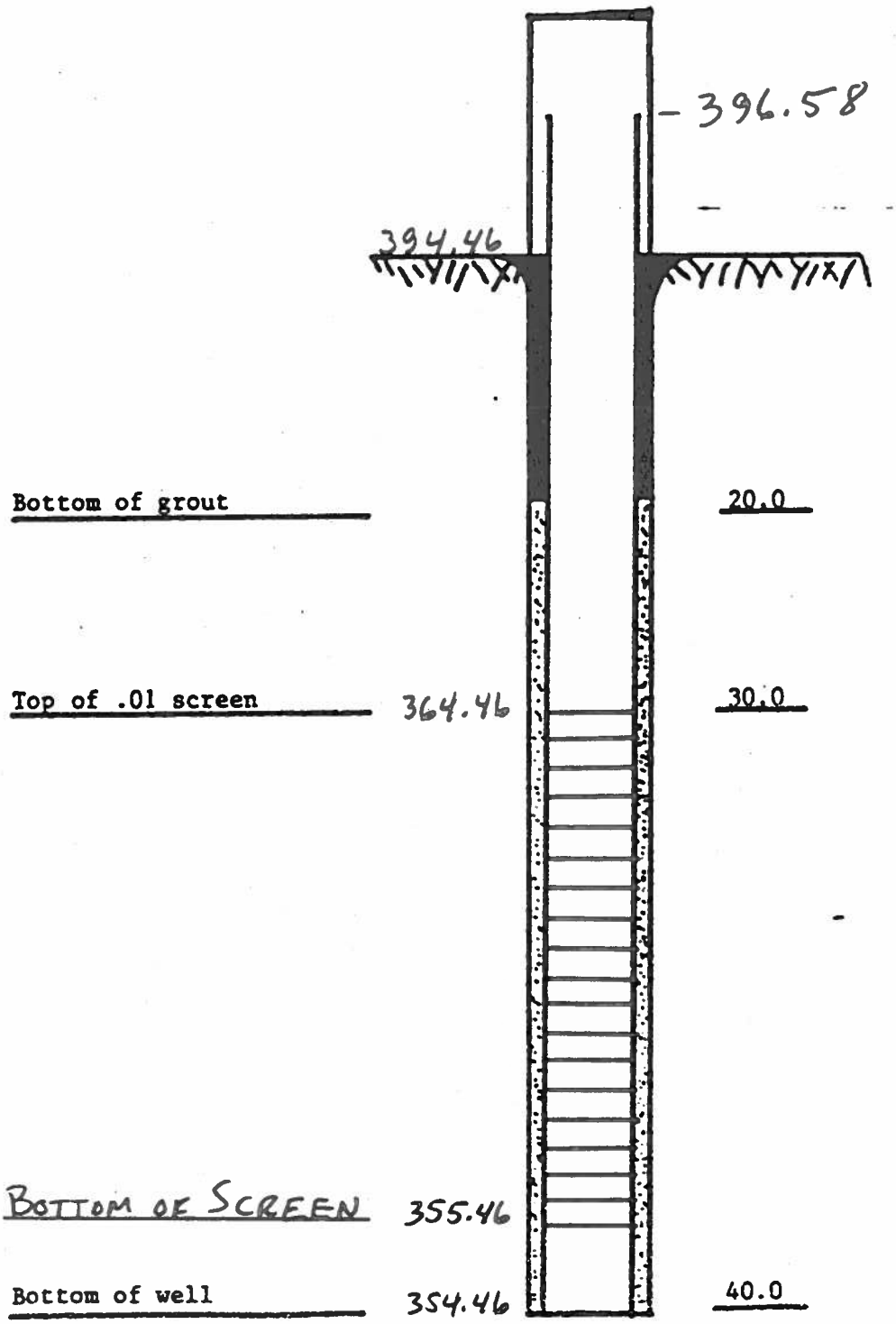
Groveport, Ohio

AEP

I & M
Rockport Plant
Ash Storage Area
Well No. 4-S
5-9-84

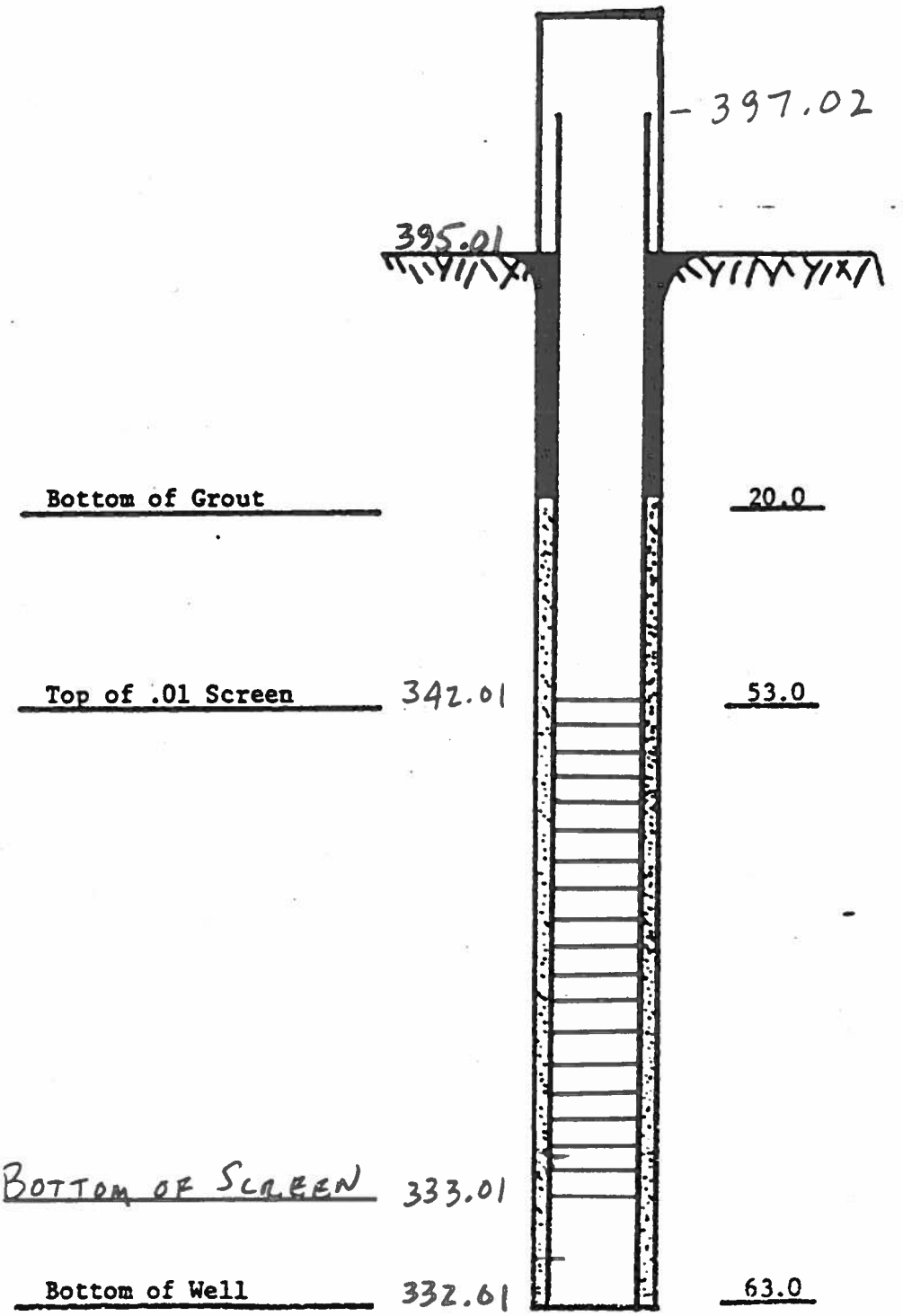
MW-4S (Abandoned)

2" PVC Pipe



I & M
Rockport Plant
Ash Storage Area
Well No. 4I
5-09-84

MW-4I (Abandoned)



AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

MW-4

JOB NUMBER _____

COMPANY INDIANA MICHIGAN POWER COMPANY

PROJECT ROCKPORT PLANT

COORDINATES N 163,459.8 E 519,814.2

GROUND ELEVATION 394.6 SYSTEM _____

WATER LEVEL	▽	▼	▼
TIME			
DATE			

BORING NO. 9904 DATE 4/27/99 SHEET 1 OF 2

BORING START 1/31/99 BORING FINISH 2/1/99

PIEZOMETER TYPE _____ WELL TYPE OW

HGT. RISER ABOVE GROUND _____ DIA _____

DEPTH TO TOP OF WELL SCREEN _____ BOTTOM _____

WELL DEVELOPMENT _____ BACKFILL Grout

FIELD PARTY MCR-DLB RIG BK-81

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
1	SS	0.0	2.0	1-1-2-3	2.0				CL	**BROWN CLAY** With organic in top 0.5, moist		Water for drilling & grouting came from fire protection wells at Rockport Plant
2	SS	2.0	4.0	2-3-3-4	2.0				CL	**BROWN SILTY CLAY**		
3	SS	4.0	6.0	2-3-3-4	2.0		5		SW	**BROWN SAND** Well graded, medium grain,Wet		Used approximately 300 gallons of quick grout to drill and grout with 5 bags.
4	SS	6.0	8.0	3-2-3-5	2.0				CL	**BROWN SILTY CLAY** Wet at 6.0; Moist at 8.0		
5	SS	8.0	10.0	2-3-4-4	2.0							
6	SS	10.0	12.0	3-4-6-8	2.0		10		SP	**BROWN SAND** Poorly graded, dry		
7	SS	12.0	14.0	3-4-6-8	2.0				SP	**SAND** Medium grain, Dry		
8	SS	14.0	16.0	2-2-3-3	2.0		15					
9	SS	16.0	18.0	3-6-8-10	2.0				SP	**SAND** Medium grain, with pea gravel, dry at 16.0; wet at 24.0		
10	SS	18.0	20.0	2-5-7-8	2.0		20					
11	SS	20.0	22.0	5-8-10-13	2.0							
12	SS	22.0	24.0	3-7-10-13	2.0							
13	SS	24.0	26.0	7-9-11-12	2.0		25					
14	SS	30.0	32.0	2-2-3-3	2.0		30		SP	**SAND** Medium grain, with pea to 1/2" gravel,wet		
15	SS	32.0	34.0	2-2-3-4	2.0							
16	SS	34.0	36.0	9-11-12-14	1.5		35		SP	**SAND** Medium grain,wet		Instead of using mud to prevent heaving sands, started inducing quick grout at 34'.
17	SS	36.0	38.0	2-2-2-4	2.0				SP	**SAND** Medium grain,with pea to 1/2" gravel,wet		
18	SS	38.0	40.0	1-1-2-5	2.0							

TYPE OF CASING USED

	NQ-2 ROCK CORE	
X	6" x 3.25 HSA	
	9" x 6.25 HSA	
	HW CASING ADVANCER	4"
	NW CASING	3"
	SW CASING	6"

Continued Next Page

PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC

WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON

RECORDER DLB

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

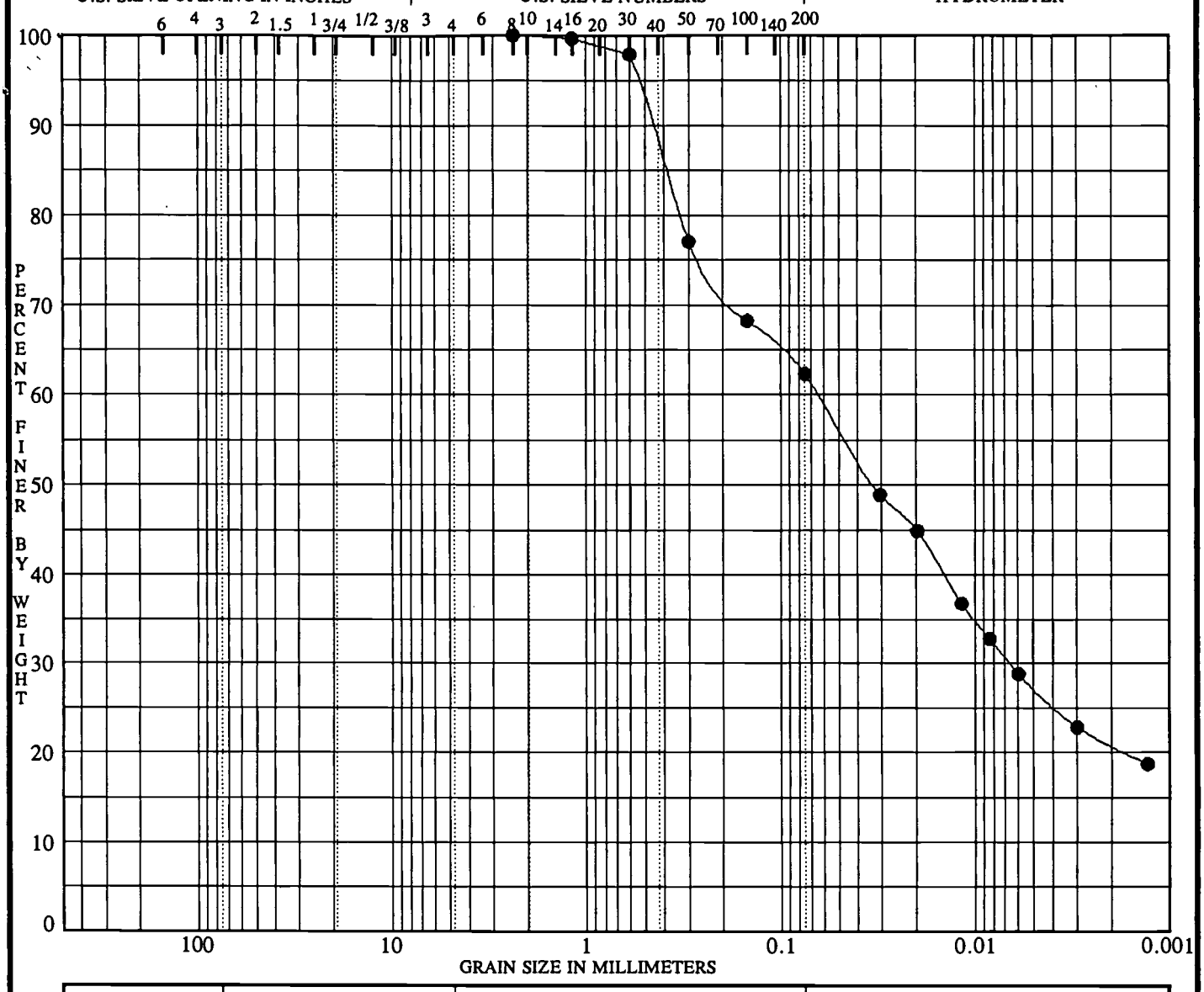
LOG OF BORING

JOB NUMBER _____

COMPANY **INDIANA MICHIGAN POWER COMPANY** BORING NO. **9904** DATE **4/27/99** SHEET **2** OF **2**

PROJECT **ROCKPORT PLANT** BORING START **1/31/99** BORING FINISH **2/1/99**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
19	SS	41.6	43.1	3-5-8	1.5		45		SW	**SAND** Well grain, medium grain,wet		
20	SS	46.6	48.1	3-6-11	1.5		50		SP	**SAND** Medium grain, with pea gravel, wet		
21	SS	51.6	53.1	4-7-8	1.5				SW	**SAND** Well graded, medium grain, wet		
22	SS	53.1	55.1	4-5-7-9	2.0							
23	SS	55.1	57.1	4-8-9-11	2.0		55					
24	SS	57.1	59.1	2-3-8-10	2.0							
25	SS	59.1	61.1	8-11-11-18	2.0		60		SP	**SAND** Medium grain,with pea to 1/2" gravel, wet		
26	SS	61.1	63.1	9-11-12-16	2.0				SP	**SAND** Medium grain,with pea gravel, few coal particles, wet		
27	SS	66.6	68.1	7-9-12	1.5		65		SP	**SAND** Medium grain, with pea to 3/4" gravel,wet		
28	SS	71.6	73.1	6-8-6	1.5		70		SP	**SAND** Medium grain, with pea to 1/2" gravel,wet		
29	SS	76.6	78.1	10-12-14	1.5		75		SP	**SAND** Medium grain,with pea to 3/4" gravel,wet		
30	SS	81.6	83.1	5-5-8	1.5		80		CL	**GRAY SILTY CLAY** Moist		
31	SS	84.1	84.8	16-50/2	0.8				CL	**BLUISH GRAY SANDY CLAY** **BLUISH GRAY SILTY CLAY** **SHALE**		Auger refusal 84.1' Spoon refusal 84.8'. Stopped boring at 84.8



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	MC%	LL	PL	PI	Sp.Gr.
●	9904	2.0	SANDY LEAN CLAY CL COMPOSITE - 2.0'-5.0'		34.0	18.4	15.6	

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Fines	% < .002
●	9904	2.0	2.360	0.064	0.007		0.0	37.7	62.3	20.8

PROJECT ROCKPORT PLANT - ROCKPORT, INDIANA

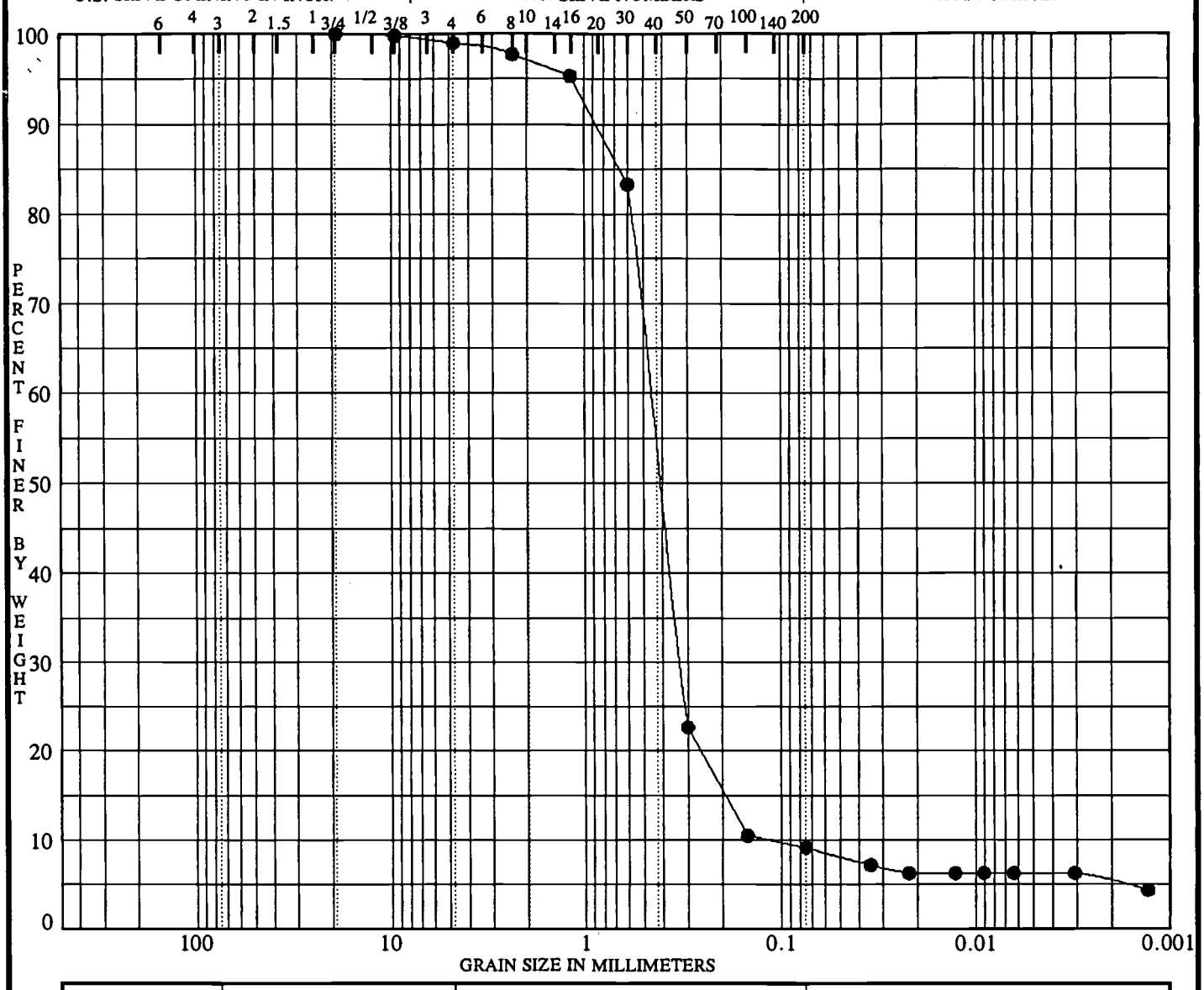
JOB NO. WO#SC3750

DATE 06/01/99

GRADATION CURVES

American Electric Power Service Corp.

Groveport, Ohio



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	MC%	LL	PL	PI	Sp.Gr.
●	9904	5.0			NP	NP	NP	
			POORLY GRADED SAND with SILT SP-SM					
			COMPOSITE 5.0'-8.0'					

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Fines	% < .002
●	9904	5.0	19.000	0.460	0.327	0.115	1.0	89.8	9.2	5.3

PROJECT ROCKPORT PLANT - ROCKPORT, INDIANA

JOB NO. WO#SC3750

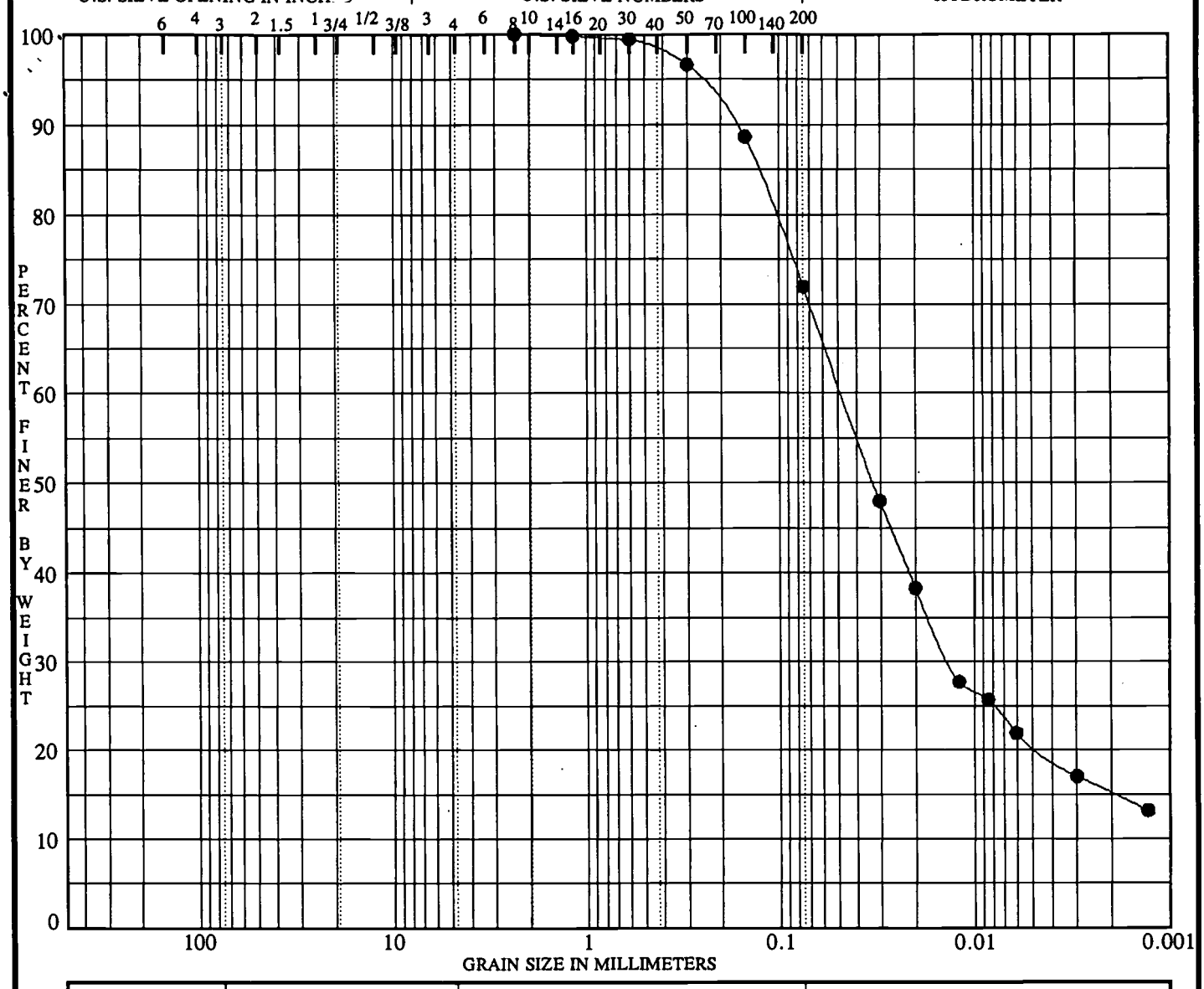
DATE 06/01/99

GRADATION CURVES

American Electric Power Service Corp.

Groveport, Ohio

AEP



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	MC%	LL	PL	PI	Sp.Gr.
●	9904	8.0			26.6	17.7	8.9	
			LEAN CLAY with SAND CL					
			COMPOSITE 8.0'-11.0'					

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Fines	% < .002
●	9904	8.0	2.360	0.048	0.013		0.0	28.1	71.9	15.2

PROJECT ROCKPORT PLANT - ROCKPORT, INDIANA

JOB NO. WO#SC3750

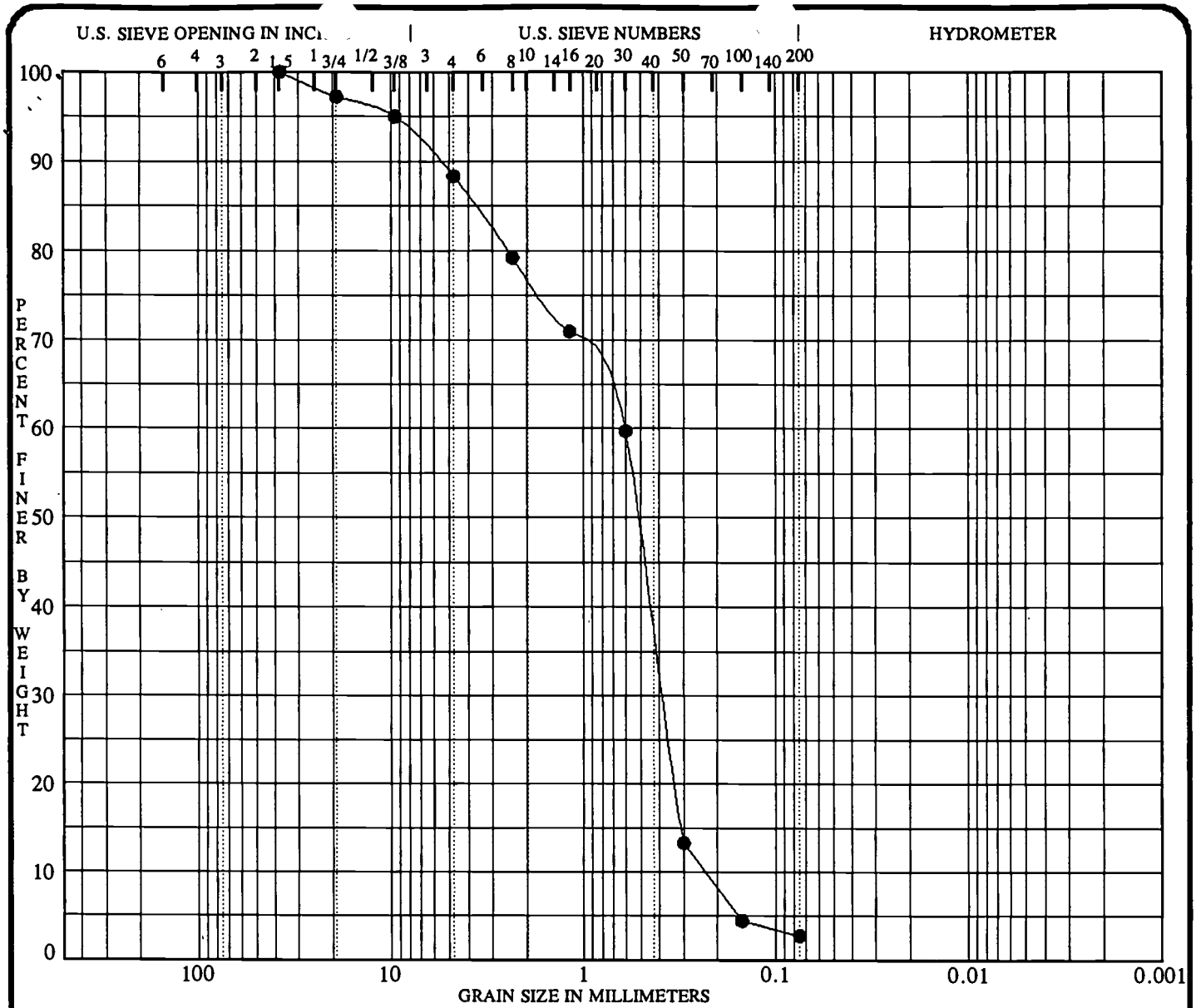
DATE 06/01/99

GRADATION CURVES

American Electric Power Service Corp.

Groveport, Ohio

AEP



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	MC%	LL	PL	PI	Sp.Gr.
●	9904	30.0			NP	NP	NP	
			POORLY GRADED SAND SP					
			WELL #4-S COMPOSITE SAMPLE 30.0'-40.0'					

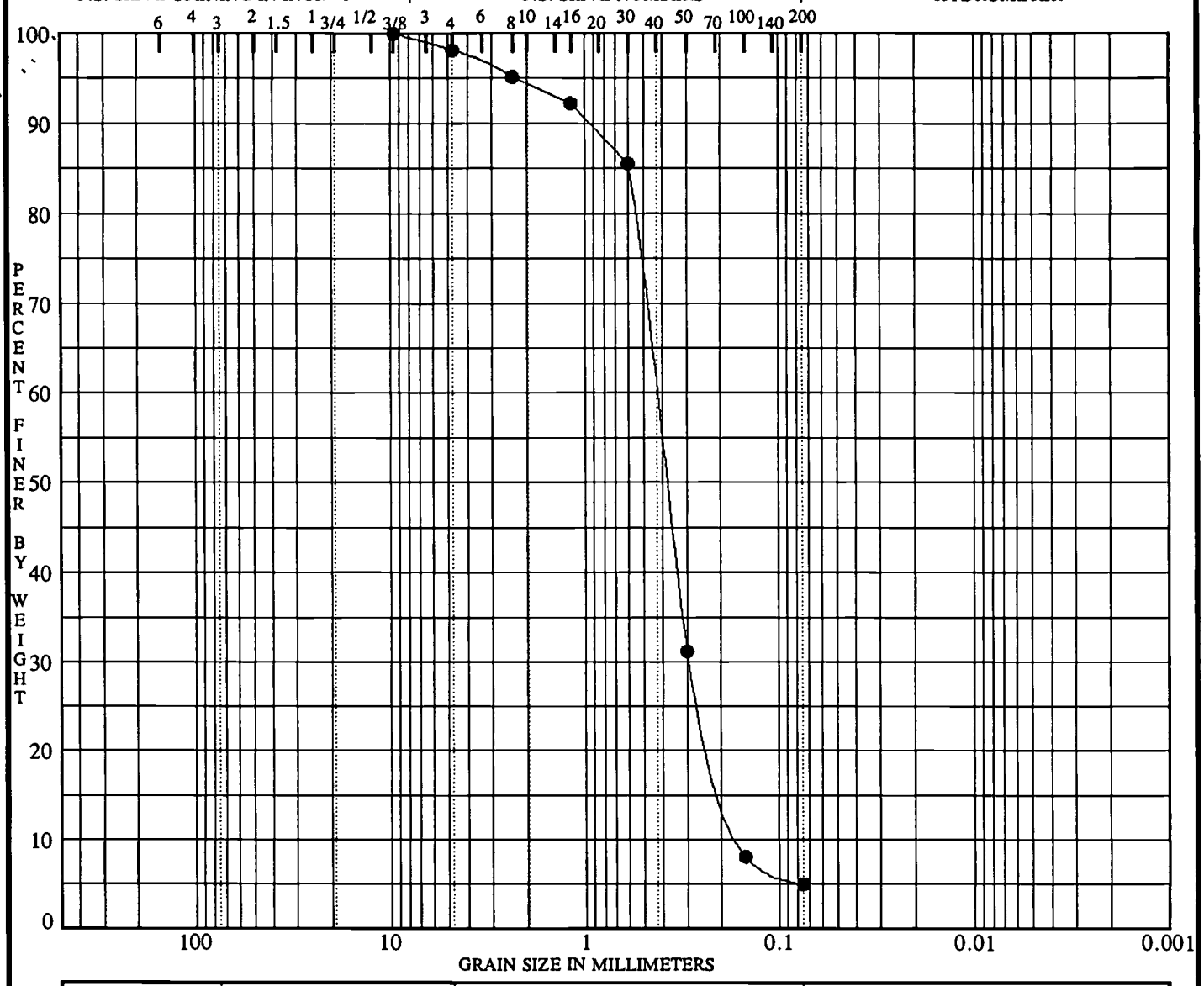
	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Fines	% < .002
●	9904	30.0	37.500	0.611	0.385	0.231	11.7	85.5	2.8	

PROJECT ROCKPORT PLANT - ROCKPORT, INDIANA JOB NO. WO#1352
DATE 04/22/99

GRADATION CURVES

American Electric Power Service Corp.
Groveport, Ohio

AEP



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	MC%	LL	PL	PI	Sp.Gr.
●	9904	53.1			NP	NP	NP	
			POORLY GRADED SAND with SILT SP-SM					
			WELL #4-I COMPOSITE SAMPLE 53.1'-63.1'					

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Fines	% < .002
●	9904	53.1	9.500	0.433	0.289	0.159	1.9	93.1	5.0	

PROJECT ROCKPORT PLANT - ROCKPORT, INDIANA

JOB NO. WO#1352

DATE 04/22/99

GRADATION CURVES

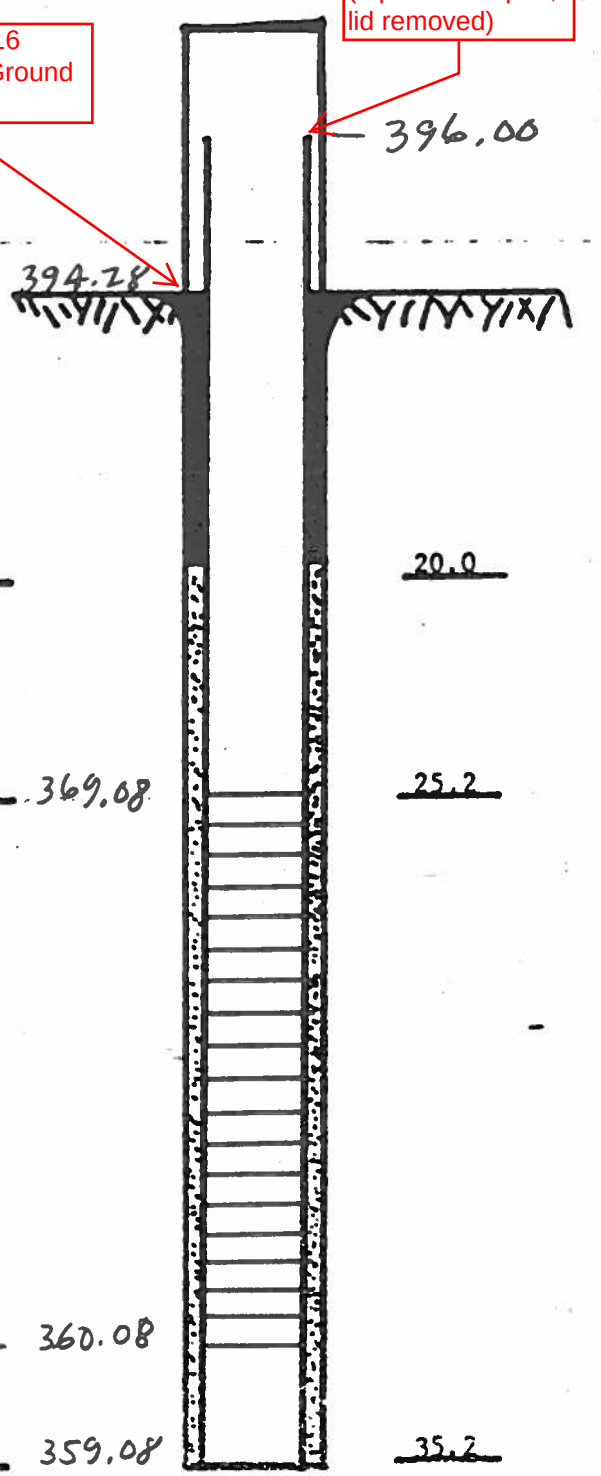
American Electric Power Service Corp.

Groveport, Ohio

AEP

I & M
Rockport Plant
Ash Storage Area
Well No. 5-S
5-10-84

MW-5S



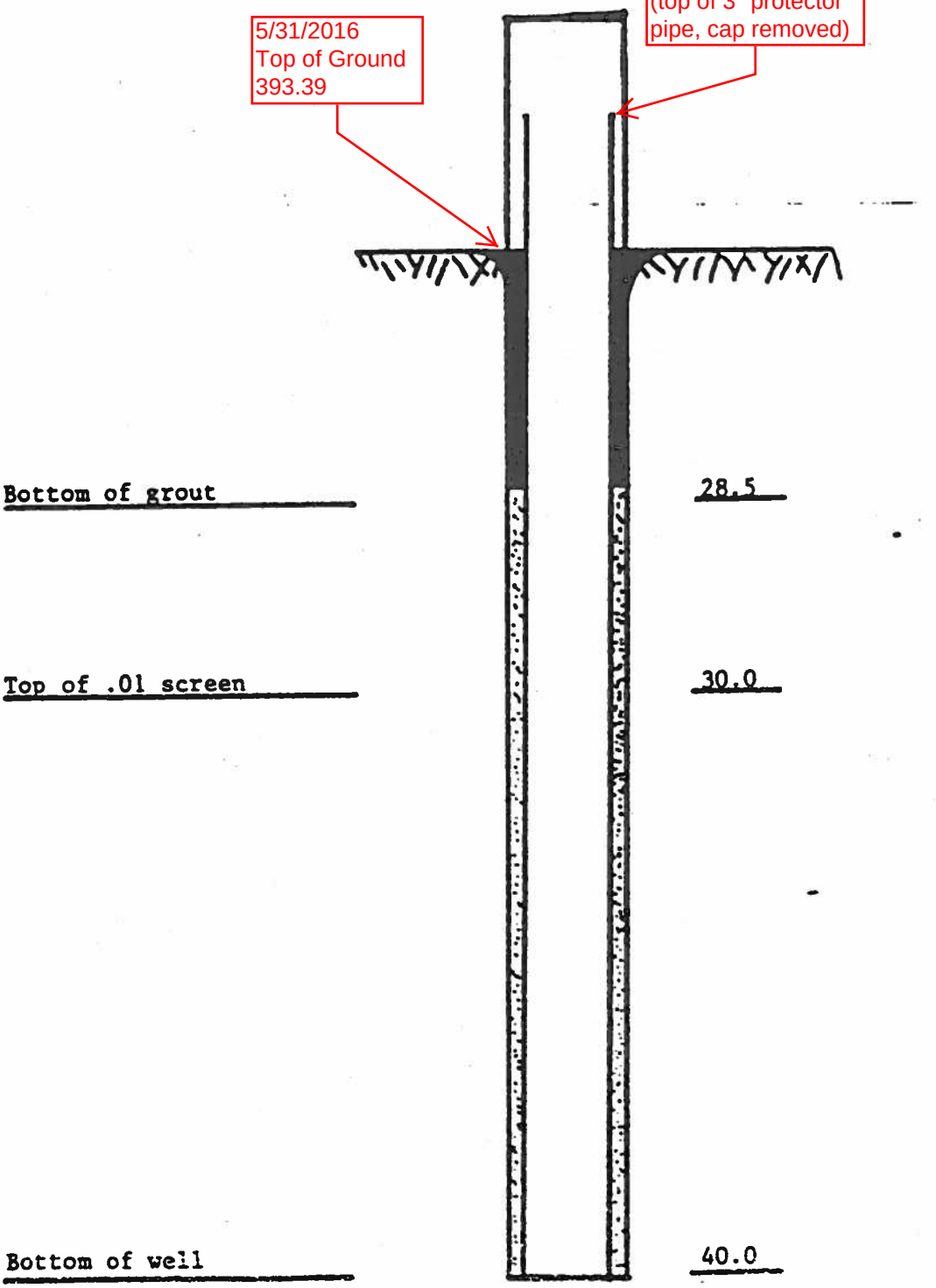
I & M
Rockport Plant
Ash Storage Area
Well No. 5-I
5-22-84

MW-5I

5/31/2016
Reference Point
394.17
(top of 3" protector
pipe, cap removed)

5/31/2016
Top of Ground
393.39

2" PVC Pipe



AME AN ELECTRIC POWER SERVICE COR RATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

MW-5

JOB NUMBER _____

COMPANY INDIANA MICHIGAN POWER COMPANY

PROJECT ROCKPORT PLANT

COORDINATES N 164,993.0 E 520,610.0

GROUND ELEVATION 392.1 SYSTEM _____

WATER LEVEL	▽	▼	▼
TIME			
DATE			

BORING NO. 9905 DATE 4/27/99 SHEET 1 OF 2

BORING START 2/12/99 BORING FINISH 2/12/99

PIEZOMETER TYPE _____ WELL TYPE OW

HGT. RISER ABOVE GROUND _____ DIA _____

DEPTH TO TOP OF WELL SCREEN _____ BOTTOM _____

WELL DEVELOPMENT _____ BACKFILL Grout

FIELD PARTY MCR-DLB RIG BK-81

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
1	SS	0.0	2.0	1-1-2-2	2.0				CL	BROWN CLAY		Water from fire protection well at Rockport Plant was used for drilling and grouting.
									CL	With organics		
2	SS	2.0	4.0	2-2-3-3	2.0					GRAY CLAY Moist		
3	SS	4.0	6.0	2-2-3-4	2.0		5					
4	SS	6.0	8.0	2-3-3-4	2.0							Decon drill and hand tools before drilling.
5	SS	8.0	10.0	1-2-2-2	2.0				CL	BROWNISH GRAY SILTY CLAY Dry		
6	SS	10.0	12.0	1-1-2-2	2.0		10					
7	SS	12.0	14.0	1-1-1-1	2.0				CL	GRAY CLAY Soft, wet		No drill mud used. Grouted from 58.6' to grade. Used approx. 50 gallons; 2 bags.
8	SS	14.0	16.0	0-0-0-0	2.0				CL	BLUISH GRAY SILTY CLAY Soft, moist		
9	SS	16.0	18.0	1-1-2-3	2.0		15					
10	SS	18.0	20.0	1-1-2-2	2.0				CL	BLUISH SANDY CLAY Wet		
11	SS	20.0	21.9	10-15-25-50/.2	1.7		20		SP	SAND With pea to 1/2" gravel, wet		
12	NQ-2	21.9	24.6		2.2					BLUISH GRAY SHALE Dry		
~~13~~	~~NQ-2~~	~~24.6~~	~~33.6~~		~~4.8~~					BLUISH GRAY SANDY CLAYSTONE		
							25			BLUISH GRAY SANDY SHALE LIGHT GRAY LIMESTONE		
							30					
14	NQ-2	33.6	43.6		10					TOP 5.0 - DARK GRAY SHALE BOTTOM 5.0 - DARK GRAY SANDY SHALE		
							35					

Continued Next Page

TYPE OF CASING USED

X	NQ-2 ROCK CORE	
X	6" x 3.25 HSA	
	9" x 6.25 HSA	
	HW CASING ADVANCER	4"
	NW CASING	3"
	SW CASING	6"
	AIR HAMMER	8"

PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC

WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON

RECORDER DLB

AEP RKPT.GPJ AEP_FULL.GDT 4/27/99

AME. AN ELECTRIC POWER SERVICE COR RATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

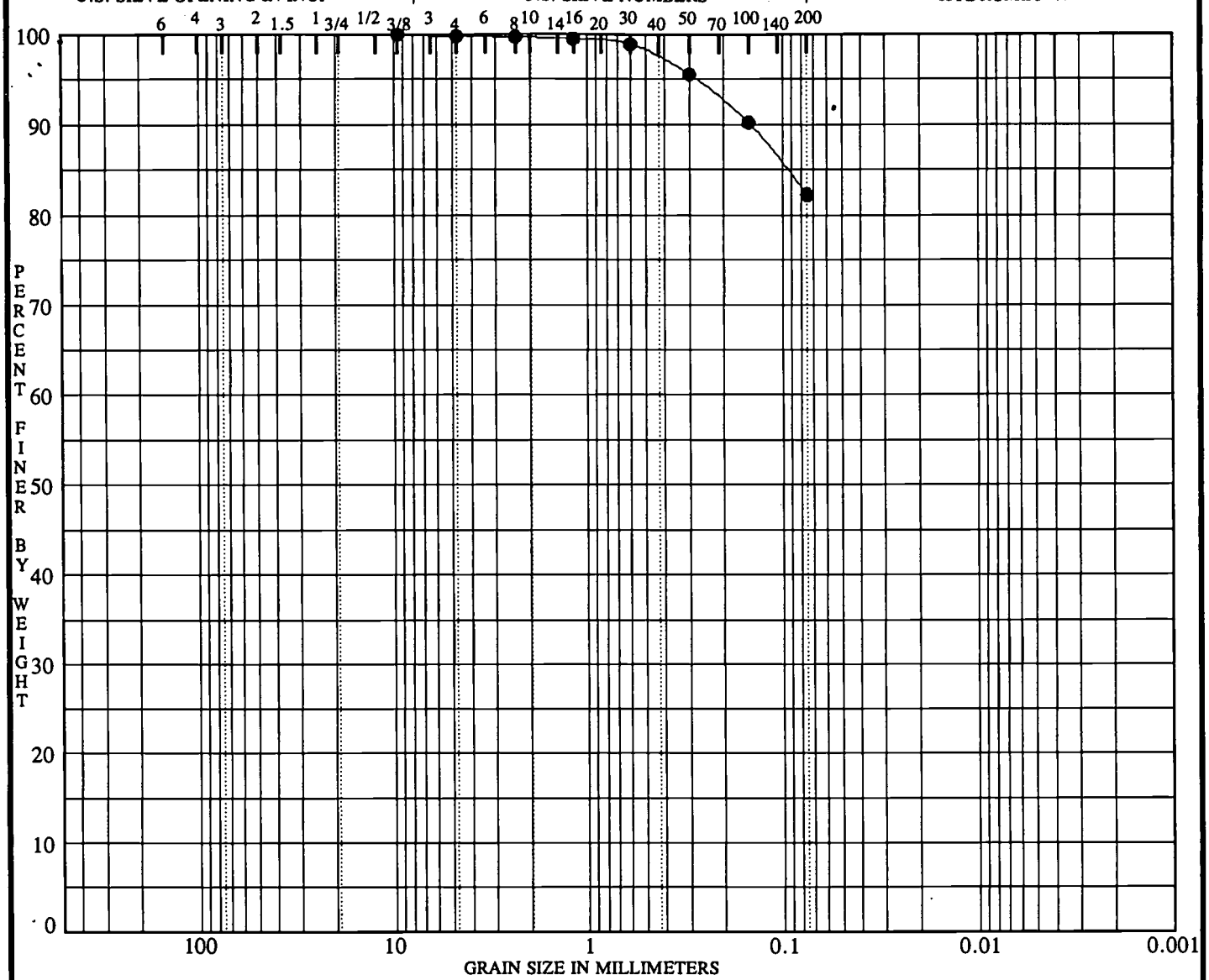
JOB NUMBER _____

COMPANY INDIANA MICHIGAN POWER COMPANY BORING NO. 9905 DATE 4/27/99 SHEET 2 OF 2

PROJECT ROCKPORT PLANT BORING START 2/12/99 BORING FINISH 2/12/99

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
15	NQ-2	43.6	53.6		9.6		45			TOP 1.5 - DARK GRAY SANDY SHALE 0.5 - COAL, fractured 0.6 - DARK GRAY CLAYSTONE 7.0 - GRAY CLAYSTONE		
16	NQ-2	53.6	58.6		5.5		50 55			LIGHT GRAY SANDY SHALE		Stopped boring at 58.6' on 2/12/99

AEP RKPT.GPJ AEP_FULL.GDT 4/27/99



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	MC%	LL	PL	PI	Sp.Gr.
●	9905	2.0			NP	NP	NP	
			SILT with SAND ML					
			COMPOSITE SAMPLE 2.0'-20.0'					

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Fines	% < .002
●	9905	2.0	9.500				0.2	17.6	82.2	

PROJECT ROCKPORT PLANT - ROCKPORT, INDIANA

JOB NO. WO#1352

DATE 04/22/99

GRADATION CURVES

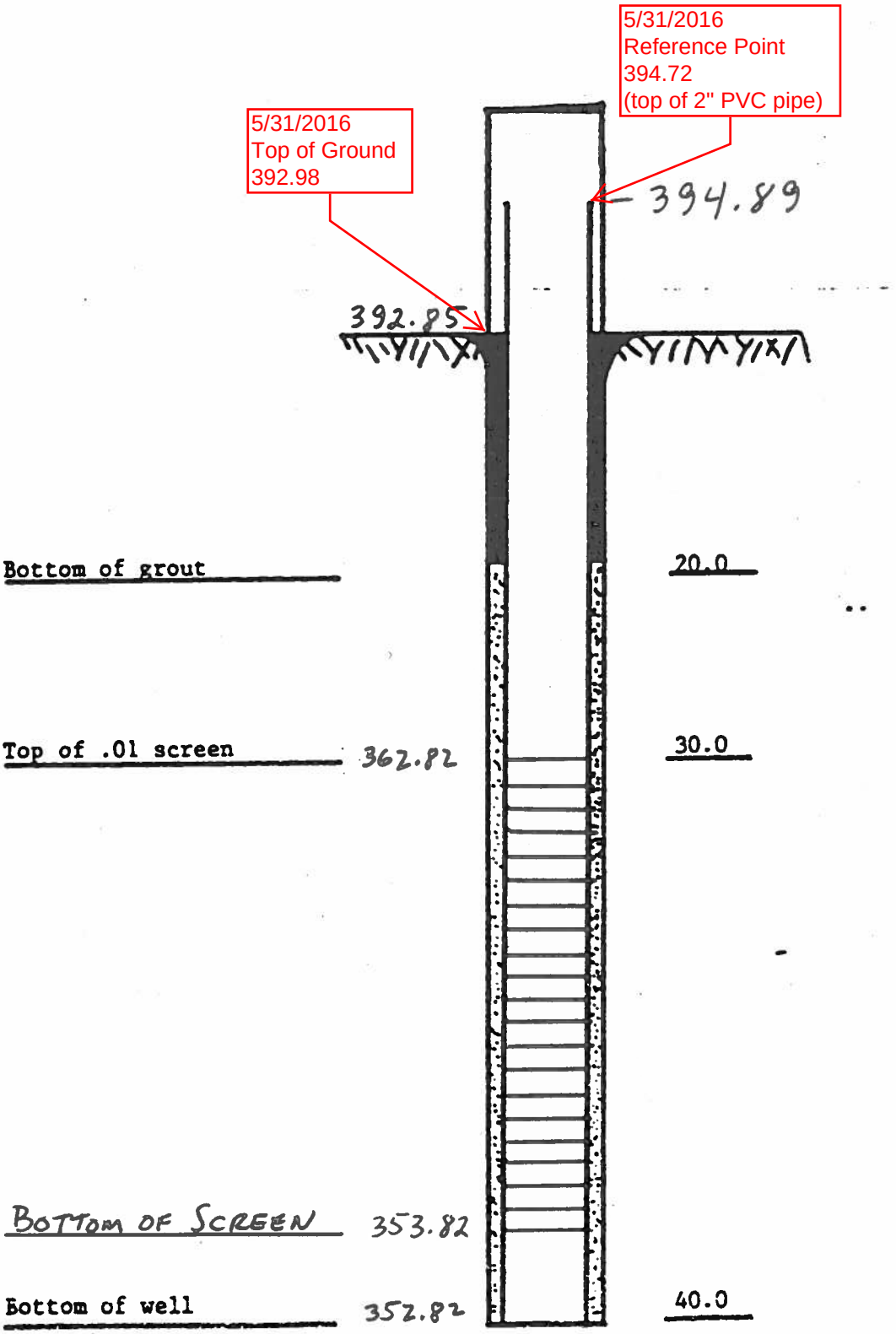
American Electric Power Service Corp.

Groveport, Ohio

AEP

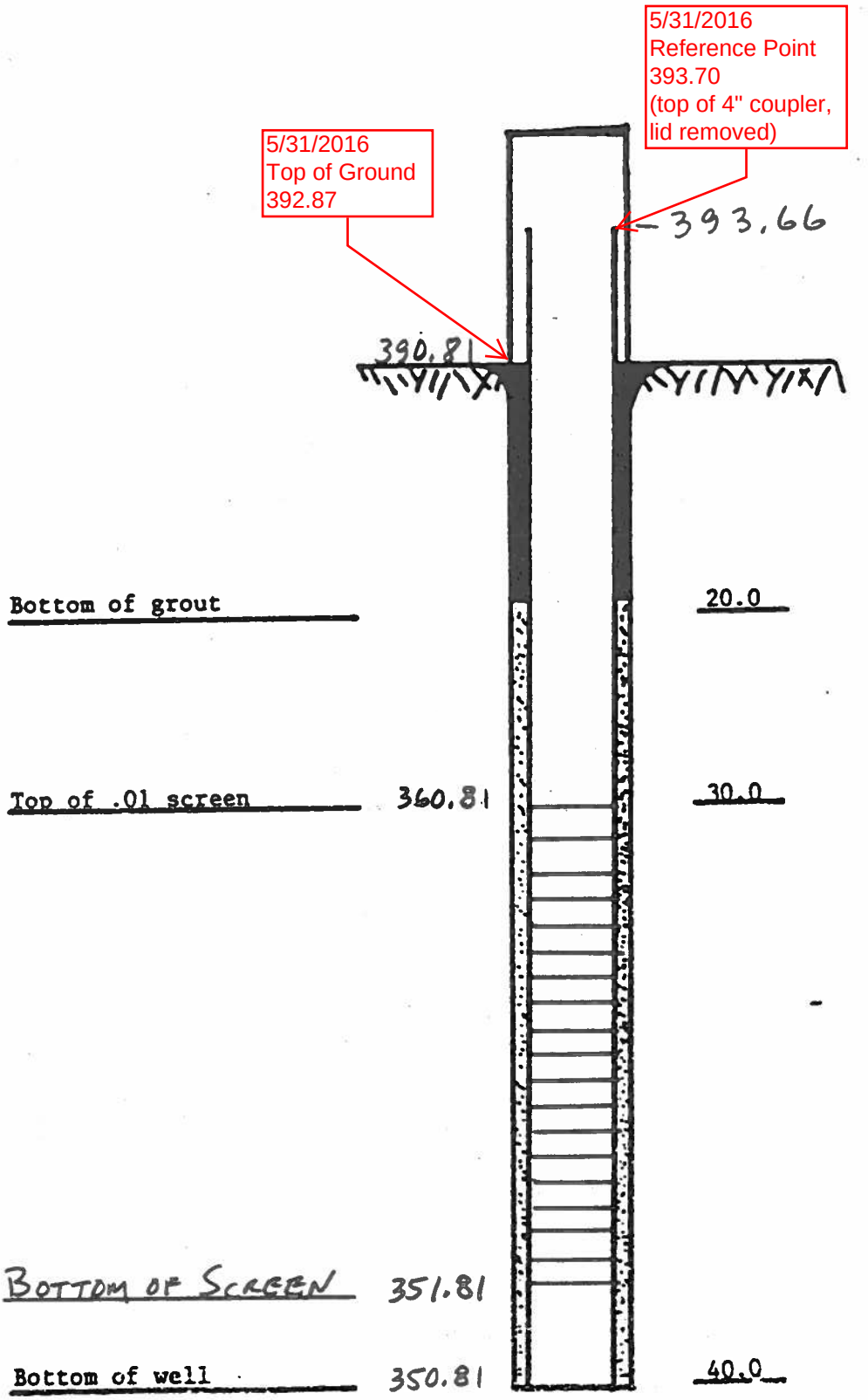
I & M.
Rockport Plant
Ash Storage Area
Well No. 6-S
5-17-84

MW-6S



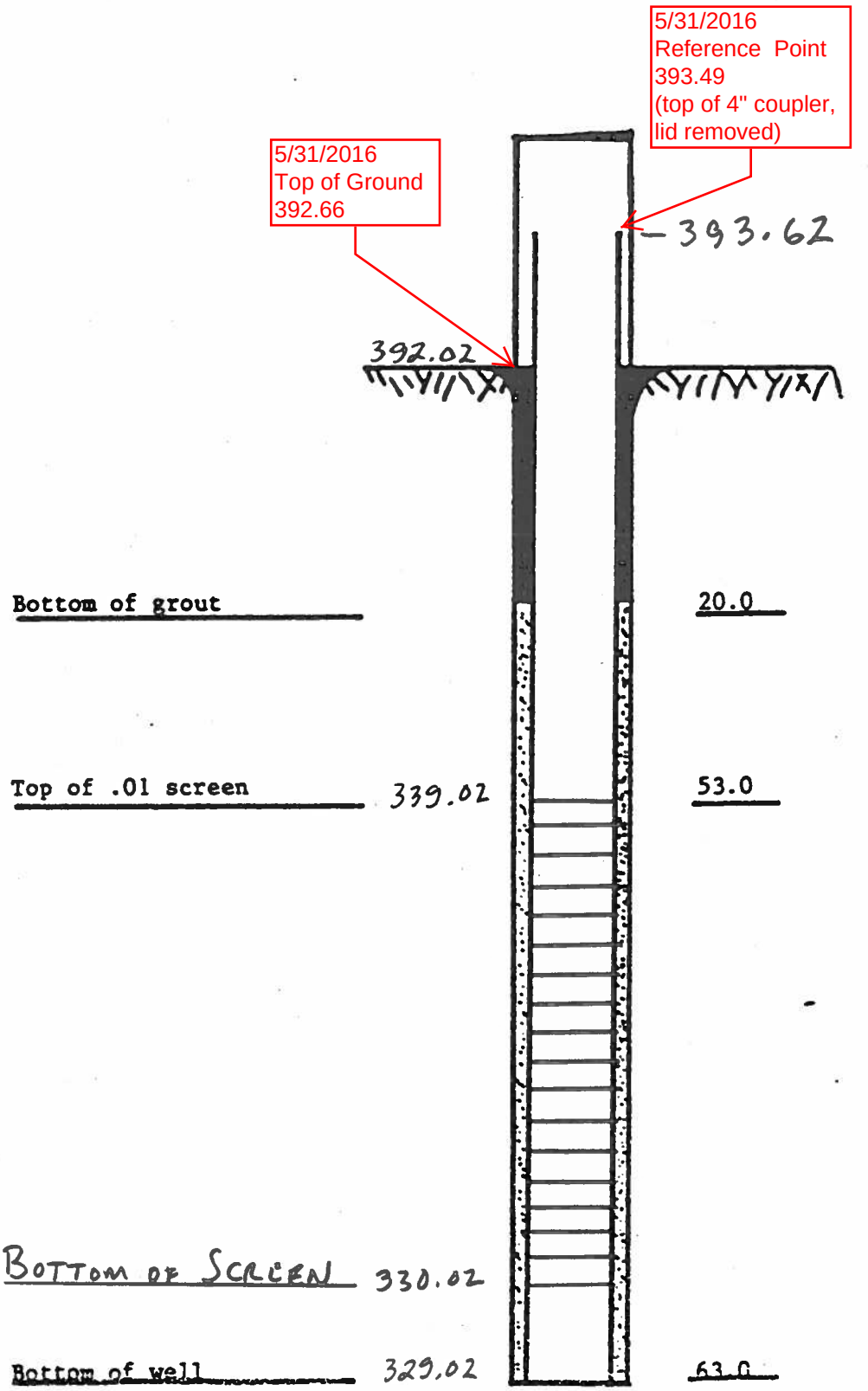
I & M
Rockport Plant
Ash Storage Area
Well No. 7-S
5-1-84

MW-7S



I & M.
Rockport Plant
Ash Storage Area
Well No. 7-I
5-24-84

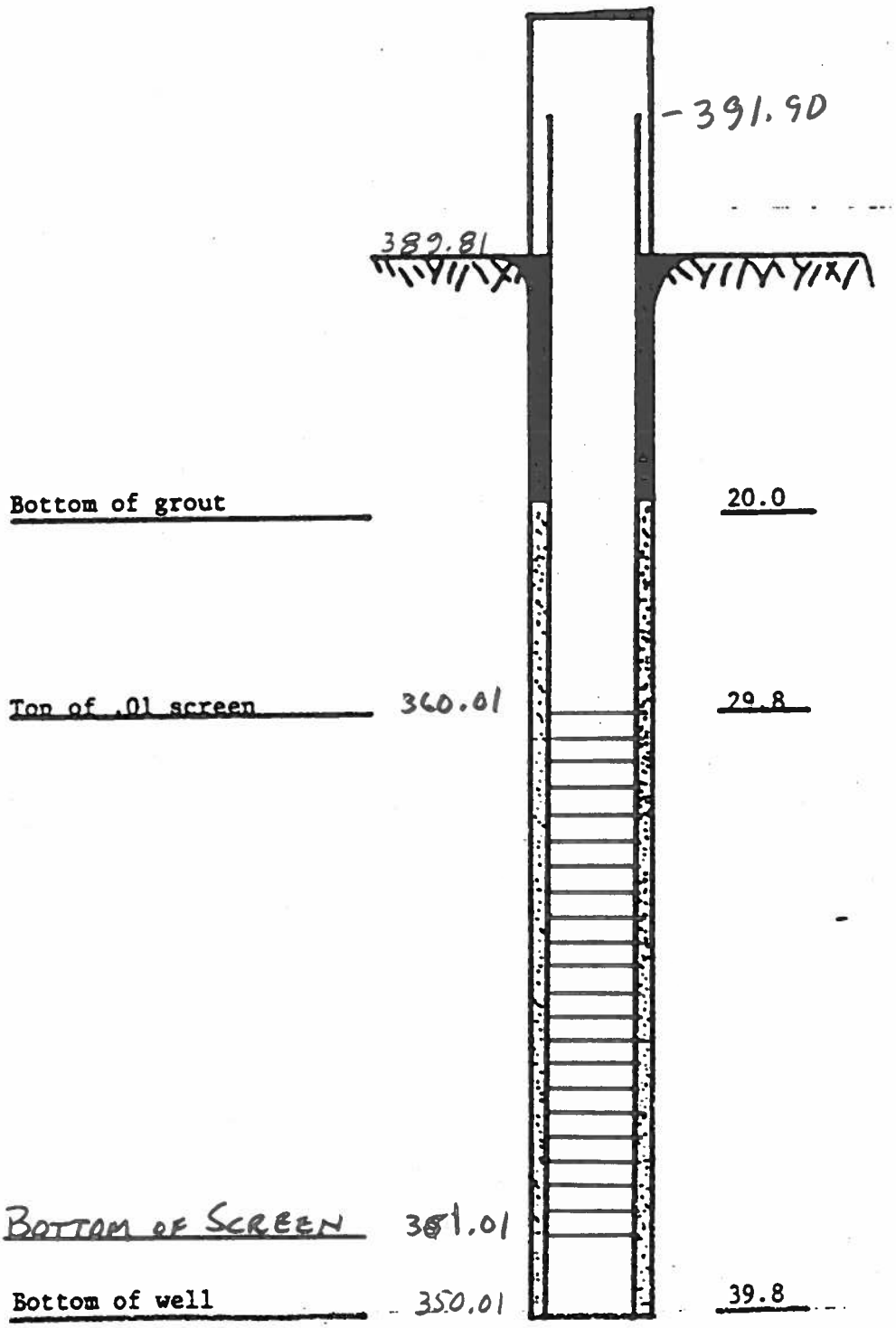
MW-7I



I & M
Rockport Plant
Ash Storage Area
Well No. 8-S
5-8-84

MW-8S (Abandoned)

2" PVC Pipe



RECORD OF WATER WELL

State Form 35880 (R5 / 9-04)

Driller–Mail complete record in 30 days to:
INDIANA DEPT. OF NATURAL RESOURCES
Division of Water
402 W. Washington St., Rm. W264
Indianapolis, IN 46204-2641
(877) 928-3755 toll-free or (317) 232-4160

County Permit Number
DNR Variance Number
Include if applicable

Fill in completely

WELL LOCATION

County where drilled	Civil township name	Township number (N-S)	Range number (E-W)	Section
Spencer	Ohio	6-S	5-W	31

Driving directions to the well location (include trip origin, street & road names, intersecting roads, and compass directions). Show well address below and subdivision in box at lower right. There is space for a map on the reverse side.

US 231 ~5 mi. to CR 350 (E of 231). ~2 mi. to entrance of landfill on N side of CR 350.

Well address:

UTM Northing 4629262.8
UTM Easting 517492.5
Datum ☑ NAD 27 ☐ NAD 83
GPS used
Subdivision name & lot number (if applicable)

If drilled for water supply, this well is: ☐ First well on property ☐ Replacement well ☐ Additional well on property ☐ Dry hole

OWNER / CONTRACTOR

Well owner–name: I & M Rockport Plant		Telephone number: 812-649-9171
Address (number and street, city, state, ZIP code): 2791 N US Hwy 231 Rockport, IN, 47635		
Building contractor–name: AEP Dolan Lab	Address (number and street, city, state, ZIP code): 4001 Bixby Rd, Groveport, OH 43125	Telephone number: 614-836-4200
Drilling contractor–name: AEP Dolan Lab	Address (number and street, city, state, ZIP code): 4001 Bixby Rd, Groveport, OH 43125	Telephone number: 614-836-4200
Equipment operator–name: Rick B. Banker	License number of operator	Date of well completion: 10/30/13

CONSTRUCTION DETAILS

Use of well
☐ Home
☐ Public supply
☐ Industrial / commercial
☐ Livestock
☐ Irrigation
☐ Monitoring / environ.
☐ Test hole
Other:

Drilling method
☐ Rotary
☐ Reverse rotary
☐ Cable tool
☐ Jet
☐ Bucket / bore
☐ Auger (including HSA)
☐ Direct push
Other:

Type of pump
☐ Submersible
☐ Shallow-well jet
☐ Deep-well jet
☐ No pump installed
Other:

Pump depth setting (feet)

Total depth of well (feet)	Borehole diameter (in.)	Gravel pack inserted	☐ Yes ☐ No
Casing length (feet)	Casing diameter (in.)	Casing material	☐ PVC ☐ Steel
Screen length (feet)	Screen diameter (in.)	Screen material	☐ PVC ☐ Steel
Screen slot size	Water quality (clear, odor, etc.)		

WELL CAPACITY TEST

Test method	Static level below surface	Gallons per min.	Hours tested	Drawdown (change in level)
☐ Air ☐ Bailing ☐ Pumping	feet			feet

GROUTING

Grout material	Grout depth from	to	No. of bags used

Installation method

WELL ABANDONMENT

Sealing material	Depth filled from	to	No. of bags used
Lean Cement Grout	43	0	4

Installation method
Tremie Grout

WELL LOG

FORMATIONS: Type of material	From (feet)	To (feet)
From Top of Pipe		
SWL 25.15'		
From Top of PVC		
Bottom of Well 43.9'		
100 Gals of lean cement grout to fill hole		
AEP MW-85		

Additional space for well log and comments on reverse side

I hereby swear or affirm, under the penalties for perjury, that the information submitted herewith is, to the best of my knowledge and belief, true, accurate, and complete.

Signature of drilling contractor or authorized representative MUST BE SIGNED OR STAMPED: Rick Banker

Date: 11/25/13

WELL CLOSURE / ABANDONMENT

American Electric Power Service Corporation / Rockport Plant

Well 8S

Spencer County / Township 6S / Range 5W / Section 31

- Removed monitoring well pump and recorded static water and sounding of bottom of well.
- Removed steel casing protector and concrete pad.
- Proceeded to drill 4.25" hollow stem auger over 2" PVC well to bottom.
- Once augers reached bottom of well, a 3 7/8" tri-cone roller bit and A rods were placed inside and lowered to a depth of 42.0' below grade. The PVC was pulled from inside of augers.
- Flushed out old cuttings.
- Finished project by tremie grouting from 42.0' to grade using 100 gallons of lean cement grout.

RECORD OF WATER WELL

State Form 35680 (R5 / 9-04)

Fill in completely

Driller--Mail complete record in 30 days to:
INDIANA DEPT. OF NATURAL RESOURCES
Division of Water
402 W. Washington St., Rm. W264
Indianapolis, IN 46204-2641
(877) 928-3755 toll-free or (317) 232-4160

County Permit Number:
DNR Variance Number:
Include if applicable

WELL LOCATION

County where drilled	Civil township name	Township number (N-S)	Range number (E-W)	Section
Spencer	Ohio	6S	5W	31

Driving directions to the well location (include trip origin, street & road names, intersecting roads, and compass directions). Show well address below and subdivision in box at lower right. There is space for a map on the reverse side.

US 231 ~5 mi. to CR350 (E of 231). ~2 mi. to entrance of landfill on N side of CR350.

Well address:

UTM Northing: 4162910.454
UTM Easting: 517492.008
Datum: ☑ NAD 27 ☐ NAD 83
GPS used:
Subdivision name & lot number (if applicable):

If drilled for water supply, this well is: ☐ First well on property ☐ Replacement well ☐ Additional well on property ☐ Dry hole

OWNER-CONTRACTOR

Well owner--name: I&M Rockport Plant
Telephone number: 812-649-9171
Address (number and street, city, state, ZIP code): 2791 N US Hwy 231, Rockport, IN, 47635

Building contractor--name: ABP- Nolan Lab
Address (number and street, city, state, ZIP code): 4001 Rixby Rd, Groveport, OH 43125
Telephone number: 614-836-4200

Drilling contractor--name: ABP- Nolan Lab
Address (number and street, city, state, ZIP code): 4001 Rixby Rd, Groveport, OH 43125
Telephone number: 614-836-4200

Equipment operator--name: Rick B. Bankes
License number of operator:
Date of well completion: 10/30/13

CONSTRUCTION DETAILS

Use of well:
☐ Home
☐ Public supply
☐ Industrial / commercial
☐ Livestock
☐ Irrigation
☑ Monitoring / environ.
☐ Test hole
Other:

Drilling method:
☐ Rotary
☐ Reverse rotary
☐ Cable tool
☐ Jet
☐ Bucket / bore
☑ Auger (including HSA)
☐ Direct push
Other:

Type of pump:
☑ Submersible
☐ Shallow-well jet
☐ Deep-well jet
☐ No pump installed
Other:

Pump depth setting (feet): 40.0

Total depth of well (feet): 42.0	Borehole diameter (in.): 6.25	Gravel pack inserted: ☑ Yes ☐ No	
Casing length (feet): 43.6	Casing diameter (in.): 2.0	Casing material: ☑ PVC ☐ Steel	Other:
Screen length (feet): 9.6	Screen diameter (in.): 2.0	Screen material: ☑ PVC ☐ Steel	Other:
Screen slot size: .010	Water quality (clear, odor, etc.): clear		

WELL CAPACITY TEST

Test method	Static level below surface	Gallons per min.	Hours tested	Drawdown (change in level)
☐ Air ☐ Bailing ☑ Pumping	26.12 feet			N/A feet

GROUTING

Grout material	Grout depth from	to	Installation method	No. of bags used
Holeplug	42	0	Tremie	14

WELL ABANDONMENT

Sealing material	Depth filled from	to	Installation method	No. of bags used

WELL LOG

FORMATIONS: Type of material	From (feet)	To (feet)
ABP MW-85R		
Sandy-Clay	0	9
Med-Fine Sand	9	42

Additional space for well log and comments on reverse side

I hereby swear or affirm, under the penalties for perjury, that the information submitted herewith is, to the best of my knowledge and belief, true, accurate, and complete.

Signature of drilling contractor or authorized representative MUST BE SIGNED OR STAMPED: Rick Bankes

Date: 11/26/13

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

MONITORING WELL CONSTRUCTION

JOB NUMBER _____

COMPANY INDIANA MICHIGAN POWER COMPANY WELL No. MW-8SR BORING No. MW-8SR INSTALLED 10/30/13

PROJECT ROCKPORT PLANT

COORDINATES N 182,910.5 E 817,492.0

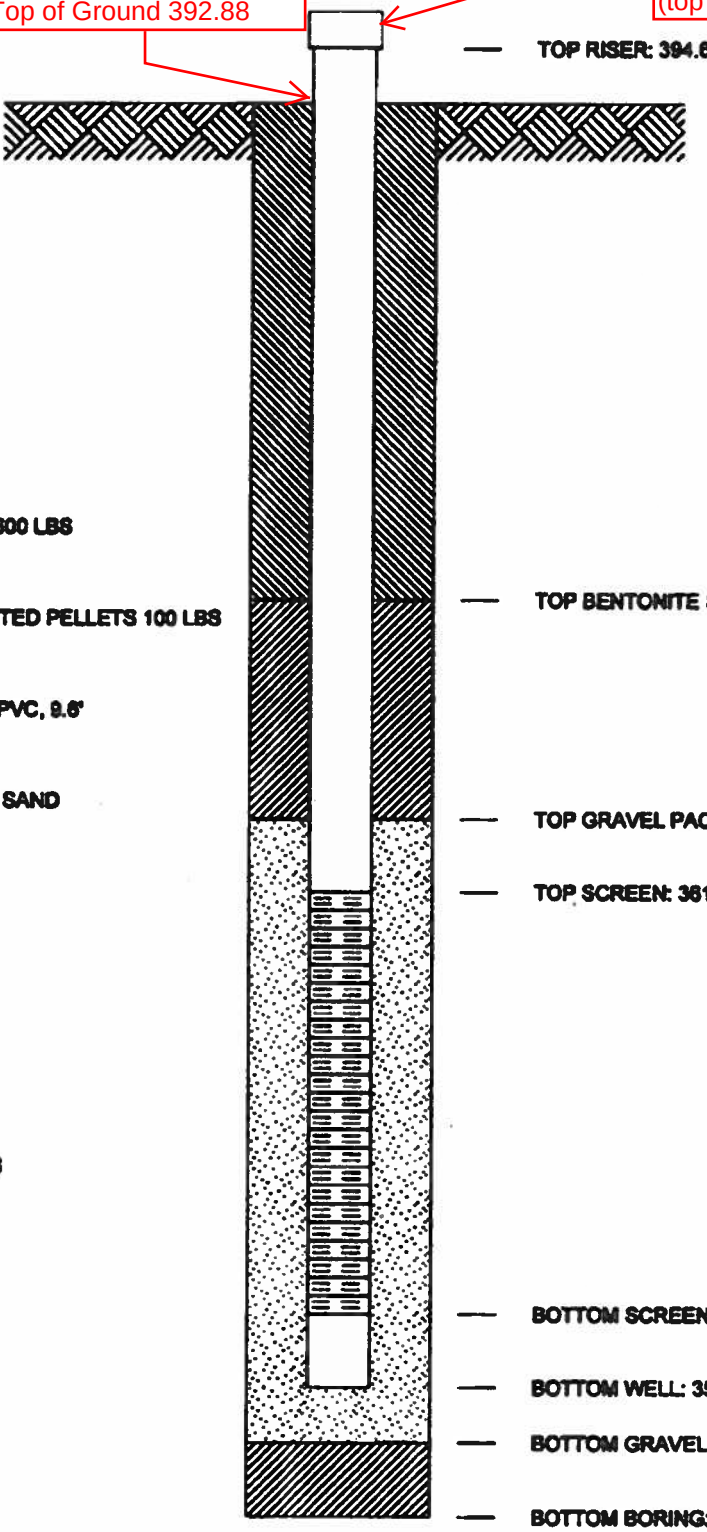
SYSTEM _____

MW-8SR

5/31/2016
Top of Ground 392.88

5/31/2016
Reference Point
394.86
(top of 2" PVC pipe)

GROUND ELEVATION 392.15 FT.



GROUT SEAL: HOLE PLUG 600 LBS

BENTONITE SEAL: 3/8" COATED PELLETS 100 LBS

SCREEN: 2" dia., .010 SLOT PVC, 9.6'

GRAVEL PACK: #5 COARSE SAND

RISER PIPE: 2", dia., PVC

SPACERS, DEPTH: N/A

To replace abandoned MW-8S

GEOMCNST ROCKPORT PLANT.GPJ AEP.GDT 11/22/13

COMPANY INDIAN AND MICHIGAN POWER CO.
PROJECT ROCKPORT ASH LANDFILL
COORDINATES N.162921.29 E.517496.00
DATE INSTALLED 11-14-92

MW-8I

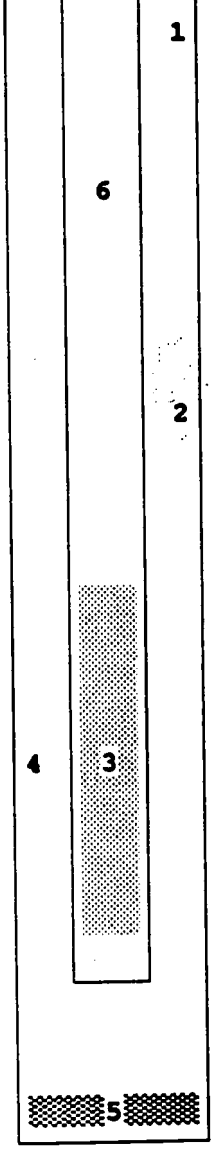
WELL CONSTRUCTION
SUMMARY ELEVATION
(ft. NGVD)
WELL NO. 8-I
REF. DATUM PT. 393.71
GRADE 391.78

NOTE: CASING PROTECTOR DETAILS
NOT SHOWN

5/31/2016
Reference Point
393.52
(top of 2" PVC cap)

5/31/2016
Top of Ground 392.42

1 GROUT SEAL VOLCLAY
2 BENTONITE SEAL
3 SCREEN 9.0 FEET
4 GRAVEL PACK
5 N.A.
6 RISER PIPE 2.0 INCH



TOP OF BENTONITE SEAL 341.8

TOP OF GRAVEL PACK 336.8

TOP OF SCREEN 336.1

BOTTOM OF SCREEN 327.1

BOTTOM OF GRAVEL PACK 326.1

BOTTOM OF BORE HOLE 326.1

GEOTECHNICAL ENGINEERING SECTION
CIVIL ENGINEERING DESIGN

AMERICAN ELECTRIC POWER SERVICE CORPORATION

OBSERVATION WELL
CDS-04

AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING

JOB NUMBER _____

COMPANY INDIANA MICHIGAN POWER COMPANY

PROJECT ROCKPORT PLANT

COORDINATES N 162,921.3 E 517,496.0

GROUND ELEVATION 391.8 SYSTEM _____

WATER LEVEL	▽ 24.8	▼	▼
TIME			
DATE	10-7-92		

BORING NO. 9244 DATE _____ SHEET 1 OF 2

BORING START 10/07/92 BORING FINISH 10/08/92

PIEZOMETER TYPE _____ WELL TYPE SS

HGT. RISER ABOVE GROUND _____ DIA 2.0

DEPTH TO TOP OF WELL SCREEN _____ BOTTOM _____

WELL DEVELOPMENT _____ BACKFILL VOLCLAY

FIELD PARTY MCR-CGF RIG BK-81

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPH LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
1	SS	0.0	1.5	2-4-5	1.1					BROWN AND GRAY CLAYEY SILT moist TRACE OF SAND, BLACK ORGANIC MATERIAL.		WELL NO. 8-I Second hole was drilled to install well.
2	SS	1.5	3.0	2-3-6	1.5							
3	SS	3.0	5.0	2-4-6-5	1.8		5					
4	ST	5.0	7.0		1.65					LIGHT BROWN CLAYEY SILT with trace of fine grain sand.		5.0 to 7.0 push 2.0, recovery 1.65, time 5, psi 500
5	ST	7.0	9.0		2.0					BROWN SILTY CLAY		7.0 to 9.0 2.0, recovery, push 2.0, time 5, psi 400.
6	SS	9.0	10.0	2-2	1.0					BROWNISH RED SILTY CLAY		
7	ST	10.0	12.0		2.0		10			BROWN SAND poorly graded fine to medium grain, dry.		10.0 to 12.0 push 2.0, recovery 2.0, time 5, psi 250.
8	SS	12.0	13.5	10-12-15	1.5					dry to moist.		
9	SS	13.5	15.0	10-15-23	1.4							
10	SS	15.0	16.5	12-16-25	1.4		15			BROWN SAND well graded, moist, quartz.		
11	SS	16.5	18.0	15-17-18	1.0							
12	SS	18.0	19.5	10-12-15	1.2					BROWN GRAVELLY SAND MOIST, 1" MAXIMUM SIZE, QUARTZ.		
13	SS	19.5	21.0	15-17-21	1.0		20					
14	SS	21.0	22.5	15-19-28	1.2					BROWN SAND MOIST, WELL GRADED, QUARTZ.		
15	SS	22.5	24.0	12-20-24	1.5					SATURATED		
16	SS	24.0	25.5	9-16-19	1.2		25					
17	SS	25.5	27.0	7-9-9	1.5					BROWN SAND AND GRAVEL saturated, quartz, 1/2 maximum.		
18	SS	27.0	28.5	4-6-11	1.4							
19	SS	28.5	30.0	5-7-9	1.2							
20	SS	30.0	31.5	4-5-6	1.2		30			BROWN SAND saturated, quartz, well graded. trace of small gravel.		
21	SS	31.5	33.0	3-4-4	1.5							
22	SS	33.0	34.5	4-5-5	1.1							
23	SS	34.5	36.0	7-10-13	1.5		35					36.0 started washing out hole with mud to keep plug out.
24	SS	36.0	37.5	8-12-16	.8							
25	SS	37.5	39.0	5-13-17	1.2					trace of small gravel.		
26	SS	39.0	40.5	4-8-17	1.0		40			BROWN SAND medium to fine grain, saturated, quartz.		
27	SS	41.9	43.4	5-9-10	1.2							
28	SS	44.4	45.9	12-16-19	1.5		45					
29	SS	46.9	48.4	5-14-16	1.4					BROWN SAND fine grain, saturated, quartz.		

Continued Next Page

TYPE OF CASING USED

	NQ-2 ROCK CORE	
X	6" x 3.25 HSA	
X	9" x 6.25 HSA	
	HW CASING ADVANCER	4"
	NW CASING	3"
	SW CASING	6"

PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC

WELL TYPE: OW = OPEN TUBE, GM = GEOMON

RECORDER _____

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

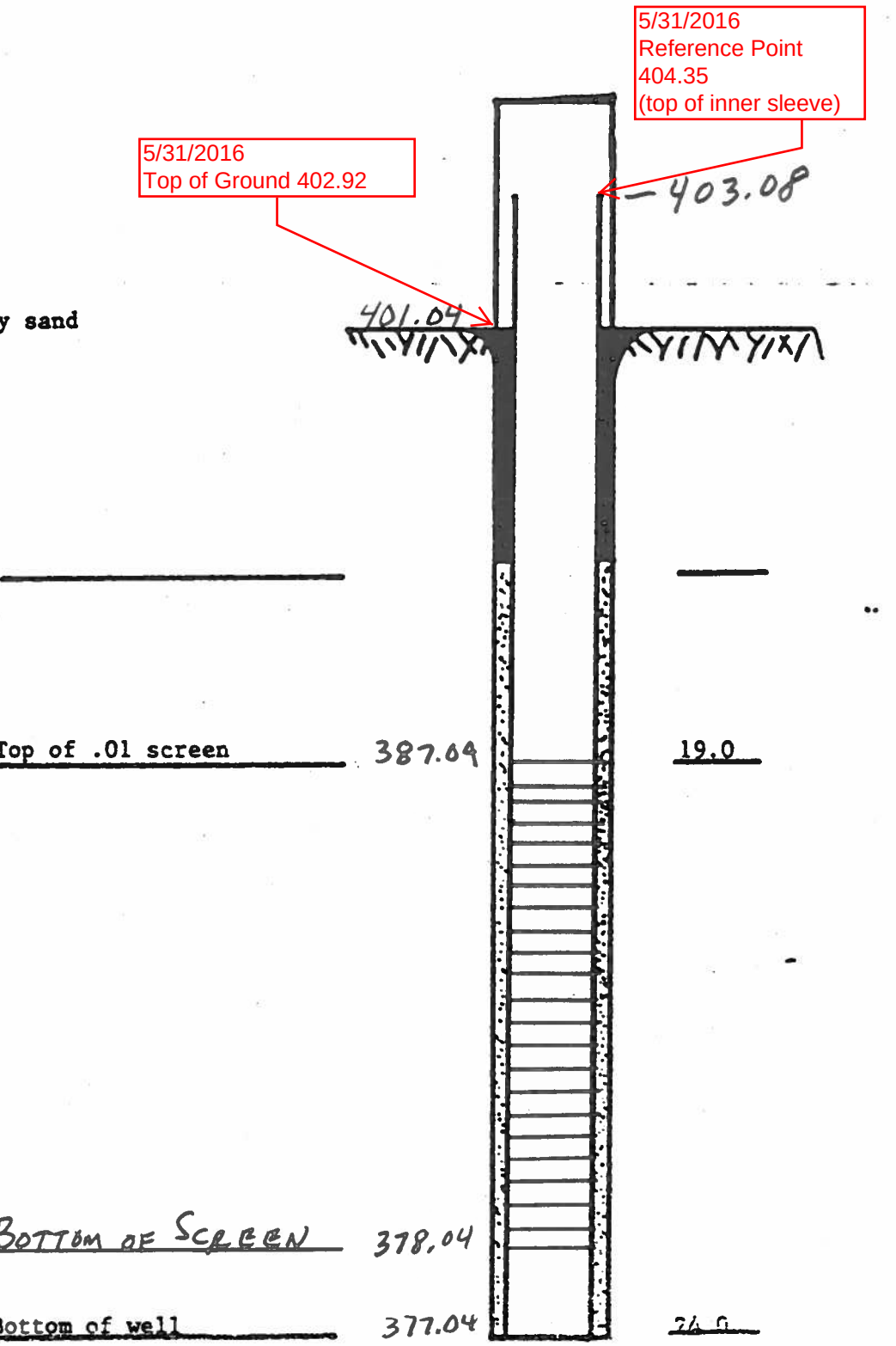
COMPANY INDIANA MICHIGAN POWER COMPANY BORING NO. 9244 DATE _____ SHEET 2 OF 2

PROJECT ROCKPORT PLANT BORING START 10/07/92 BORING FINISH 10/08/92

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPH LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
30	SS	49.4	50.9	8-12-15	1.5							50.0 top of bentonite seal.
31	SS	50.9	52.4	10-16-17	1.0							
32	SS	52.4	53.9	7-8-10	1.3							
33	SS	53.9	55.4	10-12-13	1.3		55			GRAY SAND fine to course grain, saturated, quartz.		55.0 top of gravel pack.
34	SS	55.4	56.9	11-17-18	1.5					GRAY SAND fine grain, saturated, quartz.		55.5 to 56.9 spacer.
35	SS	56.9	58.4	9-12-16	1.5					1" LAYER OF LIGNITE		55.7 top of screen.
36	SS	58.4	59.9	5-10-23	1.5		60					
37	SS	61.9	63.4	8-10-14	1.1					GRAY SAND well graded, saturated, quartz.		64.0 to 65.4 spacer.
38	SS	64.4	65.9	9-10-12	1.2		65					64.7 bottom of screen.
39	SS	66.9	68.4	2-3-7-	1.5					GRAY SAND fine to medium grain, saturated, quartz.		65.7 Bottom of gravel pack.
40	SS	69.4	69.8	50/4	-					GRAY CLAY SHALE		Hole drilled with 6.25 augers with stainless steel plate remaining in bottom of hole and using new premade bentonite donuts.

I & M
Rockport Plant
Ash Storage Area
Well No. 9-S
5-23-84

MW-9S



AME. AN ELECTRIC POWER SERVICE COR. RATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

MW-9

JOB NUMBER _____

COMPANY INDIANA MICHIGAN POWER COMPANY

PROJECT ROCKPORT PLANT

COORDINATES N 165,472.1 E 521,801.1

GROUND ELEVATION 401.6 SYSTEM _____

WATER LEVEL	▽	▼	▼
TIME			
DATE			

BORING NO. 9909 DATE 4/27/99 SHEET 1 OF 1

BORING START 2/11/99 BORING FINISH 2/11/99

PIEZOMETER TYPE _____ WELL TYPE OW

HGT. RISER ABOVE GROUND _____ DIA _____

DEPTH TO TOP OF WELL SCREEN _____ BOTTOM _____

WELL DEVELOPMENT _____ BACKFILL Grout

FIELD PARTY MCR-DLB RIG BK-81

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
1	SS	0.0	2.0	1-1-2-2	2.0				CL	**BROWN FINE GRAIN SANDY CLAY** Dry		Water for drilling and grouting came from fire protection well at Rockport Plant.
2	SS	2.0	4.0	2-2-2-3	2.0				CL	**TAN to LIGHT BROWN SILTY CLAY** With trace of fine grain sand, dry.		
3	SS	4.0	6.0	2-2-2-4	2.0		5					
4	SS	6.0	8.0	2-3-4-5	2.0							Grouted from 44.9' to grade; used approx. 40 gallons (1.5 bags).
5	SS	8.0	10.0	3-3-4-5	1.8				SP	**REDDISH BROWN FINE GRAIN SILTY SAND** Moist.		
6	SS	10.0	12.0	1-1-1-2	1.7		10					No quick gel used when soil sampling.
7	SS	12.0	14.0	2-2-3-4	2.0				SP	**BROWN FINE GRAIN SAND** Wet.		
8	SS	14.0	16.0	2-2-2-3	2.0					**DARK BROWN to LIGHT BROWN FINE GRAIN SAND**		
9	SS	16.0	18.0	1-1-4-5	2.0		15		SP	Moist.		
10	SS	18.0	20.0	5-16-7-6	2.0				SW	**LIGHT BROWN FINE to MEDIUM GRAIN SAND** Wet.		
11	SS	20.0	22.0	3-3-5-8	2.0					**LIGHT BROWN to DARK BROWN WELL GRADED MEDIUM GRAIN SAND** Moist.		
12	SS	22.0	24.0	3-4-5-8	2.0		20					
13	SS	24.0	26.0	5-8-13-37	2.0							
14	NQ-2	29.0	29.9		0		25		SP	**POORLY GRADED SAND** With pea to 1/2" gravels, moist.		
15	NQ-2	29.9	34.9		3.0					**NO RECOVERY**		Auger refusal at 29.0'
16	NQ-2	34.9	39.9				30			**BLUISH GRAY SHALE**		Pulled tools. Inner tube not latching. Took this core from inside of core barrel. All return drill water showed gray clay shale.
17	NQ-2	39.9	44.9				35			**GRAY FINE GRAIN SANDY CLAY SHALE**		
							40					Stopped boring at 44.9' on 2/11/99

TYPE OF CASING USED

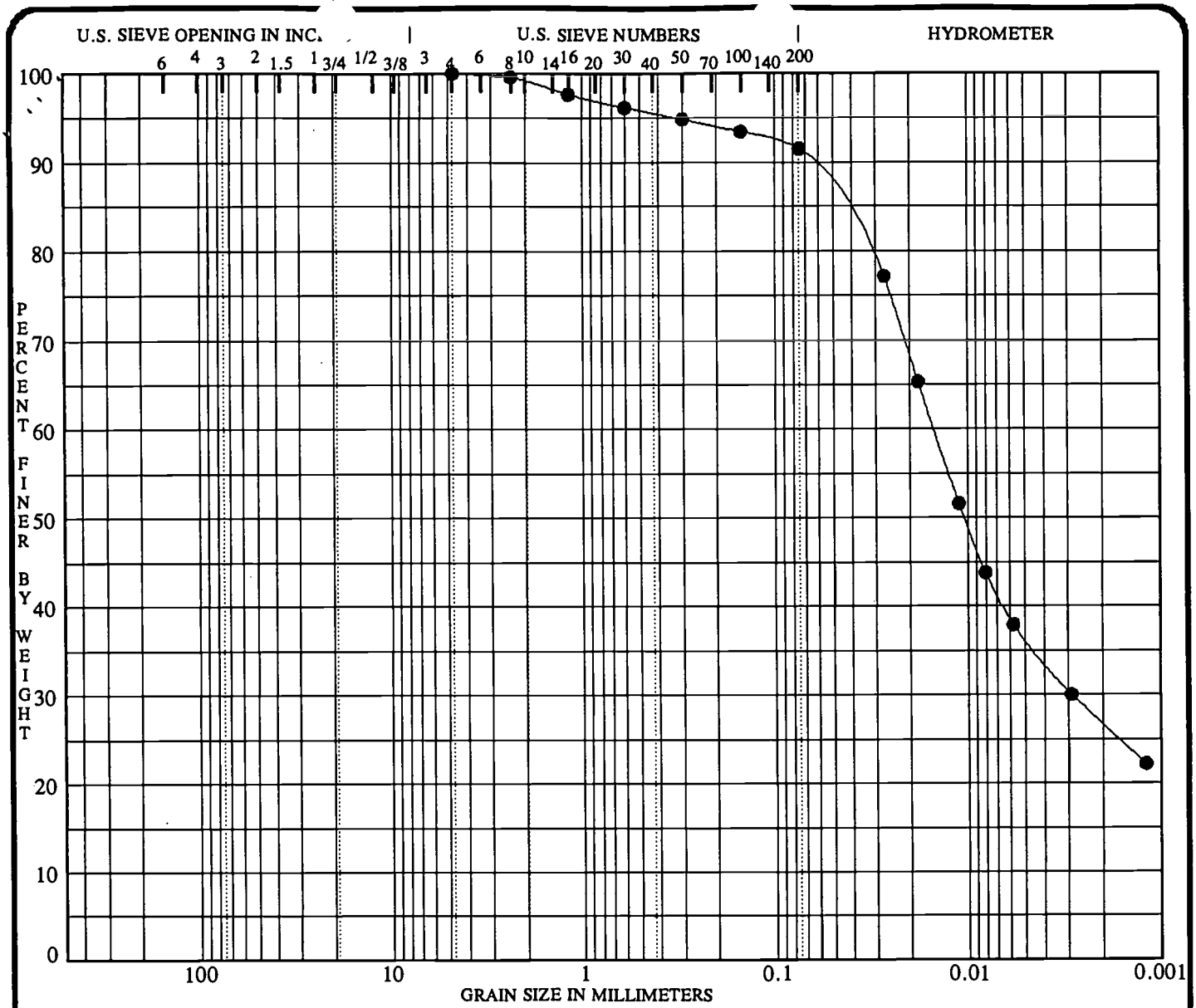
X	NQ-2 ROCK CORE	
X	6" x 3.25 HSA	
	9" x 6.25 HSA	
	HW CASING ADVANCER	4"
	NW CASING	3"
	SW CASING	6"
	AIR HAMMER	8"

PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC

WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON

RECORDER DLB

AEP RKPT.GPJ AEP_FULL.GDT 4/27/99



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	MC%	LL	PL	PI	Sp.Gr.
●	9909	2.0			35.0	18.8	16.2	
			LEAN CLAY CL					
			COMPOSITE 2.0'-8.0'					

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Fines	% < .002
●	9909	2.0	4.750	0.015	0.003		0.0	8.5	91.5	26.7

PROJECT ROCKPORT PLANT - ROCKPORT, INDIANA

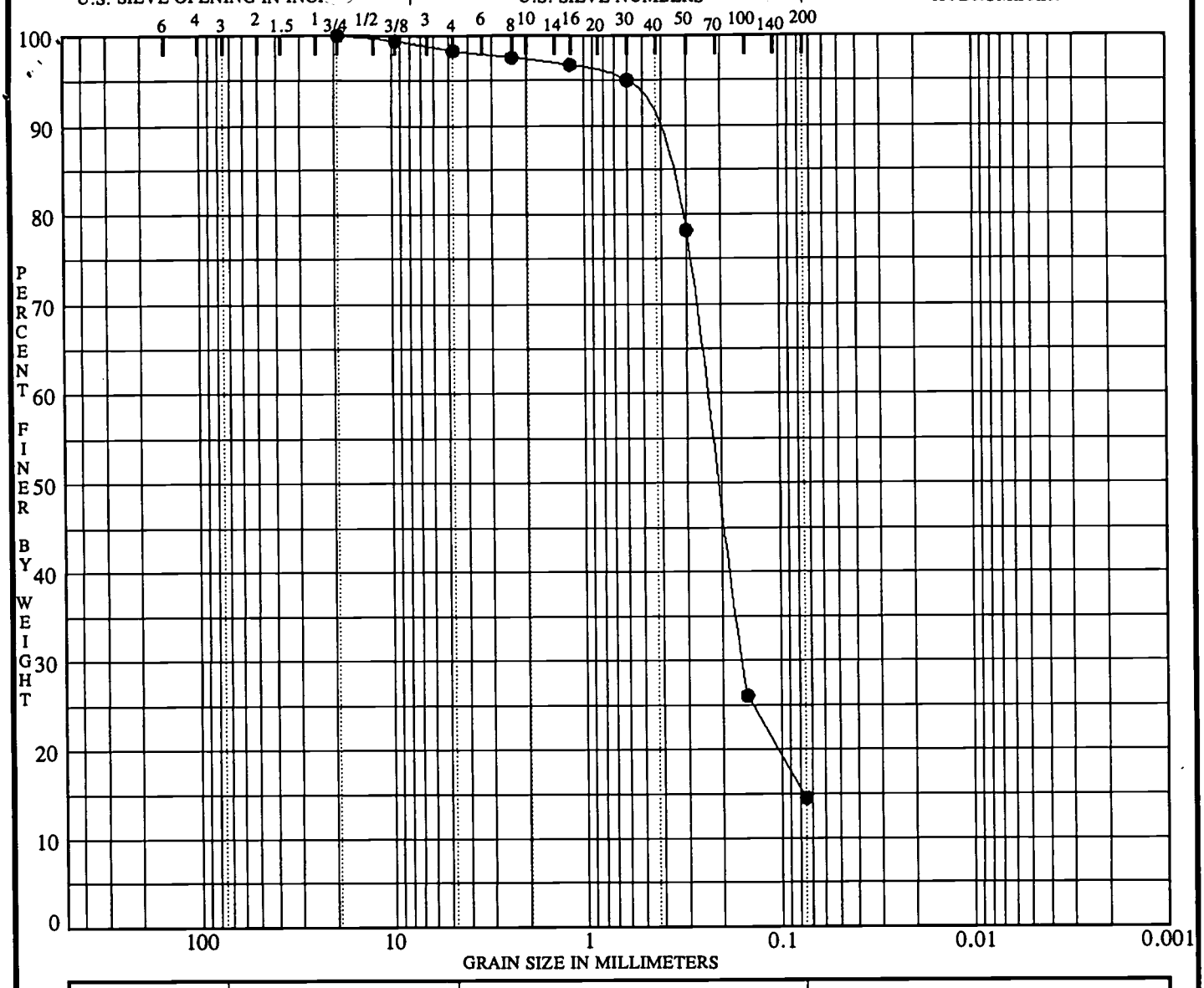
JOB NO. WO#SC3750

DATE 06/01/99

GRADATION CURVES

American Electric Power Service Corp.

Groveport, Ohio



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	MC%	LL	PL	PI	Sp.Gr.
●	9909	16.0			NP	NP	NP	
			SILTY SAND SM					
			COMPOSITE SAMPLE 16.0'-26.0'					

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Fines	%<.002
●	9909	16.0	19.000	0.236	0.158		1.7	83.8	14.5	

PROJECT ROCKPORT PLANT - ROCKPORT, INDIANA

JOB NO. WO#1352

DATE 04/22/99

GRADATION CURVES

American Electric Power Service Corp.

Groveport, Ohio

AEP

I & M
Rockport Plant
Ash Storage Area
Well No. 10-S
5-23-84

MW-10S

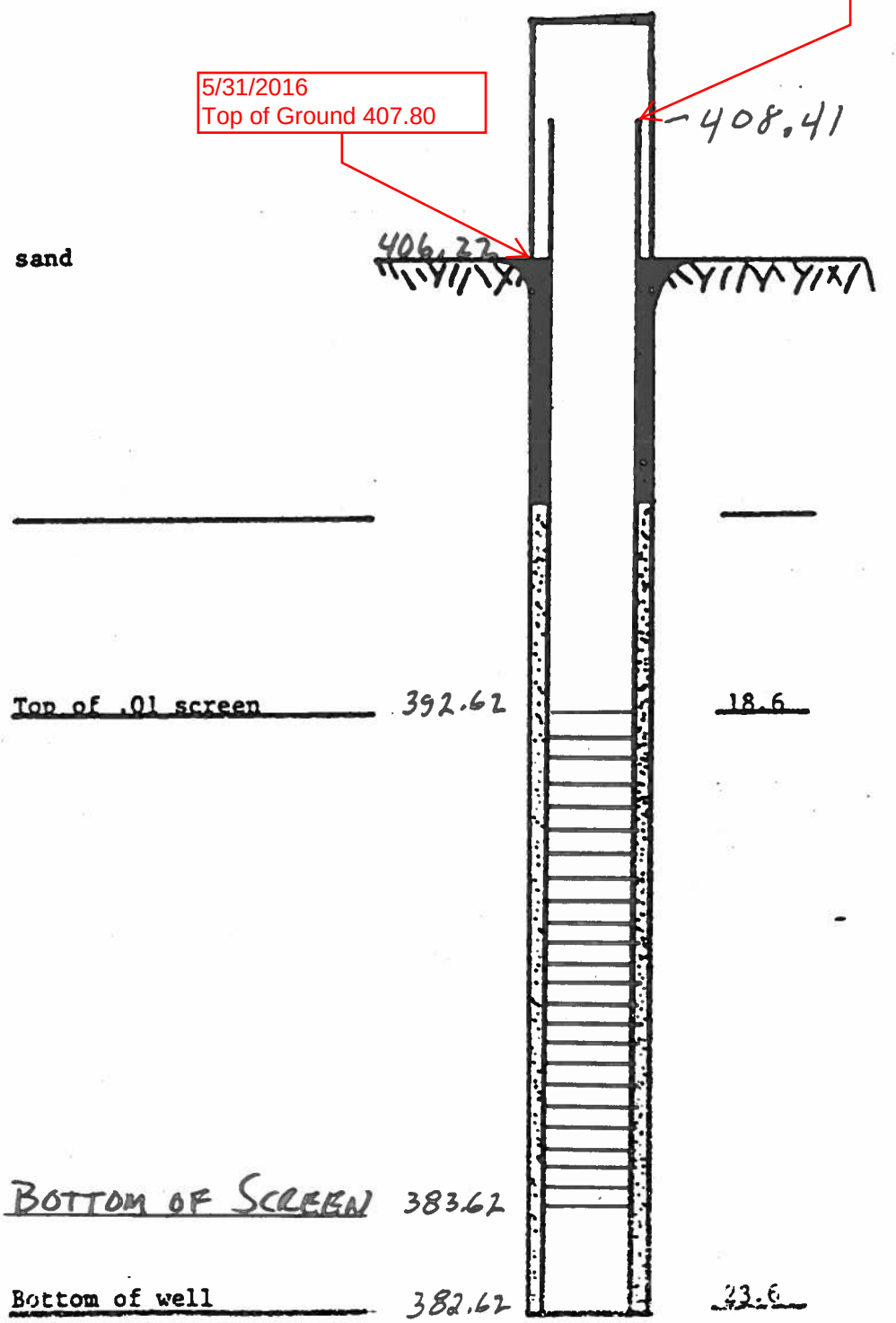
5/31/2016
Reference Point
409.16
(top of inner slope
indicator sleeve)

5/31/2016
Top of Ground 407.80

408.41

406.27

2" PVC Pipe
Installed well 10 ft. in silty sand



AME. AN ELECTRIC POWER SERVICE COR RATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____ MW-10

COMPANY INDIANA MICHIGAN POWER COMPANY

PROJECT ROCKPORT PLANT

COORDINATES N 166,560.6 E 520,751.6

GROUND ELEVATION 406.4 SYSTEM _____

WATER LEVEL	▽	▼	▼
TIME			
DATE			

BORING NO. 9910 DATE 4/27/99 SHEET 1 OF 2

BORING START 2/11/99 BORING FINISH 2/11/99

PIEZOMETER TYPE _____ WELL TYPE OW

HGT. RISER ABOVE GROUND _____ DIA _____

DEPTH TO TOP OF WELL SCREEN _____ BOTTOM _____

WELL DEVELOPMENT _____ BACKFILL Grout

FIELD PARTY MCR-DLB RIG BK-81

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
1	SS	0.0	2.0	1-1-1-1	2.0				CL	**BROWN CLAY**		Water for drilling and grouting came from fire protection well at Rockport Plant.
									CL	With organic **BROWN SILTY CLAY**		
2	SS	2.0	4.0	1-1-1-2	2.0					Moist		
									CL	**LIGHT BROWN SILTY CLAY** Moist		
3	SS	4.0	6.0	2-2-3-4	2.0				CL	**BROWN CLAY** Stiff; moist.		Grouted from 40.0' to grade using approx. 40 gallons of grout - 1.5 bags.
							5					
4	SS	6.0	8.0	3-4-4-6	2.0				CL	**BROWNISH GRAY CLAY** Stiff		
									CL	**BROWN CLAY** Moist		
5	SS	8.0	10.0	1-2-2-3	2.0							No quick gel used when soil sampling.
									CL	**SILTY CLAY** Wet		
6	SS	10.0	12.0	2-2-3-4	2.0		10		CL	**BROWN SILTY CLAY** Moist		
7	SS	12.0	14.0	2-1-2-4	2.0							
8	SS	14.0	16.0	1-1-2-2	2.0				SW	**WELL GRADED SAND** Medium grained; wet.		
							15					
9	SS	16.0	18.0	2-4-4-7	2.0							
10	SS	18.0	20.0	2-3-7-9	2.0							
									CL	**BROWN CLAY** Stiff, dry.		
11	SS	20.0	22.0	9-12-15-18	2.0		20		CL	**BROWN SILTY CLAY** Moist		
									CL	**GRAY CLAY** Stiff, dry.		
12	SS	22.0	24.0	6-8-10-14	2.0				CL	**BROWN CLAY**		
									CL	**LIGHT BROWN CLAY** Stiff, moist.		
13	SS	24.0	24.7	28-50/2	0.7					**LIGHT BROWN SHALE**		

TYPE OF CASING USED

	NQ-2 ROCK CORE
X	6" x 3.25 HSA
	9" x 6.25 HSA
	HW CASING ADVANCER 4"
	NW CASING 3"
	SW CASING 6"
	AIR HAMMER 8"

Continued Next Page

PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC

WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON

RECORDER DLB

AEP RKPT.GPJ AEP_FULL.GDT 4/27/99

AME AN ELECTRIC POWER SERVICE COR RATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

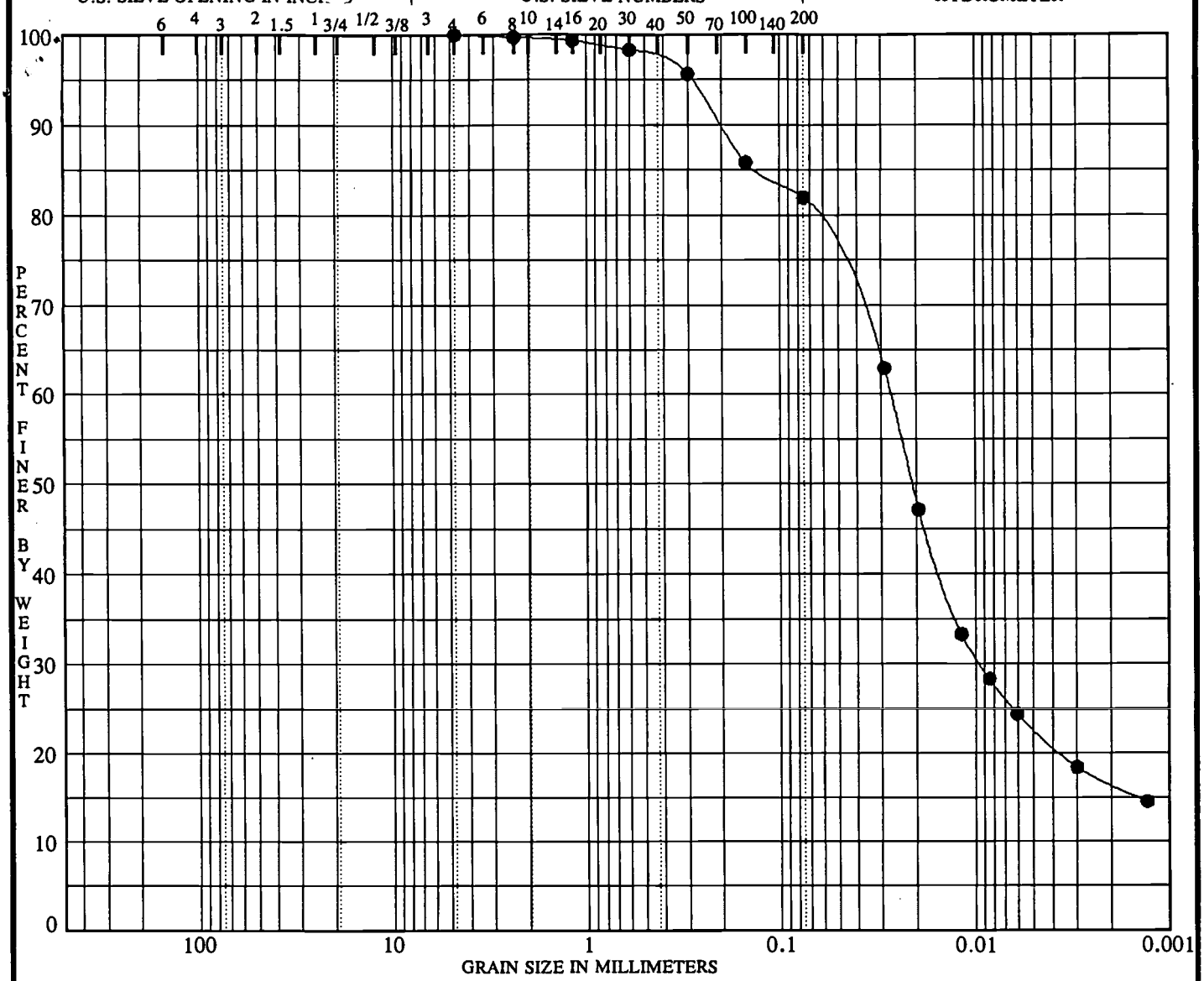
JOB NUMBER _____

COMPANY **INDIANA MICHIGAN POWER COMPANY** BORING NO. **9910** DATE **4/27/99** SHEET **2** OF **2**

PROJECT **ROCKPORT PLANT** BORING START **2/11/99** BORING FINISH **2/11/99**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	SAMPLE DEPTH IN FEET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
14	NQ-2	24.7	28.8		0.5					**BROWN SHALE**		Looking at core showed fine grain sand from overburden inbedded in core which was not letting core slide into inner tube and causing it to be washed away.
15	NQ-2	28.8	33.0		5.2		30			**GRAY FINE GRAIN SANDY CLAY SHALE** Medium hard, somewhat cemented.		
16	NQ-2	33.0	40.0		7.0		35					
							40					Stopped boring at 40.0' on 2/11/99

AEP RKPT.GPJ AEP_FULL.GDT 4/27/99



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	MC%	LL	PL	PI	Sp.Gr.
●	9910	2.0			29.5	18.1	11.5	
			LEAN CLAY with SAND CL					
			COMPOSITE 2.0'-14.0'					

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Fines	% < .002
●	9910	2.0	4.750	0.027	0.010		0.0	18.1	81.9	16.5

PROJECT ROCKPORT PLANT - ROCKPORT, INDIANA

JOB NO. WO#SC3750

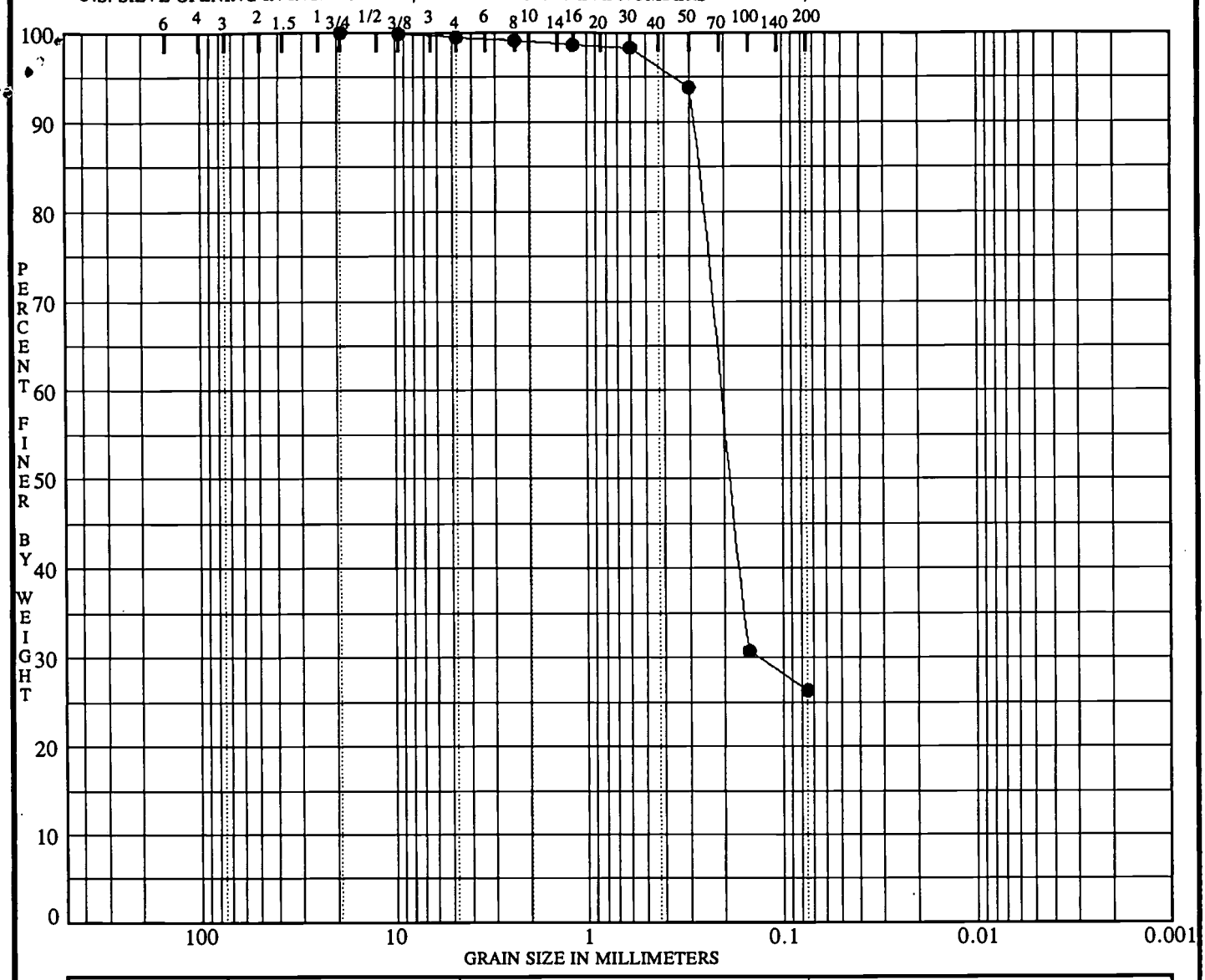
DATE 06/01/99

GRADATION CURVES

American Electric Power Service Corp.

Groveport, Ohio

AEP



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	MC%	LL	PL	PI	Sp.Gr.
●	9910	14.0			NP	NP	NP	
			SILTY SAND SM					
			COMPOSITE SAMPLE 14.0'-20.0'					

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Fines	% < .002
●	9910	14.0	19.000	0.207	0.134		0.5	73.2	26.3	

PROJECT ROCKPORT PLANT - ROCKPORT, INDIANA

JOB NO. WO#1352

DATE 04/22/99

GRADATION CURVES

American Electric Power Service Corp.

Groveport, Ohio

COMPANY INDIAN AND MICHIGAN POWER CO.
PROJECT ROCKPORT ASH LANDFILL
COORDINATES N.164421.03 E.523964.21
DATE INSTALLED 11-16-92

MW-11S

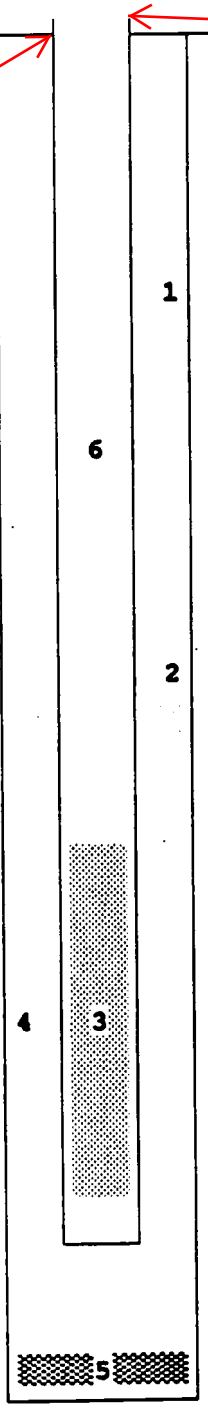
WELL CONSTRUCTION
SUMMARY ELEVATION
(ft. NGVD)
WELL NO. 11-S
REF. DATUM PT. 399.97
GRADE 397.60

NOTE: CASING PROTECTOR DETAILS
NOT SHOWN

5/31/2016
Reference Point
400.07
(top of 2" PVC pipe)

5/31/2016
Top of Ground 398.22

1 GROUT SEAL VOLCLAY
2 BENTONITE SEAL
3 SCREEN 9.0 FEET
4 GRAVEL PACK
5 N.A.
6 RISER PIPE 2.0 INCH



TOP OF BENTONITE SEAL 375.4

TOP OF GRAVEL PACK 370.4

TOP OF SCREEN 368.0

BOTTOM OF SCREEN 359.0

BOTTOM OF GRAVEL PACK 358.0

BOTTOM OF BORE HOLE 358.0

GEOTECHNICAL ENGINEERING SECTION
CIVIL ENGINEERING DESIGN

AMERICAN ELECTRIC POWER SERVICE CORPORATION

OBSERVATION WELL
CDS-04

AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING

JOB NUMBER _____

COMPANY INDIANA MICHIGAN POWER COMPANY

PROJECT ROCKPORT PLANT

COORDINATES N 164,421.0 E 523,964.2

GROUND ELEVATION 397.6 SYSTEM _____

WATER LEVEL	▽ 34.4	▼	▼
TIME			
DATE	9-27-92		

BORING NO. 9230 DATE _____ SHEET 1 OF 2

BORING START 09/25/92 BORING FINISH 09/27/92

PIEZOMETER TYPE _____ WELL TYPE SS

HGT. RISER ABOVE GROUND _____ DIA 2"

DEPTH TO TOP OF WELL SCREEN _____ BOTTOM _____

WELL DEVELOPMENT _____ BACKFILL VOLCLAY

FIELD PARTY ROUSH/FOLGER RIG BK-81

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPH LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
1	SPT	1.9	3.4	9-17-19	1.5					BROWN CLAYEY SILT, dry		WELL 11-S
2	SPT	4.4	5.9	8-9-11	1.5		5			BROWN CLAYEY SAND, very fine grain, dry. moist		Hole drilled with 6.25 augers using stainless plates remaining in borings. New premade bentonite type donuts. Water induced in hole to make seal. 27.4 to 28.8 spacer. 37.9 to 39.3 spacer. Second hole drilled to install well.
3	SPT	6.9	8.4		1.3							
4	SPT	9.4	10.9	6-7-7	1.0		10			BROWN SAND, fine to medium grain, moist.		
5	SPT	11.9	13.4	4-6-6	1.5							
6	SPT	14.4	15.9	5-7-7	1.1		15					
7	SPT	16.9	18.4	7-8-28	1.4					SAND w/PEA GRAVEL, medium to coarse grain, some 1/4" to 1/2" gravel.		
8	SPT	19.4	20.9	8-12-19	1.0		20					
9	SPT	21.9	23.4	7-14-27	1.5							22.2 top of bentonite seal.
10	SPT	24.4	25.9	12-20-25	1.1		25					
11	SPT	26.9	28.4	9-10-14	1.2							27.2 top of gravel pack.
12	SPT	29.4	30.9	8-14-21	1.4		30			BROWN SAND w/PEA GRAVEL, fine to medium grain.		29.6 top of screen.
13	SPT	31.9	33.4	5-8-14	1.0					GRAY SAND w/PEA GRAVEL, medium to coarse grain, wet.		
14	SPT	34.4	35.9	7-9-16	1.2		35			BROWN SAND, fine to medium grain with some pea gravel and 1/4" gravel.		Hit water.
15	SPT	36.9	38.4	8-10-12	.9							38.6 bottom of screen. Began using drill mud. 39.6 bottom of gravel pack.
16	SPT	39.4	40.9	4-6-7	.9		40					
17	SPT	41.9	43.4	5-7-9	1.3							
18	SPT	44.4	45.9	7-8-12	1.1		45			BROWN SAND, medium grain with 1" lens black organic.		
19	SPT	46.9	46.9	50/0	0							

Continued Next Page

TYPE OF CASING USED

	NQ-2 ROCK CORE
X	6" x 3.25 HSA
X	9" x 6.25 HSA
	HW CASING ADVANCER 4"
	NW CASING 3"
	SW CASING 6"

PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC

WELL TYPE: OW = OPEN TUBE, GM = GEOMON

RECORDER _____

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY **INDIANA MICHIGAN POWER COMPANY** BORING NO. **9230** DATE _____ SHEET **2** OF **2**

PROJECT **ROCKPORT PLANT** BORING START **09/25/92** BORING FINISH **09/27/92**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPH LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
												Grouted hole with Vol-clay grout. 49.3 auger refusal. broken piece of limestone in auger.

COMPANY INDIAN AND MICHIGAN POWER CO.
PROJECT ROCKPORT ASH LANDFILL
COORDINATES N.160223.99 E.523968.99
DATE INSTALLED 11-15-92

MW-12S

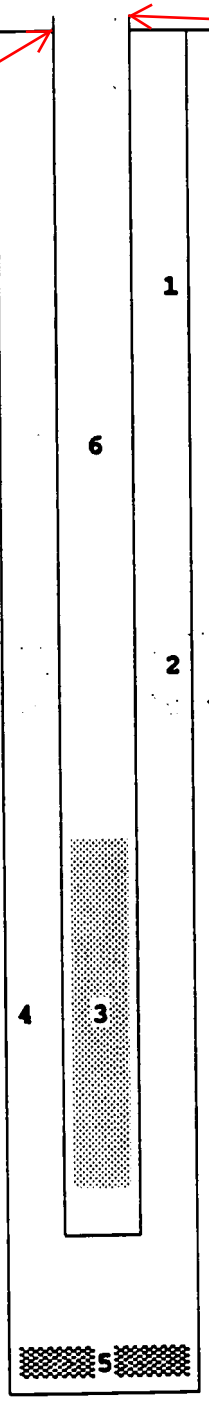
WELL CONSTRUCTION SUMMARY ELEVATION (ft. NGVD)
WELL NO. 12-S
REF. DATUM PT. 403.45
GRADE 401.57

NOTE: CASING PROTECTOR DETAILS NOT SHOWN

5/31/2016
Reference Point
403.58
(top of 2" PVC pipe)

5/31/2016
Top of Ground 402.35

1 GROUT SEAL VOLCLAY
2 BENTONITE SEAL
3 SCREEN 9.0 FEET
4 GRAVEL PACK
5 N.A.
6 RISER PIPE 2.0 INCH



TOP OF BENTONITE SEAL 362.4

TOP OF GRAVEL PACK 357.4

TOP OF SCREEN 356.5

BOTTOM OF SCREEN 347.5

BOTTOM OF GRAVEL PACK 346.5

BOTTOM OF BORE HOLE 346.5

GEOTECHNICAL ENGINEERING SECTION
CIVIL ENGINEERING DESIGN

AMERICAN ELECTRIC POWER SERVICE CORPORATION

OBSERVATION WELL
CDS-04

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY INDIANA MICHIGAN POWER COMPANY

PROJECT ROCKPORT PLANT

COORDINATES N 160,224.0 E 523,969.0

GROUND ELEVATION 401.6 SYSTEM _____

WATER LEVEL	▽ 39.0	▼	▼
TIME			
DATE	10-28-92		

BORING NO. 9231 DATE _____ SHEET 1 OF 3

BORING START 10/28/92 BORING FINISH 11/03/92

PIEZOMETER TYPE _____ WELL TYPE SS

HGT. RISER ABOVE GROUND _____ DIA 2"

DEPTH TO TOP OF WELL SCREEN _____ BOTTOM _____

WELL DEVELOPMENT _____ BACKFILL VOLCLAY

FIELD PARTY MCR-GCF RIG BK-81

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPH LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
1	SS	1.8	3.3	3-6-6	1.2					BROWN SILT trace of v-fine sand.		Well NO. 12-S Second hole was drilled to install well.
2	SS	4.3	5.8	3-5-7	1.4		5			BROWN SAND v-fine grain.		
3	SS	6.8	8.3	10-11-13	1.5					BROWN SAND medium grain.		
4	SS	9.3	10.8	1-2-1	1.5		10			GRAY CLAY moist,trace of very fine sand.		
5	SS	11.8	13.3	1-2-3	1.5					BROWN SILTY CLAY moist.		
6	SS	14.3	15.8	1-1-2	1.5		15					
7	SS	16.8	18.3	1-1-2	1.5					16.8 moist to wet.		
8	SS	19.3	20.8	6-8-10	1.0		20			BROWN SAND fine grain, moist to wet.		
9	SS	21.8	23.3	10-12-14	.6					SAND fine to medium grain.		
10	SS	24.3	25.8	7-12-16	.9		25					
11	SS	26.8	28.3	6-6-11	1.3							
12	SS	29.3	30.8	7-10-11	1.2		30					
13	SS	31.8	33.3	9-10-14	1.0							
14	SS	34.3	35.8	9-8-12	1.0		35					
15	SS	36.8	38.3	8-14-16	1.0					BROWN GRAVELLY SAND moist to wet. 39.3 saturated.		39.1 Top of bentonite seal. 41.8 STARTED USE DRILL MUD TO WASH OUT PLUG. 44.1 Top of gravel pack.
16	SS	39.3	40.8	12-16-17	.9		40					
17	SS	41.8	43.3	8-12-13	1.2							
18	SS	44.3	45.8	6-10-15	1.0		45					
19	SS	46.8	48.3	4-6-9	1.5					BROWN SAND fine grain.		45.0 Top of screen.

TYPE OF CASING USED

	NQ-2 ROCK CORE
X	6" x 3.25 HSA
X	9" x 6.25 HSA
	HW CASING ADVANCER 4"
	NW CASING 3"
	SW CASING 6"

Continued Next Page

PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC

WELL TYPE: OW = OPEN TUBE, GM = GEOMON

RECORDER _____

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY **INDIANA MICHIGAN POWER COMPANY** BORING NO. **9231** DATE _____ SHEET **2** OF **3**

PROJECT **ROCKPORT PLANT** BORING START **10/28/92** BORING FINISH **11/03/92**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPH LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
20	SS	49.3	50.8	5-10-11	1.5					1/4" black seam of organic material.		
21	SS	51.8	53.3	4-8-7	1.0					BROWN/GRAY SAND medium to course grain.		
~~22~~	~~SS~~	~~54.3~~	~~55.8~~	~~5-10-12~~	~~1.3~~		55			BROWN/GRAY GRAVELLY SAND		54.0 Bottom of screen.
23	SS	56.8	58.3	10-14-17	1.5					BROWN SAND fine grain		55.0 Bottom of gravel pack.
~~24~~	~~SS~~	~~59.3~~	~~60.8~~	~~8-12-15~~	~~.9~~		60			GRAY GRAVELLY SAND		Hole drilled with 6.25 augers and stainless plates remaining in hole. Bentonite seal premade bentonite donuts.
25	SS	61.8	63.3	10-12-14	1.2					BROWN/GRAY SAND medium grain		
~~26~~	~~SS~~	~~64.3~~	~~65.8~~	~~11-14-16~~	~~1.0~~		65			fine to medium grain		
27	SS	66.8	68.3	10-14-16	1.2					GRAY SAND medium to course grain.		45.2-47.6 spacer. 53.3-54.7 spacer.
~~28~~	~~SS~~	~~69.3~~	~~70.8~~	~~8-12-14~~	~~1.5~~		70					
29	SS	71.8	73.3	4-6-7	1.3							
~~30~~	~~SS~~	~~74.3~~	~~75.8~~	~~10-10-15~~	~~1.2~~		75			GRAY GRAVELLY SAND		
31	SS	76.8	78.3	9-14-14	.9					GRAY SAND medium grain.		
~~32~~	~~SS~~	~~79.3~~	~~80.8~~	~~14-10-14~~	~~.9~~		80			GRAY GRAVELLY SAND		
33	SS	81.8	83.3	15-14-14	1.0					BROWN SAND medium to course grain.		
~~34~~	~~SS~~	~~84.3~~	~~85.8~~	~~25-12-10~~	~~.2~~		85					
35	SS	86.8	88.3	6-12-7	.9					BROWN SAND AND GRAVEL		
~~36~~	~~SS~~	~~89.3~~	~~90.8~~	~~21-20-24~~	~~1.4~~		90					
37	SS	91.8	93.3	19-25-26	1.3					BROWN SAND COURSE GRAIN,		
~~38~~	~~SS~~	~~94.3~~	~~95.8~~	~~14-11-13~~	~~1.2~~		95					95.0 started drilling through cobbles
39	SS	96.8	98.3	26-50-50/2	.9					BROWN SAND fine to medium grain.		
~~40~~	~~SS~~	~~99.3~~	~~100.8~~	~~8-10-13~~	~~7.~~		100			medium grain		
41	SS	101.8	103.3	10-10-16	1.5					medium grain with top 3" gray silt.		
~~42~~	~~SS~~	~~104.3~~	~~105.8~~	~~5-5-10~~	~~1.5~~		105			silt layer .1 at top of spoon.		
43	SS	106.8	108.3	6-9-9	1.0					GRAY SAND medium to fine grain.		
~~44~~	~~SS~~	~~109.3~~	~~110.8~~	~~3-3-5~~			110			GRAY SAND fine grain with .1 reddish brown silt.		
45	SS	111.8	113.3	8-11-12	1.5					GRAY SAND fine grain.		

Continued Next Page

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY **INDIANA MICHIGAN POWER COMPANY** BORING NO. **9231** DATE _____ SHEET **3** OF **3**

PROJECT **ROCKPORT PLANT** BORING START **10/28/92** BORING FINISH **11/03/92**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPH LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
46	SS	114.3	115.8	3-4-8	1.1					**GRAY SAND** medium to fine grain.		
47	SS	116.8	118.3	5-10-12	1.3							
48	SS	118.3	119.8	10-14-18								119.8 STOPPED BORING PER J.T. MASSEY-NORTON. volclay grout to surface

COMPANY INDIAN AND MICHIGAN POWER CO.
PROJECT ROCKPORT ASH LANDFILL
COORDINATES N.160702.32 E.521529.05
DATE INSTALLED 11-17-92

MW-13S

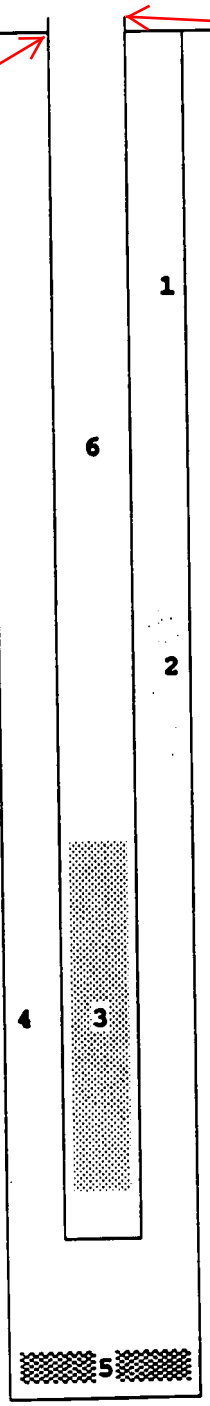
WELL CONSTRUCTION
SUMMARY ELEVATION
(ft. NGVD)
WELL NO. 13-S
REF. DATUM PT. 399.91
GRADE 397.92

NOTE: CASING PROTECTOR DETAILS
NOT SHOWN

5/31/2016
Reference Point
399.79
(top of 2" PVC pipe)

5/31/2016
Top of Ground 398.26

1 GROUT SEAL VOLCLAY
2 BENTONITE SEAL
3 SCREEN 9.0 FEET
4 GRAVEL PACK
5 N.A.
6 RISER PIPE 2.0 INCH



TOP OF BENTONITE SEAL 368.9

TOP OF GRAVEL PACK 363.9

TOP OF SCREEN 363.4

BOTTOM OF SCREEN 354.4

BOTTOM OF GRAVEL PACK 353.4

BOTTOM OF BORE HOLE 353.4

GEOTECHNICAL ENGINEERING SECTION
CIVIL ENGINEERING DESIGN

AMERICAN ELECTRIC POWER SERVICE CORPORATION

OBSERVATION WELL
CDS-04

AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING

JOB NUMBER _____

COMPANY INDIANA MICHIGAN POWER COMPANY

PROJECT ROCKPORT PLANT

COORDINATES N 160,702.3 E 521,529.1

GROUND ELEVATION 397.9 SYSTEM _____

WATER LEVEL	▽ 31.2	▼	▼
TIME			
DATE	11-18-92		

BORING NO. 9232 DATE _____ SHEET 1 OF 3

BORING START 10/18/92 BORING FINISH 10/19/92

PIEZOMETER TYPE _____ WELL TYPE SS

HGT. RISER ABOVE GROUND _____ DIA 2.0

DEPTH TO TOP OF WELL SCREEN _____ BOTTOM _____

WELL DEVELOPMENT _____ BACKFILL VOLCLAY

FIELD PARTY MCR-GCF RIG BK-81

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPH LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
1	SS	1.6	3.1	3-6-8	1.5					BROWN/GRAY CLAYEY SILT dry		Well no. 13-S Second hole was drilled to install well.
2	SS	4.1	5.6	4-8-9	1.5		5			BROWN SANDY CLAYEY SILT very fine grain, dry to moist.		
3	SS	6.6	8.1	1-1-5	1.5							
4	SS	9.1	10.6	3-4-6	1.5		10					
5	SS	11.6	13.1	3-4-6	1.5							
6	SS	14.1	15.6	3-3-6	1.5		15			CLAYEY SAND fine grain, moist.		
7	SS	16.6	18.1	3-3-8	1.5							
8	SS	19.1	20.6	4-5-6	1.2		20			sand fine grain.		
9	SS	21.6	23.1	4-6-9	1.3							
10	SS	24.1	25.6	8-11-11	1.0		25			BROWN SAND medium grain, with some pea size gravel, moist.		
11	SS	26.6	28.1	5-7-10	1.2					BROWN SAND medium to course grain with pea size gravel.		
12	SS	29.1	30.6	4-7-10	1.3		30					29.0 Top of bentonite seal.
13	SS	31.6	33.1	6-8-9	1.2					BROWN SAND medium to course grain, moist to wet.		
14	SS	34.1	35.6	6-9-11	1.0		35			BROWN GRAVELLY SAND maximum size 1", saturated		34.0 Top of gravel pack. 34.0 Began washing hole with drill mud to keep out plug. 34.5 Top of screen.
15	SS	36.6	38.1	8-12-15	1.0					BROWN SAND AND GRAVEL		
16	SS	39.1	40.6	8-11-13	1.0		40					
17	SS	41.6	43.1	10-14-16	.8							43.5 Bottom of screen.
18	SS	44.1	45.6	9-11-16	1.2		45					44.5 Bottom of gravel pack. Hole drilled with
19	SS	46.6	48.1	8-18-24	1.0					grading to more sand 46.6.		

TYPE OF CASING USED

	NQ-2 ROCK CORE	
X	6" x 3.25 HSA	
X	9" x 6.25 HSA	
	HW CASING ADVANCER	4"
	NW CASING	3"
	SW CASING	6"

Continued Next Page

PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC

WELL TYPE: OW = OPEN TUBE, GM = GEOMON

RECORDER _____

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY INDIANA MICHIGAN POWER COMPANY BORING NO. 9232 DATE _____ SHEET 2 OF 3

PROJECT ROCKPORT PLANT BORING START 10/18/92 BORING FINISH 10/19/92

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPH LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
20	SS	49.1	50.6	9-16-17	1.0					**BROWN GRAVELLY SAND** medium to course grain, pea size gravel with 1.5" limestone gravel.		6.25 augers and stainless steel plate remaining in boring. Seal made with prepacked bentonite donute.34.3-35.7 Spacer. 42.8-44.2 Spacer.
21	SS	51.6	53.1	10-18-26	1.1							
22	SS	54.1	55.6	13-18-28	1.3		55			3" LAYER OF FINE GRAIN BROWN SAND 54.3 TO 54.6.		
23	SS	56.6	58.1	11-14-18	1.5							
24	SS	59.1	60.6	7-10-12	1.5		60			**GRAY SAND** fine to medium grain with some pea size gravel.		
25	SS	61.6	63.1	6-11-11	1.2							
26	SS	64.1	65.6	8-10-12	1.0		65			**GRAY GRAVELLY SAND** medium to course grain, maximum size 1".		
27	SS	66.6	68.1	8-12-25	1.0							
28	SS	69.1	70.6	6-9-15	1.2		70					
29	SS	71.6	73.1	10-18-28	1.0							
30	SS	74.1	75.6	9-12-15	1.2		75					
31	SS	76.6	78.1	12-15-15	1.5							
32	SS	79.1	80.6	11-15-20	1.3		80					
33	SS	81.6	83.1	12-19-30	1.0							
34	SS	84.1	85.6	12-24-30	1.2		85			3"seam of pea gravel		
35	SS	86.6	88.1	13-17-28	1.3							
36	SS	89.1	90.6	6-9-14	1.0		90					
37	SS	91.6	93.1	1-2-5	0							
38	SS	94.1	95.6	13-18-26	1.5		95			**GRAY SAND** fine to medium grain, with gray sandy clay layer 94.7 to 95.0. medium grain		
39	SS	96.6	98.1	5-10-24	1.5							
40	SS	99.1	100.6	21-31-21	1.5		100			**GREENISH GRAY SILTY GRAVELLY CLAY** fine to medium grain.		
41	SS	101.6	103.1	7-10-11	1.5					**GREENISH/GRAY SILTY SAND** v-fine grain. 104.0 to 105.6 gravelly sand course grain		
42	SS	104.1	105.6	10-12-13	1.5		105					
43	SS	106.6	108.1	11-12-20	.6							
44	SS	109.1	110.6	4-6-8	1.2		110			**GRAY SAND AND GRAVEL** 1" maximum size.		
.1	SS	111.5	111.6	50/1	45					**GRAY LIMESTONE**		111.6 Auger refusal. volclay grout top 30.0 feet of hole.

Continued Next Page

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY **INDIANA MICHIGAN POWER COMPANY** BORING NO. **9232** DATE _____ SHEET **3** OF **3**

PROJECT **ROCKPORT PLANT** BORING START **10/18/92** BORING FINISH **10/19/92**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPH LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
												This boring was off site, going to set piezometer on company property 10 to 12 feet north. Per farmer, Carl Scaggs and J. Massey-Norton.

COMPANY INDIAN AND MICHIGAN POWER CO.
PROJECT ROCKPORT ASH LANDFILL
COORDINATES N.164779.40 E.518743.82
DATE INSTALLED 12-8-922

MW-14S

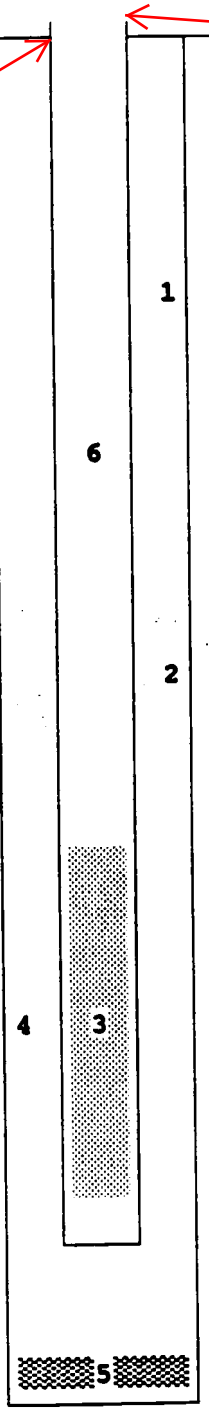
WELL CONSTRUCTION
SUMMARY ELEVATION
(ft. NGVD)
WELL NO. 14-S
REF. DATUM PT. 394.45
GRADE 392.52

NOTE: CASING PROTECTOR DETAILS
NOT SHOWN

5/31/2016
Reference Point
394.78
(top of 2" PVC pipe)

5/31/2016
Top of Ground 392.66

1 GROUT SEAL VOLCLAY
2 BENTONITE SEAL
3 SCREEN 9.0 FEET
4 GRAVEL PACK
5 N.A.
6 RISER PIPE 2.0 INCH



TOP OF BENTONITE SEAL 376.3

TOP OF GRAVEL PACK 371.3

TOP OF SCREEN 370.5

BOTTOM OF SCREEN 361.5

BOTTOM OF GRAVEL PACK 360.5

BOTTOM OF BORE HOLE 360.5

GEOTECHNICAL ENGINEERING SECTION
CIVIL ENGINEERING DESIGN

AMERICAN ELECTRIC POWER SERVICE CORPORATION

OBSERVATION WELL
CDS-04

AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING

JOB NUMBER _____

COMPANY INDIANA MICHIGAN POWER COMPANY

PROJECT ROCKPORT PLANT

COORDINATES N 164,779.4 E 518,743.8

GROUND ELEVATION 392.5 SYSTEM _____

WATER LEVEL	▽ 26.1	▼	▼
TIME			
DATE	9-28-92		

BORING NO. 9233 DATE _____ SHEET 1 OF 1

BORING START 09/27/92 BORING FINISH 09/28/92

PIEZOMETER TYPE _____ WELL TYPE SS

HGT. RISER ABOVE GROUND _____ DIA 2"

DEPTH TO TOP OF WELL SCREEN _____ BOTTOM _____

WELL DEVELOPMENT _____ BACKFILL VOLCLAY

FIELD PARTY ROUSH/FOLGER RIG B-81

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPH LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
1	SPT	1.7	3.2	3-9-16	1.5					GRAY AND BROWN SILTY CLAY, dry to moist.		Well no. 14-S Second hole was drilled to install well.
2	SS	5.0	7.0		2.0		5					
3	SS	7.0	9.0		2.0							
4	SS	10.0	12.0		2.0		10					
5	SS	12.0	14.0		.8							
6	SS	15.0	17.0		.4		15			BROWN SAND GRAVEL		
7	SS	17.0	17.2	33-50/.2	.2					REDDISH BROWN SAND w/PEA GRAVEL, medium to coarse grain sand, some 1/4" gravel, dry.		16.2 Top of bentonite seal.
8	SPT	17.2	18.5		.6		20					
~~9~~	~~SPT~~	~~19.5~~	~~21.0~~	~~8-20-25~~	~~1.4~~							21.2 Top of gravel pack. 22.0 Top of screen.
10	SPT	22.0	23.5	12-13-16	.8							Hit water.
~~11~~	~~SPT~~	~~24.5~~	~~26.0~~	~~10-15-24~~	~~.9~~		25					
12	SPT	27.0	28.5	6-5-5	1.1					BROWN CLAYEY SAND, medium grain, wet.		
~~13~~	~~SPT~~	~~29.5~~	~~31.0~~	~~4-7-12~~	~~1.3~~		30			BROWN SAND, fine to medium grain, some pea gravel, wet.		31.0 Bottom of screen. 32.0 Bottom of gravel pack.
14	SPT	32.0	33.5	4-9-11								
~~15~~	~~SPT~~	~~34.5~~	~~34.8~~	~~50/.3~~	~~.3~~		35			BROWN TO TAN SILTY CLAY SHALE		Hole drilled with 6.25 augers and stainless steel plates remaining in hole. Seal made with prepacked bentonite donuts and water placed on seal. 22.2-23.6 Spacer. 30.3-31.7 Spacer
16	A	34.8	36.4									

TYPE OF CASING USED

	NQ-2 ROCK CORE
X	6" x 3.25 HSA
X	9" x 6.25 HSA
	HW CASING ADVANCER 4"
	NW CASING 3"
	SW CASING 6"

PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC

WELL TYPE: OW = OPEN TUBE, GM = GEOMON

RECORDER _____

COMPANY INDIAN AND MICHIGAN POWER CO.
PROJECT ROCKPORT ASH LANDFILL
COORDINATES N.163584.97 E.521886.93
DATE INSTALLED 11-13-92

MW-15S

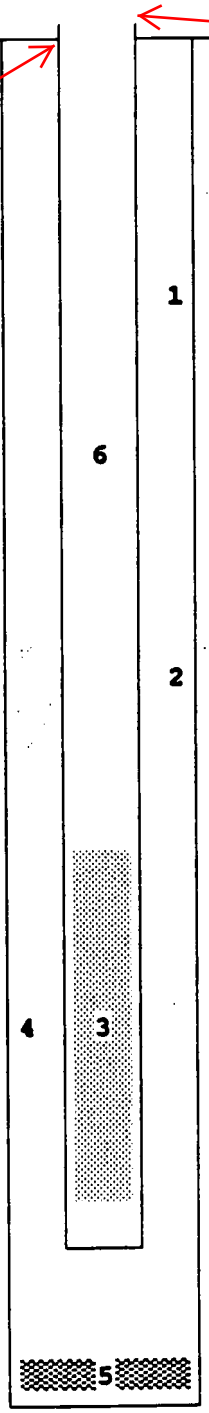
WELL CONSTRUCTION
SUMMARY ELEVATION
(ft. NGVD)
WELL NO. 15-S
REF. DATUM PT. 392.53
GRADE 390.53

NOTE: CASING PROTECTOR DETAILS
NOT SHOWN

5/31/2016
Reference Point
392.46
(top of 2" PVC cap)

5/31/2016
Top of Ground 391.53

1 GROUT SEAL VOLCLAY
2 BENTONITE SEAL
3 SCREEN 9.0 FEET
4 GRAVEL PACK
5 N.A.
6 RISER PIPE 2.0 INCH



TOP OF BENTONITE SEAL 366.5

TOP OF GRAVEL PACK 361.5

TOP OF SCREEN 360.4

BOTTOM OF SCREEN 351.4

BOTTOM OF GRAVEL PACK 350.4

BOTTOM OF BORE HOLE 350.4

GEOTECHNICAL ENGINEERING SECTION
CIVIL ENGINEERING DESIGN

AMERICAN ELECTRIC POWER SERVICE CORPORATION

OBSERVATION WELL
CDS-04

COMPANY INDIAN AND MICHIGAN POWER CO.
PROJECT ROCKPORT ASH LANDFILL
COORDINATES N.163578.20 E.521892.67
DATE INSTALLED 11-13-92

MW-15I

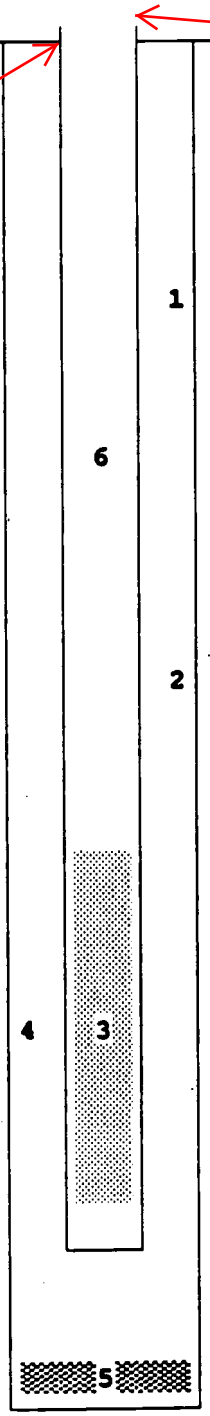
WELL CONSTRUCTION
SUMMARY ELEVATION
(ft. NGVD)
WELL NO. 15-I
REF. DATUM PT. 392.70
GRADE 390.46

NOTE: CASING PROTECTOR DETAILS
NOT SHOWN

5/31/2016
Reference Point
392.70
(top of 2" PVC cap)

5/31/2016
Top of Ground 391.60

1 GROUT SEAL VOLCLAY
2 BENTONITE SEAL
3 SCREEN 9.0 FEET
4 GRAVEL PACK
5 N.A.
6 RISER PIPE 2.0 INCH



TOP OF BENTONITE SEAL 340.1

TOP OF GRAVEL PACK 335.1

TOP OF SCREEN 334.7

BOTTOM OF SCREEN 325.7

BOTTOM OF GRAVEL PACK 324.7

BOTTOM OF BORE HOLE 324.7

GEOTECHNICAL ENGINEERING SECTION
CIVIL ENGINEERING DESIGN

AMERICAN ELECTRIC POWER SERVICE CORPORATION

OBSERVATION WELL
CDS-04

AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING

JOB NUMBER _____

COMPANY INDIANA MICHIGAN POWER COMPANY

PROJECT ROCKPORT PLANT

COORDINATES N 163,585.0 E 521,886.9

GROUND ELEVATION 390.5 SYSTEM _____

WATER LEVEL	▽ 24.5	▼	▼
TIME			
DATE	9-13-92		

BORING NO. 9234 DATE _____ SHEET 1 OF 2

BORING START 09/12/92 BORING FINISH 09/24/92

PIEZOMETER TYPE _____ WELL TYPE SS

HGT. RISER ABOVE GROUND _____ DIA 2"

DEPTH TO TOP OF WELL SCREEN _____ BOTTOM _____

WELL DEVELOPMENT _____ BACKFILL VOLCLAY

FIELD PARTY ROUSH/FOLGER RIG BK-81

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPH LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
1	SPT	0.0	1.5	6-7-10	1.5					BROWN-GRAY SILTY CLAY, dry.		Well no. 15-S 15-I Second and third hole drilled to install wells.
2	SPT	1.5	3.0	4-4-8	1.3							
3	SPT	3.0	4.5	3-4-5	1.5							
4	SPT	4.5	6.0	5-6-9	1.5		5			BROWN-GRAY SILTY CLAY, with a trace of very fine grain sand, dry to moist.		
5	SPT	6.0	7.5	4-7-10	1.5							
6	SPT	7.5	9.0	3-7-9	1.5					BROWN w/some GRAY CLAYEY SAND, seams of each throughout.		
7	SPT	9.0	10.5	3-5-10	1.5		10					
8	SPT	10.5	12.0	3-6-9	1.1							
9	SPT	12.0	13.5	3-7-10	1.5							
10	SPT	13.5	15.0	3-4-5	1.5							
11	SPT	15.0	16.5	3-4-6	1.5		15			BROWN SILTY CLAY, with some fine grain sand.		
12	SPT	16.5	18.0	4-5-7	1.5							
13	SPT	18.0	19.5	2-4-4	1.5							
14	SPT	19.5	21.0	2-2-4	1.5		20			BROWN-GRAY CLAYEY SAND, fine grain, moist.		
15	SPT	21.0	22.5	2-2-3	1.5							
16	SPT	22.5	24.0	2-5-9	1.3							
17	SPT	24.0	25.5	12-16-20	.9					BROWN CLAYEY SAND, medium to coarse grain, moist.		24.0 Top of bentonite seal. Hit water. Water level 9-13-92.
18	SPT	25.5	27.0	8-9-12	1.2		25			RUSTY BROWN SAND w/PEA GRAVEL, medium to coarse grain, wet.		
19	SPT	27.0	28.5	6-7-8	1.3							
20	SPT	28.5	30.0	4-5-6	1.4					GRAY SAND w/PEA GRAVEL, medium to coarse grain. some 1/4" to 1/2" gravel		29.0 Top of gravel pack. 30.1 Top of screen. Began using drill mud.
21	SPT	30.0	31.5	7-9-14	1.5		30					
22	SPT	31.5	33.0	9-12-18	1.5					BROWN SAND, medium to coarse grain, with lens clay.		
23	SPT	33.0	34.5	7-7-10	.8							
24	SPT	34.5	36.0	5-7-16	1.0		35			BROWN SAND w/GRAVEL, medium to coarse grain.		
25	SPT	36.0	37.5	8-17-19	1.0							
26	SPT	37.5	39.0	8-11-20	1.1					TAN-BROWN SAND w/PEA GRAVEL, medium to coarse grain, some 1/4" to 1/2" gravel.		39.1 Bottom of screen. 40.1 Botttom of gravel pack.
27	SPT	39.0	40.5	7-14-18	1.0		40			SAND, fine to medium grain with lens black organic.		
28	SPT	41.5	43.0	10-22-24	.8					GRAY SAND, medium to coarse grain.		
29	SPT	44.0	45.5	9-14-17	1.3		45			GRAY SAND w/PEA GRAVEL, medium to coarse grain, 1/2" lens organic, some 1/4" to 1/2" gravel.		
30	SPT	46.5	48.0	7-14-20	1.0							

Continued Next Page

TYPE OF CASING USED

	NQ-2 ROCK CORE	
X	6" x 3.25 HSA	
X	9" x 6.25 HSA	
	HW CASING ADVANCER	4"
	NW CASING	3"
	SW CASING	6"

PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC

WELL TYPE: OW = OPEN TUBE, GM = GEOMON

RECORDER _____

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY **INDIANA MICHIGAN POWER COMPANY** BORING NO. **9234** DATE _____ SHEET **2** OF **2**

PROJECT **ROCKPORT PLANT** BORING START **09/12/92** BORING FINISH **09/24/92**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPH LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
31	SPT	49.0	50.0	10-15	1.0							50.5 Top of bentonite seal.
32	SPT	50.0	51.5	9-11-15	1.4							
33	SPT	51.5	53.0	12-16-18	1.4							
34	SPT	53.0	54.5	12-15-19	1.1							
35	SPT	54.5	56.0	10-15-22	1.5		55			**GRAY SAND w/PEA GRAVEL** medium to coarse grain.		
36	SPT	56.0	57.5	8-15-22	1.0							55.5 Top of gravel pack.
37	SPT	57.5	59.0	10-18-24	1.3					1/2" gravel and limestone fragments.		55.9 Top of screen.
38	SPT	59.0	60.5	14-19-27	1.4		60			**GRAVEL**, 1/4 to 3/4" with some limestone fragments and coarse grain sand.		
39	SPT	61.5	63.0	13-18-24	1.0							
40	SPT	64.0	65.5	15-19-30	1.3		65			1/4" lens of tan very fine sand, some gray clay shale.		64.9 Bottom of screen.
41	SPT	66.5	66.7	50/.2	.2					**GRAY CLAY SHALE**		65.9 Bottom of gravel pack.
42	A	66.7	67.2									Holed drilled with 6.25 augers and stainless steel plate remaining in hole. Seal premade bentonite donuts . 55.7-57.1 Spacer. 64.2-65.6 Spacer 30.3-31.7 Spacer. 38.4-39.8 Spacer.

COMPANY INDIAN AND MICHIGAN POWER CO.
PROJECT ROCKPORT ASH LANDFILL
COORDINATES N.162944.89 E.521986.62
DATE INSTALLED 12-11-92

MW-16S

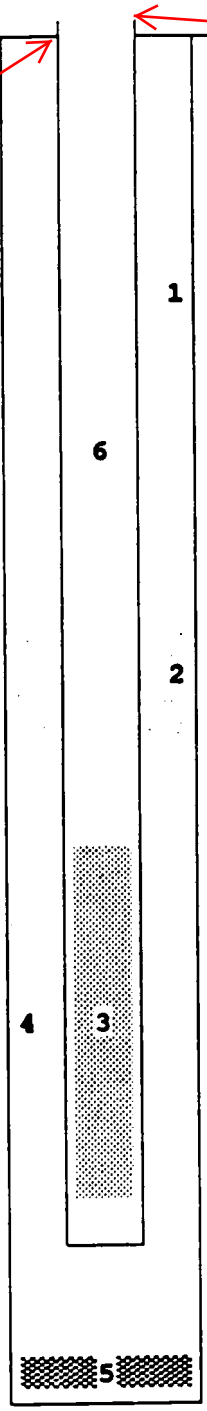
WELL CONSTRUCTION
SUMMARY ELEVATION
(ft. NGVD)
WELL NO. 16-S
REF. DATUM PT. 394.38
GRADE 392.49

NOTE: CASING PROTECTOR DETAILS
NOT SHOWN

5/31/2016
Reference Point
394.35
(top of 2" PVC cap)

5/31/2016
Top of Ground 393.58

1 GROUT SEAL VOLCLAY
2 BENTONITE SEAL
3 SCREEN 9.0 FEET
4 GRAVEL PACK
5 N.A.
6 RISER PIPE 2.0 INCH



TOP OF BENTONITE SEAL 369.5

TOP OF GRAVEL PACK 364.5

TOP OF SCREEN 363.6

BOTTOM OF SCREEN 354.6

BOTTOM OF GRAVEL PACK 353.6

BOTTOM OF BORE HOLE 353.6

GEOTECHNICAL ENGINEERING SECTION
CIVIL ENGINEERING DESIGN

AMERICAN ELECTRIC POWER SERVICE CORPORATION

OBSERVATION WELL
CDS-04

COMPANY INDIAN AND MICHIGAN POWER CO.
PROJECT ROCKPORT ASH LANDFILL
COORDINATES N.162943.87 E.521995.51
DATE INSTALLED 12-11-92

MW-16I

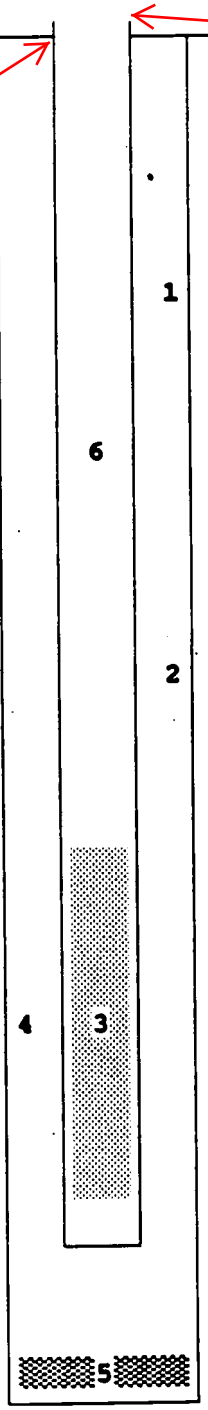
WELL CONSTRUCTION SUMMARY ELEVATION (ft. NGVD)
WELL NO. 16-I
REF. DATUM PT. 394.38
GRADE 392.64

NOTE: CASING PROTECTOR DETAILS NOT SHOWN

5/31/2016
Reference Point
394.26
(top of 2" PVC cap)

5/31/2016
Top of Ground 393.47

1 GROUT SEAL VOLCLAY
2 BENTONITE SEAL
3 SCREEN 9.0 FEET
4 GRAVEL PACK
5 N.A.
6 RISER PIPE 2.0 INCH



TOP OF BENTONITE SEAL 341.0

TOP OF GRAVEL PACK 336.0

TOP OF SCREEN 334.9

BOTTOM OF SCREEN 325.9

BOTTOM OF GRAVEL PACK 324.9

BOTTOM OF BORE HOLE 324.9

GEOTECHNICAL ENGINEERING SECTION
IVIL ENGINEERING DESIGN

AMERICAN ELECTRIC POWER SERVICE CORPORATION

OBSERVATION WELL
CDS-04

COMPANY INDIAN AND MICHIGAN POWER CO.
PROJECT ROCKPORT ASH LANDFILL
COORDINATES N.162946.25 E.521978.31
DATE INSTALLED 12-9-92

MW-16D

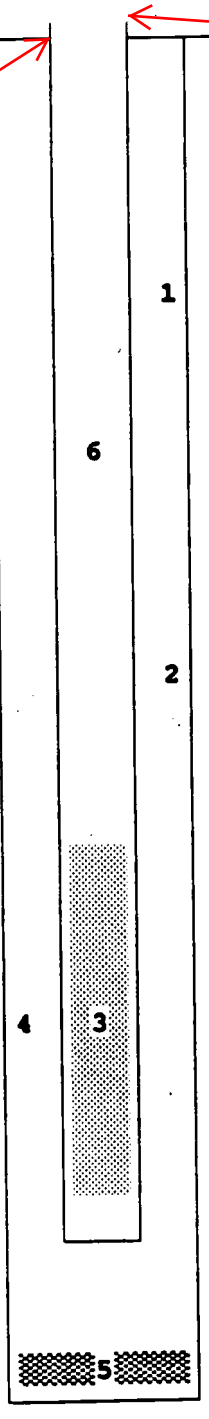
WELL CONSTRUCTION SUMMARY ELEVATION (ft. NGVD)
WELL NO. 16-D
REF. DATUM PT. 394.47
GRADE 392.53

NOTE: CASING PROTECTOR DETAILS NOT SHOWN

5/31/2016
Reference Point
394.38
(top of 2" PVC cap)

5/31/2016
Top of Ground 393.83

1 GROUT SEAL VOLCLAY
2 BENTONITE SEAL
3 SCREEN 9.0 FEET
4 GRAVEL PACK
5 N.A.
6 RISER PIPE 2.0 INCH



TOP OF BENTONITE SEAL 308.5

TOP OF GRAVEL PACK 303.5

TOP OF SCREEN 302.8

BOTTOM OF SCREEN 293.8

BOTTOM OF GRAVEL PACK 292.8

BOTTOM OF BORE HOLE 292.8

GEOTECHNICAL ENGINEERING SECTION
CIVIL ENGINEERING DESIGN

AMERICAN ELECTRIC POWER SERVICE CORPORATION

OBSERVATION WELL
CDS-04

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY **INDIANA MICHIGAN POWER COMPANY**

PROJECT **ROCKPORT PLANT**

COORDINATES **N 162,944.9 E 521,986.6**

GROUND ELEVATION **392.5** SYSTEM _____

WATER LEVEL	▽ 27.5	▽	▽
TIME			
DATE	10-14-92		

BORING NO. **9243** DATE _____ SHEET **1** OF **3**

BORING START **10/14/92** BORING FINISH **10/17/92**

PIEZOMETER TYPE _____ WELL TYPE **SS**

HGT. RISER ABOVE GROUND _____ DIA **2.0**

DEPTH TO TOP OF WELL SCREEN _____ BOTTOM _____

WELL DEVELOPMENT _____ BACKFILL _____

FIELD PARTY **MCR-GCF** RIG **BK-81**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPH LOG	USCS
1	SS	0.0	1.5	1-2-3	.8				
2	SS	1.5	3.0	11-12-13	.3				
3	SS	3.0	5.0	10-12-12	1.5				
4	ST	5.0	7.0		.2		5		
5	ST	7.0	9.0		0				
6	SS	9.0	10.0	20	0		10		
7	ST	10.0	12.0		2.0				
8	ST	12.0	14.0		2.0				
9	SS	14.0	15.0	12-15	1.0		15		
10	ST	15.0	17.0		1.7				
11	SS	17.0	19.0	9-13-15	1.5				
12	SS	19.0	20.5	5-8-10	1.2		20		
13	SS	20.5	22.0	5-10-9	1.2				
14	SS	22.0	23.5	4-5-14	1.5				
15	SS	23.5	25.0	6-18-18	1.3		25		
16	SS	25.0	26.5	12-13-15	1.0				
17	SS	26.5	28.0	5-9-13	1.0				
18	SS	28.0	29.5	5-6-7	1.2				
19	SS	29.5	31.0	4-6-6	1.0		30		
20	SS	31.0	32.5	5-5-7	1.1				
21	SS	32.5	34.0	6-9-11	1.1				
22	SS	34.0	35.5	6-6-10	1.0		35		
23	SS	35.5	37.0	5-5-7	.8				
24	SS	37.0	38.5	4-4-6	.7				
25	SS	38.5	40.0	13-13-9	1.0				
26	SS	41.6	43.1	7-11-15	.9		40		
27	SS	44.1	45.6	8-14-16	1.5				
28	SS	46.6	48.1	8-11-13	1.5		45		

SOIL / ROCK IDENTIFICATION

BROWN SILT dry
BROWN/GRAY SILT dry

TAN TO BROWN CLAYEY SILT

BROWN SILT with trace of very fine sand
BROWN CLAYEY SILT

REDDISH BROWN GRAY SANDY SILT fine grain.
BROWN TO TAN CLAYEY SILT with a trace of very fine sand.
BROWN SANDY SILT fine grain.
BROWN SANDY CLAYEY SILT fine grain.

BROWN/GRAY SANDY CLAY fine grain.

REDDISH/BROWN SAND medium grain with some pea size gravel,dry to moist.

BROWN GRAVELLY SAND medium to course grain, 1/2" maximum size, dry to moist.
WET

SAND medium to course grain, saturated.

BROWN SAND AND GRAVEL 1/2" maximum size.
SAME WITH 3/4" MAXIMUM SIZE.

WELL

DRILLER'S NOTES

Well no. 16-S,16-I,16-D Wells were installed in three holes.

push 2.0, recovery 2.0, time 8, psi 1200

push 2.0, recovery 1.7, time 10 psi 1500

23.0 Top of bentonite seal.

28.0 Top of gravel pack.
28.9 Top of screen.

Began useing drill mud to keep out plug.

37.9 Bottom of screen.
38.9 Bottom of gravel pack.

TYPE OF CASING USED

	NQ-2 ROCK CORE	
X	6" x 3.25 HSA	
X	9" x 6.25 HSA	
	HW CASING ADVANCER	4"
	NW CASING	3"
	SW CASING	6"

Continued Next Page

PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC

WELL TYPE: OW = OPEN TUBE, GM = GEOMON

RECORDER _____

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY **INDIANA MICHIGAN POWER COMPANY** BORING NO. **9243** DATE _____ SHEET **2** OF **3**

PROJECT **ROCKPORT PLANT** BORING START **10/14/92** BORING FINISH **10/17/92**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPH LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
29	SS	49.1	50.6	8-11-12	.8					**GRAY SAND** medium to course grain		
30	SS	50.6	52.1	2-12-22	.9							51.6 Top of bentonite seal.
31	SS	52.1	53.6	7-11-16	1.0							
32	SS	53.6	55.1	6-11-17	.8		55					
33	SS	55.1	56.6	8-14-14	1.2							
34	SS	56.6	58.1	6-11-16	1.3							56.6 Top of gravel pack.
35	SS	58.1	59.6	11-11-16	1.4							57.7 Top of screen.
36	SS	59.6	61.1	6-12-15	0		60					
37	SS	61.6	63.1	13-15-15	1.1							
38	SS	64.1	65.6	14-15-15	1.0		65					
39	SS	66.6	68.1	14-16-21	1.2							66.7 Bottom of screen.
40	SS	69.1	70.6	22-26-21	1.0							67.7 Bottom of gravel pack.
41	SS	71.6	73.1	12-12-10	1.1		70					
42	SS	74.1	75.6	6-6-10	.9		75					
43	SS	76.6	78.1	7-8-10	1.5					**BROWN SAND** fine grain.		
44	SS	79.1	80.6	7-7-9	1.3		80					
45	SS	80.6	82.1	8-11-13	1.3							
46	SS	82.1	83.6	8-12-17	1.2							84.0 Top of bentonite seal.
47	SS	83.6	85.1	6-11-15	1.3		85					
48	SS	85.1	86.6	7-9-14	1.5							
49	SS	86.6	88.1	6-11-15	1.5							89.0 Top of gravel pack.
50	SS	88.1	89.6	4-8-13	1.3		90					89.7 Top of screen.
51	SS	91.6	93.1	4-6-8	1.4							
52	SS	94.1	95.6	5-5-8	1.3		95			**BROWN SAND** fine to medium grain.		
53	SS	96.6	98.1	6-7-11	1.2					medium grain.		
54	SS	99.1	100.6	4-8-11	.9		100			**BROWN SAND**		98.7 Bottom of screen.
55	SS	101.6	102.3	50-50/2	.6					100.4 TO 100.5 SEAM OF CLAYEY PEA SIZE GRAVEL.		99.7 Bottom of gravel pack.
										BROWN CLAY SHALE weathered.		28.7-31.1 and 37.2-38.6 spacer. 57.5-58.9 and 66.0-67.4 spacer. 89.5-90.9 and 98.0-99.4 spacer. Hole was drilled with 6.25 augers and stainless steel plate remaining in hole.

Continued Next Page

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY **INDIANA MICHIGAN POWER COMPANY** BORING NO. **9243** DATE _____ SHEET **3** OF **3**

PROJECT **ROCKPORT PLANT** BORING START **10/14/92** BORING FINISH **10/17/92**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPH LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
												Seal was premade bentonite donuts. 102.7 Auger refusal at 102.7, volclay grouted top of boring.

COMPANY INDIAN AND MICHIGAN POWER CO.
PROJECT ROCKPORT ASH LANDFILL
COORDINATES N.164398.59 E.521162.54
DATE INSTALLED 11-1-92

MW-17S

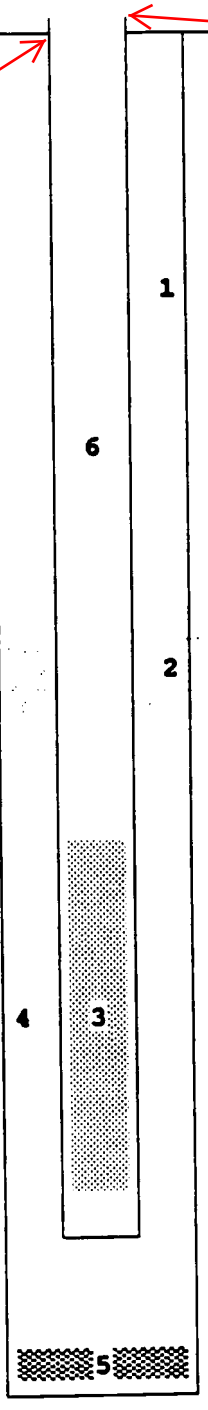
WELL CONSTRUCTION
SUMMARY ELEVATION
(ft. NGVD)
WELL NO. 17-S
REF. DATUM PT. 395.46
GRADE 393.13

NOTE: CASING PROTECTOR DETAILS
NOT SHOWN

5/31/2016
Reference Point
395.34
(top of 2" PVC cap)

5/31/2016
Top of Ground 393.85

1 GROUT SEAL VOLCLAY
2 BENTONITE SEAL
3 SCREEN 9.0 FEET
4 GRAVEL PACK
5 N.A.
6 RISER PIPE 2.0 INCH



TOP OF BENTONITE SEAL 368.6

TOP OF GRAVEL PACK 363.6

TOP OF SCREEN 362.5

BOTTOM OF SCREEN 353.6

BOTTOM OF GRAVEL PACK 352.6

BOTTOM OF BORE HOLE 352.6

GEOTECHNICAL ENGINEERING SECTION
CIVIL ENGINEERING DESIGN

AMERICAN ELECTRIC POWER SERVICE CORPORATION

OBSERVATION WELL
CDS-04

COMPANY INDIAN AND MICHIGAN POWER CO.
PROJECT ROCKPORT ASH LANDFILL
COORDINATES N.164404.36 E.521157.17
DATE INSTALLED 11-1-92

MW-17I

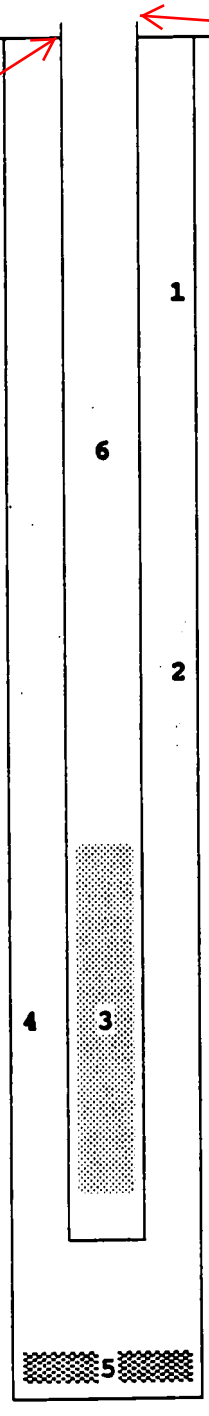
WELL CONSTRUCTION
SUMMARY ELEVATION
(ft. NGVD)
WELL NO. 17-I
REF. DATUM PT. 395.29
GRADE 393.28

NOTE: CASING PROTECTOR DETAILS
NOT SHOWN

5/31/2016
Reference Point
395.40
(top of 2" PVC cap)

5/31/2016
Top of Ground 394.11

1 GROUT SEAL VOLCLAY
2 BENTONITE SEAL
3 SCREEN 9.0 FEET
4 GRAVEL PACK
5 N.A.
6 RISER PIPE 2.0 INCH



TOP OF BENTONITE SEAL 341.5

TOP OF GRAVEL PACK 337.0

TOP OF SCREEN 336.5

BOTTOM OF SCREEN 326.9

BOTTOM OF GRAVEL PACK 325.9

BOTTOM OF BORE HOLE 325.9

GEOTECHNICAL ENGINEERING SECTION
CIVIL ENGINEERING DESIGN

AMERICAN ELECTRIC POWER SERVICE CORPORATION

OBSERVATION WELL

CDS-04

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY **INDIANA MICHIGAN POWER COMPANY**

PROJECT **ROCKPORT PLANT**

COORDINATES **N 164,398.6 E 521,162.5**

GROUND ELEVATION **393.1** SYSTEM _____

WATER LEVEL	▽ 27.8	▼	▼
TIME			
DATE	9-28-92		

BORING NO. **9245** DATE _____ SHEET **1** OF **2**

BORING START **09/28/92** BORING FINISH **10/06/92**

PIEZOMETER TYPE _____ WELL TYPE **SS**

HGT. RISER ABOVE GROUND _____ DIA **2.0**

DEPTH TO TOP OF WELL SCREEN _____ BOTTOM _____

WELL DEVELOPMENT _____ BACKFILL **VOLCLAY**

FIELD PARTY **MCR-GCF** RIG **BK-81**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPH LOG	USCS	SOIL / ROCK IDENTIFICATION
1	SS	0.0	1.5	4-6-8	1.5					**BROWN/GRAY SILTY CLAY** dry to moist.
2	SS	1.5	3.0	2-2-3	1.5					
3	SS	3.0	5.0	2-3-3-4	1.7					more clay
4	ST	5.0	7.0				5			**REDDISH BROWN CLAY**
5	ST	7.0	9.0							**BROWN SILTY CLAY**
6	SS	9.0	10.0	7-11	1.0		10			**BROWN SANDY CLAY** fine grain, dry to moist.
7	ST	10.0	12.0		2.0					**BROWN SILTY CLAY**
8	ST	12.0	14.0		2.0					**BROWN/GRAY SILTY CLAY** moist.
9	SS	14.0	15.0	2-4	1.0		15			**BROWN SANDY CLAY** fine grain, dry to moist.
10	ST	15.0	17.0		100					**BROWN CLAYEY SAND** fine grain, moist.
11	ST	17.0	19.0		100					**SANDY SILTY CLAY** fine grain
12	SS	19.0	20.5	3-6-7	1.5		20			**BROWN SANDY CLAY** fine grain, dry to moist.
13	SS	20.5	22.0	4-5-6	1.5					more sand
14	SS	22.0	23.5	5-8-11	1.5					
15	SS	23.5	25.0	3-6-7	1.3					
16	SS	25.0	26.5	6-20-26	1.1		25			**BROWN SAND** medium to course grain, moist to wet.
17	SS	26.5	28.0	9-16-23	1.4					
18	SS	28.0	29.5	13-22-24	1.0					
19	SS	29.5	31.0	9-17-22	1.2		30			
20	SS	31.0	32.5	14-22-24	1.5					
21	SS	32.5	34.0	11-18-25	1.4					
22	SS	34.0	35.5	11-9-10	1.5					
23	SS	35.5	37.0	12-15-20	1.2		35			**BROWN SAND** medium grain.
24	SS	37.0	38.5	12-14-25	1.1					
25	SS	38.5	40.0	12-18-25	1.3					**GRAY SAND** medium to course grain with 1" layer of orgainc material.
26	SS	41.7	43.2	12-18-20	1.0		40			**GRAY SAND AND GRAVEL** 1/2" maximum size.
27	SS	44.2	45.7	11-16-19	1.3					
28	SS	46.7	48.2	8-11-12	1.5		45			

WELL

DRILLER'S NOTES

Well no. 17-S 17-I
Wells were installed in two holes.

24.5 Top of bentonite seal.

29.5 Top of gravel pack.
30.5 Top of screen.

39.5 Bottom of screen.
40.5 Bottom of gravel pack.

TYPE OF CASING USED

	NQ-2 ROCK CORE
X	6" x 3.25 HSA
X	9" x 6.25 HSA
	HW CASING ADVANCER 4"
	NW CASING 3"
	SW CASING 6"

Continued Next Page

PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC

WELL TYPE: OW = OPEN TUBE, GM = GEOMON

RECORDER _____

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY **INDIANA MICHIGAN POWER COMPANY** BORING NO. **9245** DATE _____ SHEET **2** OF **2**

PROJECT **ROCKPORT PLANT** BORING START **09/28/92** BORING FINISH **10/06/92**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPH LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
29	SS	49.2	50.7	10-11-12	.9							
30	SS	50.7	52.2	9-16-26	1.2							
31	SS	52.2	53.7	8-19-22	1.4					**GRAY SAND** medium grain.		51.8 Top of bentonite seal.
32	SS	53.7	55.2	10-14-17	1.0		55					
33	SS	55.2	56.7	11-16-23	1.0					MEDIUM TO COURSE GRAIN WITH 1" SEAM OF COAL 55.3 TO 55.4.		56.3 Top of screen. 56.8 Top of gravel pack.
34	SS	56.7	58.2	8-14-20	1.0							
35	SS	58.2	59.7	10-16-24	1.5		60					
36	SS	61.7	63.2	8-14-17	1.2							
~~37~~	~~SS~~	~~64.2~~	~~65.7~~	~~14-17-19~~	~~.9~~		65					
38	SS	66.7	68.2	15-35-29	1.3					**GRAY CLAY SHALE**		66.4 Bottom of screen. 67.4 Bottom of gravel pack. Holes were drilled with 6.25 augers and stainless steel platesremaining in hole. Seal were premade bentonite donuts. 56.5-57.9 and 65.7-67.1 spacer.
39	SS	69.2	69.4	50/2	.1							

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

MONITORING WELL CONSTRUCTION

JOB NUMBER

COMPANY **INDIANA MICHIGAN POWER COMPANY** WELL No. **MW-18** BORING No. **MW-18** INSTALLED **10/26/04**

PROJECT **ROCKPORT PLANT**

COORDINATES **N 161,048.3 E 518,397.6**

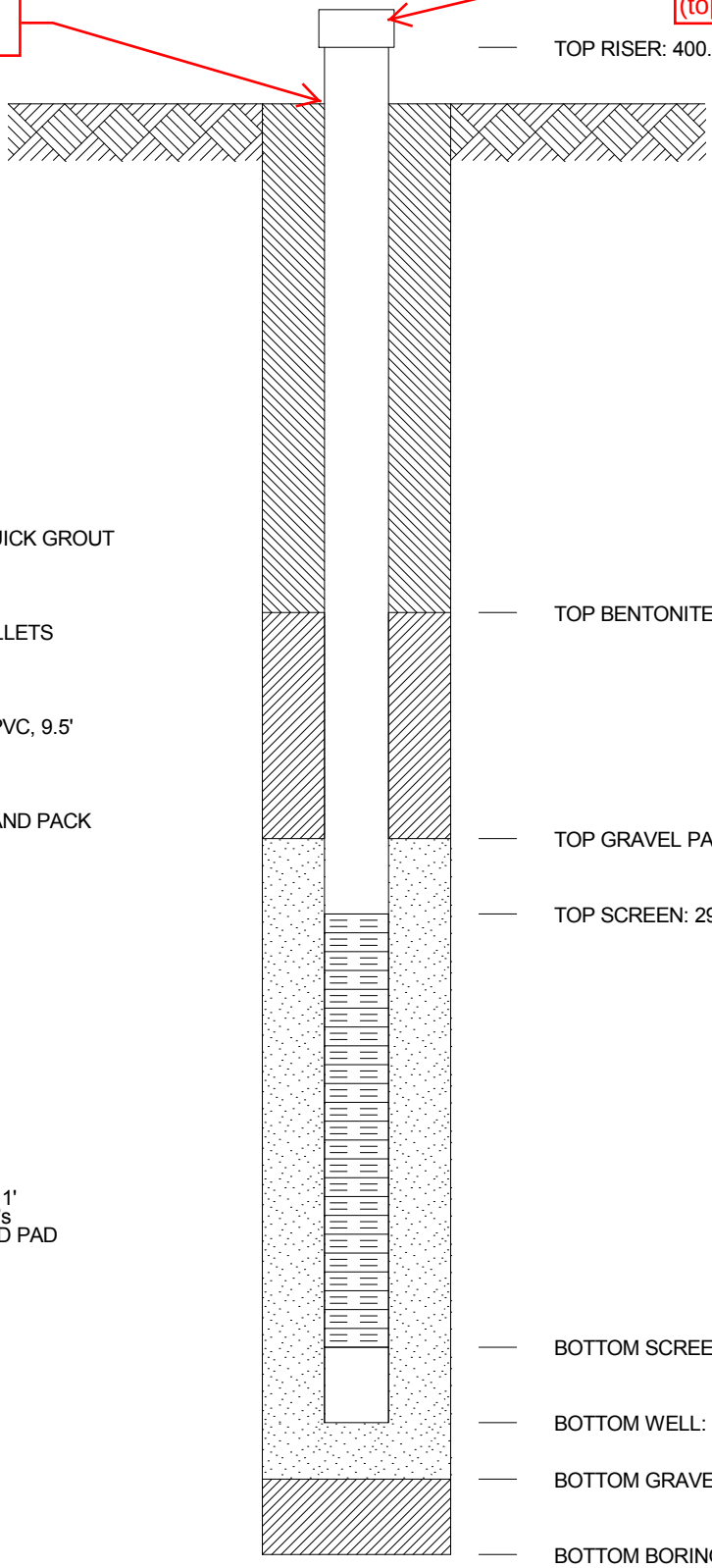
SYSTEM

MW-18

5/31/2016
Reference Point
400.65
(top of 2" PVC pipe)

5/31/2016
Top of Ground 398.30

GROUND ELEVATION 397.88 FT.



TOP RISER: 400.38 FT.

TOP BENTONITE SEAL: 302.68 FT.

TOP GRAVEL PACK: 301.08 FT.

TOP SCREEN: 298.18 FT.

BOTTOM SCREEN: 289.18 FT.

BOTTOM WELL: 288.68 FT.

BOTTOM GRAVEL PACK: 287.38 FT.

BOTTOM BORING: 287.38 FT.

GROUT SEAL: 300 gallons QUICK GROUT

BENTONITE SEAL: 50 lbs PELLETS

SCREEN: 2" dia., .020 SLOT PVC, 9.5'

GRAVEL PACK: NATURAL SAND PACK

RISER PIPE: 2", dia., PVC

SPACERS, DEPTH:

-SWL @ INSTALLATION = 42.1'
-INSTALLED WITH 4.25" HSA's
-SET PROTECTOR & POURED PAD

GEOMCNST RK PLANT.GPJ AEP.GDT 9/9/15

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER

COMPANY **INDIANA MICHIGAN POWER COMPANY**

PROJECT **ROCKPORT PLANT**

COORDINATES **N 161,048.3 E 518,397.6**

GROUND ELEVATION **397.9** SYSTEM

Water Level, ft	▽	▼	▼
TIME			
DATE			

BORING NO. **MW-18** DATE **9/9/15** SHEET **1** OF **4**

BORING START **10/25/04** BORING FINISH **10/26/04**

PIEZOMETER TYPE **SS** WELL TYPE **OW**

HGT. RISER ABOVE GROUND **2.5** DIA **2"**

DEPTH TO TOP OF WELL SCREEN **99.7** BOTTOM **108.7**

WELL DEVELOPMENT BACKFILL **QUICK GROUT**

FIELD PARTY **MCR / TLS** RIG **BK-81**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		0.0	2.0									Boring drilled for the Effluent Dilution System.
1	SS	2.0	3.5	2-3-4	1.3		5			**MEDIUM STIFF 5Y 5/6 LIGHT OLIVE BROWN CLAY** 1.0 tsf, w/ little amount of fine sand, dry		
2	SS	7.0	8.5	3-4-9	1.5		10			**STIFF 5Y 4/4 MODERATE OLIVE BROWN CLAY** 2.5 tsf, w/ some fine sand, dry		
3	SS	12.0	13.5	2-2-4	1.5		15			**MEDIUM STIFF 10YR 6/6 DARK YELLOWISH ORANGE CLAY** 1.0 tsf, w/ trace of fine sand, moist		
4	SS	17.0	18.5	6-8-10	1.5		20			**MEDIUM DENSE 5YR 6/4 LIGHT BROWN MEDIUM GRAIN SAND** w/ little amount of clay, moist		
5	SS	22.0	23.5	6-8-12	1.5		25					
6	SS	27.0	28.5	5-6-11	1.3					**MEDIUM DENSE 5YR 5/6 LIGHT BROWN MEDIUM GRAIN SAND** w/ fine gravel, wet		

TYPE OF CASING USED

	NQ-2 ROCK CORE	
X	6" x 3.25 HSA	
	9" x 6.25 HSA	
	HW CASING ADVANCER	4"
	NW CASING	3"
	SW CASING	6"
	AIR HAMMER	8"

Continued Next Page

PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC

WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON

RECORDER **TLS**

AEP RK PLANT.GPJ AEP.GDT 9/9/15

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER

COMPANY **INDIANA MICHIGAN POWER COMPANY** BORING NO. **MW-18** DATE **9/9/15** SHEET **2** OF **4**

PROJECT **ROCKPORT PLANT** BORING START **10/25/04** BORING FINISH **10/26/04**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
7	SS	32.0	33.5	4-4-4	1.5		35			**LOOSE 5YR 5/6 LIGHT BROWN MEDIUM GRAIN SAND** w/ little amount of fine gravel, wet		
8	SS	37.0	38.5	6-8-11	1.3		40			**MEDIUM DENSE 10YR 5/4 MODERATE YELLOWISH BROWN MEDIUM GRAIN SAND** w/ fine gravel, wet		With HSA's to 37', had a 15 hour SWL of 27.5' Washed heaving sand out of HSA's @ 37.0'. Started inducing water into HSA's @ 37' to prevent heaving sands.
9	SS	42.0	43.5	6-12-13	1.5		45					
10	SS	47.0	48.5	4-5-4	1.5		50			**LOOSE 5YR 5/6 LIGHT BROWN FINE GRAIN SAND** wet **LOOSE 10YR 4/2 DARK YELLOWISH BROWN FINE GRAVEL** wet		
11	SS	52.0	53.5	5-6-10	1.5		55			**MEDIUM DENSE 10YR 5/4 MODERATE YELLOWISH BROWN MEDIUM GRAIN SAND** w/ some fine gravel, wet Trace to little coal		
12	SS	57.0	58.5	4-4-5	1.5		60					
13	SS	62.0	63.5	10-8-8	1.5		65			**MEDIUM DENSE 10YR 6/2 PALE YELLOWISH BROWN COARSE GRAIN SAND** w/ little amount of fine gravel, trace of coal, wet		
14	SS	67.0	68.5	6-8-8	1.5					**MEDIUM DENSE 5YR 5/6 LIGHT BROWN COARSE GRAIN SAND** w/ fine gravel, wet		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER

COMPANY **INDIANA MICHIGAN POWER COMPANY** BORING NO. **MW-18** DATE **9/9/15** SHEET **3** OF **4**

PROJECT **ROCKPORT PLANT** BORING START **10/25/04** BORING FINISH **10/26/04**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
							70					
15	SS	72.0	73.5	14-5-8	1.5		75					
16	SS	77.0	78.5	5-5-6	1.5					**MEDIUM DENSE 5YR 4/4 MODERATE BROWN COARSE GRAIN SAND** w/ little amount of fine gravel, wet		
17	SS	82.0	83.5	4-4-7	0.9		80			Trace of coal		
18	SS	87.0	88.5	6-4-5	1.5		85					
19	SS	92.0	93.5	4-4-6	1.3		90			**LOOSE 10YR 4/2 DARK YELLOWISH BROWN COARSE GRAIN SAND** w/ little amount of fine gravel, trace of coal, wet		
20	SS	97.0	98.5	5-5-8	1.5		95			**MEDIUM DENSE 5YR 5/6 LIGHT BROWN MEDIUM GRAIN SAND** w/ trace of fine gravel, wet		
21	SS	102.0	103.5	2-4-5	1.5		100			**LOOSE 5YR 5/6 LIGHT BROWN MEDIUM GRAIN SAND** w/ trace of fine gravel, wet		
22	SS	107.0	108.5	15-15-20	1.1		105			**DENSE 5YR 5/6 LIGHT BROWN COARSE**		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY **INDIANA MICHIGAN POWER COMPANY** BORING NO. **MW-18** DATE **9/9/15** SHEET **4** OF **4**

PROJECT **ROCKPORT PLANT** BORING START **10/25/04** BORING FINISH **10/26/04**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
										GRAIN SAND w/ some fine gravel, wet		
							110					
23	SS	110.3	110.5	50/.2	0.2					**GRAY CLAY SHALE** Dry		Auger refusal @ 110.3' Stopped boring @ 110.5' on 10/26/04. Installed 2" well. See well log.

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

MONITORING WELL CONSTRUCTION

JOB NUMBER

COMPANY **INDIANA MICHIGAN POWER COMPANY** WELL No. **MW-19** BORING No. **MW-19** INSTALLED **11/4/04**

PROJECT **ROCKPORT PLANT**

COORDINATES **N 161,159.0 E 518,561.3**

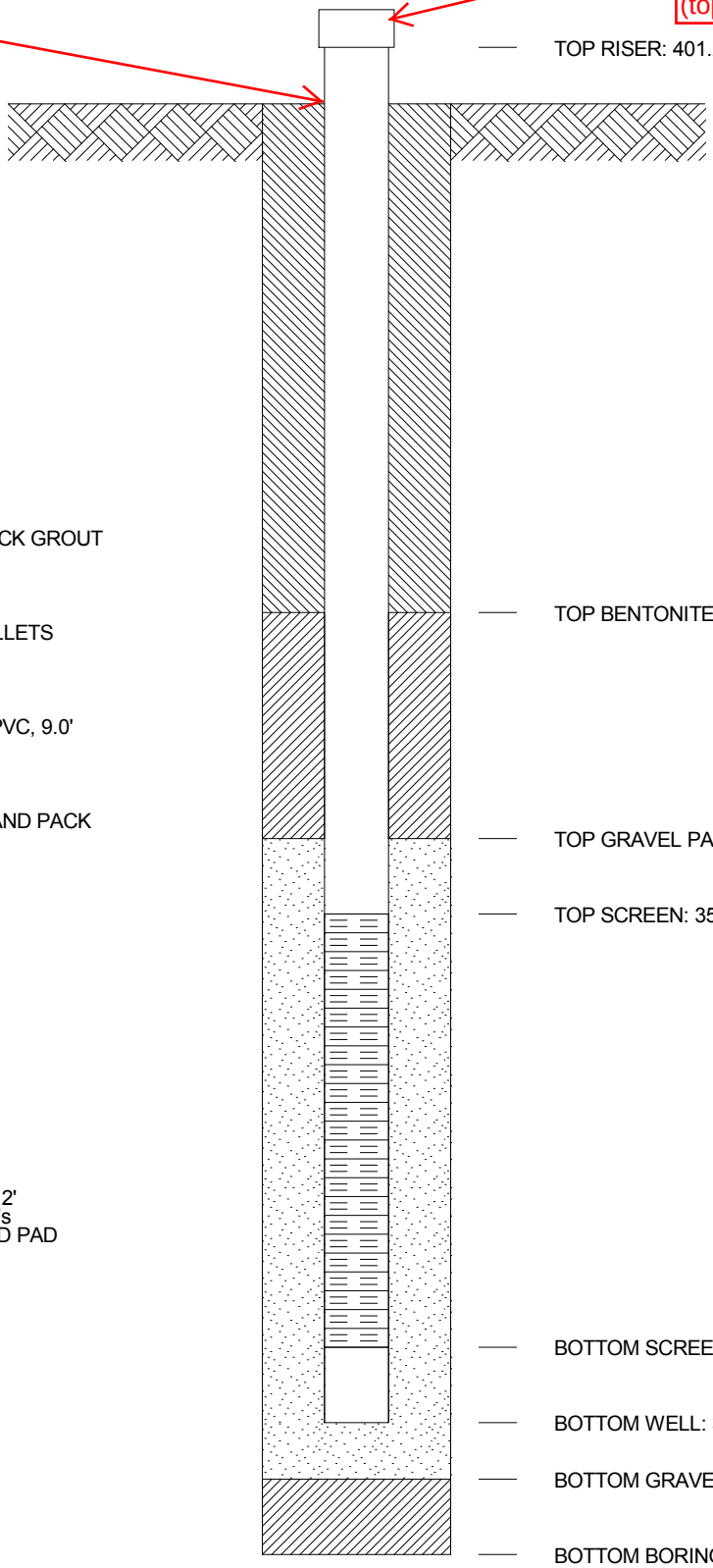
SYSTEM

MW-19

5/31/2016
Reference Point
401.44
(top of 2" PVC pipe)

5/31/2016
Top of Ground 399.15

GROUND ELEVATION 398.74 FT.



TOP RISER: 401.24 FT.

TOP BENTONITE SEAL: 362.44 FT.

TOP GRAVEL PACK: 360.14 FT.

TOP SCREEN: 358.44 FT.

BOTTOM SCREEN: 349.44 FT.

BOTTOM WELL: 348.74 FT.

BOTTOM GRAVEL PACK: 347.94 FT.

BOTTOM BORING: 347.94 FT.

GROUT SEAL: 80 gallons QUICK GROUT

BENTONITE SEAL: 40 lbs PELLETS

SCREEN: 2" dia., .020 SLOT PVC, 9.0'

GRAVEL PACK: NATURAL SAND PACK

RISER PIPE: 2", dia., PVC

SPACERS, DEPTH:

-SWL @ INSTALLATION = 30.2'
-INSTALLED WITH 4.25" HSA's
-SET PROTECTOR & POURED PAD

GEOMCNST RK PLANT.GPJ AEP.GDT 9/9/15

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER

COMPANY **INDIANA MICHIGAN POWER COMPANY**

PROJECT **ROCKPORT PLANT**

COORDINATES **N 161,159.0 E 518,561.3**

GROUND ELEVATION **398.7** SYSTEM

Water Level, ft	▽	▼	▼
TIME			
DATE			

BORING NO. **MW-19** DATE **9/9/15** SHEET **1** OF **2**

BORING START **11/3/04** BORING FINISH **11/4/04**

PIEZOMETER TYPE **SS** WELL TYPE **OW**

HGT. RISER ABOVE GROUND **2.5** DIA **2"**

DEPTH TO TOP OF WELL SCREEN **40.3** BOTTOM **49.3**

WELL DEVELOPMENT BACKFILL **QUICK GROUT**

FIELD PARTY **MCR / CB** RIG **BK-81**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		0.0	1.9									Boring drilled for the Effluent Dilution System.
1	SS	1.9	3.4	3-3-5	1.5					**MEDIUM STIFF 10YR 5/4 MODERATE YELLOWISH BROWN SILTY CLAY** 0.75 tsf, w/ some fine sand, dry		
2	SS	6.9	8.4	5-6-8	1.5		5			**STIFF 10YR 5/4 MODERATE YELLOWISH BROWN SILTY CLAY** 2.25 tsf, w/ trace of fine sand, dry		
3	SS	11.9	13.4	2-2-3	1.5		10			**LOOSE 5YR 5/6 LIGHT BROWN FINE SAND**		
4	SS	16.9	18.4	3-6-8	0.8		15			**MEDIUM STIFF 5YR 4/4 MODERATE BROWN SILT** w/ little amount of fine sand, moist		
5	SS	21.9	23.4	7-9-10	1.0		20			**MEDIUM DENSE 10YR 6/6 DARK YELLOWISH ORANGE FINE GRAIN SAND** dry		
6	SS	26.9	28.4	3-3-5	0.8		25			**MEDIUM DENSE 10YR 6/6 DARK YELLOWISH ORANGE FINE GRAIN SAND** w/ trace of fine gravel, dry		
										LOOSE 10YR 5/4 MODERATE YELLOWISH BROWN FINE GRAIN SAND moist		

TYPE OF CASING USED

	NQ-2 ROCK CORE	
X	6" x 3.25 HSA	
	9" x 6.25 HSA	
	HW CASING ADVANCER	4"
	NW CASING	3"
	SW CASING	6"
	AIR HAMMER	8"

Continued Next Page

PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC

WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON

RECORDER **MCR**

AEP RK PLANT.GPJ AEP.GDT 9/9/15

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER

COMPANY **INDIANA MICHIGAN POWER COMPANY** BORING NO. **MW-19** DATE **9/9/15** SHEET **2** OF **2**

PROJECT **ROCKPORT PLANT** BORING START **11/3/04** BORING FINISH **11/4/04**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
7	SS	31.9	33.4	2-3-3	0.8		35			**LOOSE 10YR 4/2 DARK YELLOWISH BROWN MEDIUM GRAIN SAND** w/ little fine gravel, wet		
8	SS	36.9	38.4	4-6-9	0.7		40			**MEDIUM DENSE 10YR 4/2 DARK YELLOWISH BROWN MEDIUM GRAIN SAND** w/ little fine gravel, wet		
9	SS	41.9	43.4	3-6-7	0.8		45			**MEDIUM DENSE 10YR 5/4 MODERATE YELLOWISH BROWN FINE GRAIN SAND** moist		
10	SS	46.9	48.4	7-10-11	0.5		50			**MEDIUM DENSE 10YR 4/2 DARK YELLOWISH BROWN MEDIUM GRAIN SAND** w/ little fine gravel, wet		Stopped boring @ 50.8' on 11/04/04. Installed 2" well. See well log.

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

MONITORING WELL CONSTRUCTION

JOB NUMBER

COMPANY **INDIANA MICHIGAN POWER COMPANY** WELL No. **MW-20** BORING No. **MW-20** INSTALLED **11/3/04**

PROJECT **ROCKPORT PLANT**

COORDINATES **N 160,996.7 E 518,492.4**

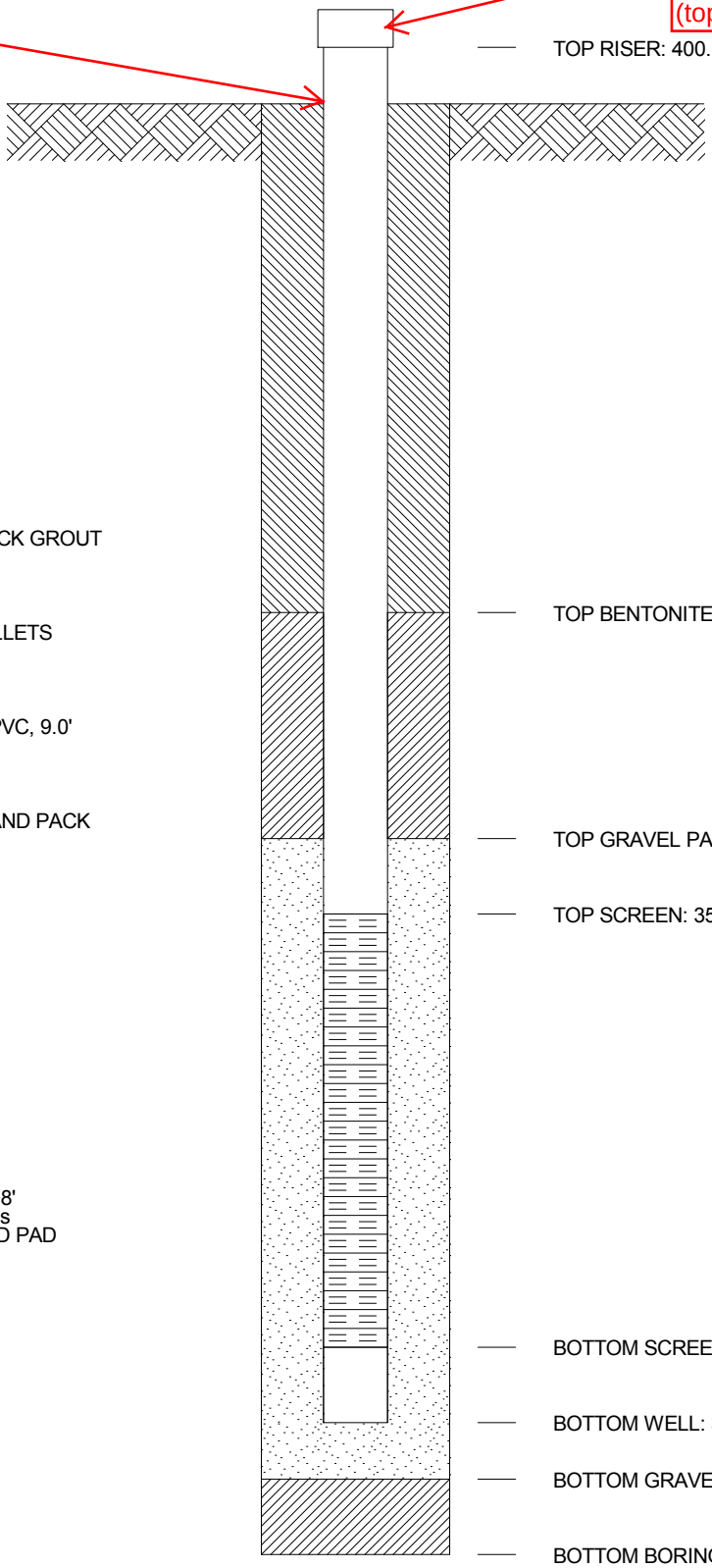
SYSTEM

MW-20

5/31/2016
Top of Ground 398.49

GROUND ELEVATION 398.02 FT.

5/31/2016
Reference Point
400.78
(top of 2" PVC pipe)



TOP RISER: 400.52 FT.

TOP BENTONITE SEAL: 361.32 FT.

TOP GRAVEL PACK: 359.62 FT.

TOP SCREEN: 357.22 FT.

BOTTOM SCREEN: 348.22 FT.

BOTTOM WELL: 347.52 FT.

BOTTOM GRAVEL PACK: 347.52 FT.

BOTTOM BORING: 347.02 FT.

GROUT SEAL: 80 gallons QUICK GROUT

BENTONITE SEAL: 50 lbs PELLETS

SCREEN: 2" dia., .020 SLOT PVC, 9.0'

GRAVEL PACK: NATURAL SAND PACK

RISER PIPE: 2", dia., PVC

SPACERS, DEPTH:

-SWL @ INSTALLATION = 34.8'
-INSTALLED WITH 4.25" HSA's
-SET PROTECTOR & POURED PAD

GEOMCNST RK PLANT.GPJ AEP.GDT 9/9/15

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER

COMPANY **INDIANA MICHIGAN POWER COMPANY**

PROJECT **ROCKPORT PLANT**

COORDINATES **N 160,996.7 E 518,492.4**

GROUND ELEVATION **398.0** SYSTEM

Water Level, ft	▽	▼	▼
TIME			
DATE			

BORING NO. **MW-20** DATE **9/9/15** SHEET **1** OF **2**

BORING START **10/27/04** BORING FINISH **11/3/04**

PIEZOMETER TYPE **SS** WELL TYPE **OW**

HGT. RISER ABOVE GROUND **2.5** DIA **2"**

DEPTH TO TOP OF WELL SCREEN **40.8** BOTTOM **49.8**

WELL DEVELOPMENT BACKFILL **QUICK GROUT**

FIELD PARTY **MCR / TLS** RIG **BK-81**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		0.0	1.8									Boring drilled for the Effluent Dilution System.
1	SS	1.8	3.3	4-6-5	1.5					**STIFF 5YR 5/6 LIGHT BROWN CLAY** 1.5 tsf, w/ some fine sand		
2	SS	6.8	8.3	2-4-4	1.5		5			**MEDIUM STIFF MOTTLED 5YR 5/6 LIGHT BROWN & 10Y 6/2 PALE OLIVE CLAY** 1.75 tsf, w/ little fine sand		
3	SS	11.8	13.3	0-0-0	1.4		10			**SOFT 5YR 3/2 GRAYISH BROWN CLAY** 0 tsf		Weight of hammer pushed spoon
4	SS	16.8	18.3	3-6-7	1.5		15			**MEDIUM STIFF 10YR 5/4 MODERATE YELLOWISH BROWN CLAY w/ SAND** 0.5 tsf		
5	SS	21.8	23.3	4-6-8	1.5		20			**MEDIUM DENSE 5YR 5/6 LIGHT BROWN COARSE SAND**		With HSA's to 38.3', had a 168 hour SWL of 23.4'
6	SS	26.8	28.3	4-7-9	1.5		25			**MEDIUM DENSE 10YR 5/4 MODERATE YELLOWISH BROWN COARSE SAND** w/ some fine gravel		

TYPE OF CASING USED

	NQ-2 ROCK CORE	
X	6" x 3.25 HSA	
	9" x 6.25 HSA	
	HW CASING ADVANCER	4"
	NW CASING	3"
	SW CASING	6"
	AIR HAMMER	8"

Continued Next Page

PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC

WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON

RECORDER **TLS**

AEP RK PLANT.GPJ AEP.GDT 9/9/15

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER

COMPANY **INDIANA MICHIGAN POWER COMPANY** BORING NO. **MW-20** DATE **9/9/15** SHEET **2** OF **2**

PROJECT **ROCKPORT PLANT** BORING START **10/27/04** BORING FINISH **11/3/04**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
7	SS	31.8	33.3	3-5-6	1.5		35			**MEDIUM DENSE 10YR 4/4 MODERATE BROWN COARSE SAND** w/ some fine gravel		
8	SS	36.8	38.3	3-6-7	1.0		40					
9	SS	41.8	43.3	7-7-13	1.0		45			**MEDIUM DENSE 10YR 4/2 DARK YELLOWISH BROWN MEDIUM GRAIN SAND** w/ little fine gravel, wet		
10	SS	46.8	48.3	6-6-14	1.0		50			**MEDIUM DENSE 5YR 5/2 PALE BROWN MEDIUM GRAIN SAND** w/ trace of fine gravel, wet		Stopped boring @ 51.0' on 11/03/04. Installed 2" well. See well log.

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

MONITORING WELL CONSTRUCTION

JOB NUMBER 40881154-01

COMPANY AMERICAN ELECTRIC POWER

PROJECT ROCKPORT LANDFILL

COORDINATES N 161,298.6 E 520,310.8

SYSTEM

WELL No. S-21 BORING No. B-0821S INSTALLED 1/13/09

MW-21S

5/31/2016
Top of Ground 398.70

GROUND ELEVATION 398.57 FT.

5/31/2016
Reference Point
400.77
(top of 2" PVC pipe)

TOP RISER: 400.76 FT.

GROUT SEAL: Quick Grout 75 gals

BENTONITE SEAL: 3/8" Coated Bentonite Pellets 75 lbs

SCREEN: 2" dia., 0.020 Slot Sch 40, 10'

GRAVEL PACK: #4 Quartz Sand 350 lbs

RISER PIPE: 2", dia., Sch 40

SPACERS, DEPTH: 20'

TOP BENTONITE SEAL: 374.97 FT.

TOP GRAVEL PACK: 372.67 FT.

TOP SCREEN: 369.77 FT.

BOTTOM SCREEN: 359.27 FT.

BOTTOM WELL: 358.67 FT.

BOTTOM GRAVEL PACK: 358.57 FT.

BOTTOM BORING: 358.57 FT.

-Drilled w/6.25" HSA's w/stainless steel plate
-SWL @ Install N/A
-Added water to hydrate pellets
-Developed well
-Installing well wizard bladder pump @ later date
-Drill water from on site production well

GEOMCNST ROCKPORT LANDFILL.GPJ AEP.GDT 2/10/09

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

MONITORING WELL CONSTRUCTION

JOB NUMBER 40881154-01

COMPANY AMERICAN ELECTRIC POWER

PROJECT ROCKPORT LANDFILL

COORDINATES N 161,299.5 E 520,291.1

SYSTEM

WELL No. I-21 BORING No. B-0821I INSTALLED 1/13/09

MW-21I

5/31/2016
Reference Point
400.72
(top of 2" PVC pipe)

5/31/2016
Top of Ground 398.23

GROUND ELEVATION 398.52 FT.

TOP RISER: ~~400.74 FT.~~

GROUT SEAL: Quick Grout 250 gals

BENTONITE SEAL: 3/8" Coated Bentonite Pellets 50 lbs

SCREEN: 2" dia., 0.020 Slot Sch 40, 10'

GRAVEL PACK: #4 Quartz Sand 325 lbs

RISER PIPE: 2", dia., Sch 40

SPACERS, DEPTH: 40'

TOP BENTONITE SEAL: 350.12 FT.

TOP GRAVEL PACK: 347.52 FT.

TOP SCREEN: 345.42 FT.

BOTTOM SCREEN: 335.92 FT.

BOTTOM WELL: 335.32 FT.

BOTTOM GRAVEL PACK: 335.32 FT.

BOTTOM BORING: 335.32 FT.

-Drilled w/6.25" HSA's w/stainless steel plate
-SWL @ Install N/A
-Added water to hydrate pellets
-Developed well
-Installing well wizard bladder pump @ later date
-Drill water from on site production well

GEOMCNST ROCKPORT LANDFILL.GPJ AEP GDT 2/10/09

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

MONITORING WELL CONSTRUCTION

JOB NUMBER 40881154-01

COMPANY AMERICAN ELECTRIC POWER

PROJECT ROCKPORT LANDFILL

COORDINATES N 161,298.3 E 520,300.3

SYSTEM

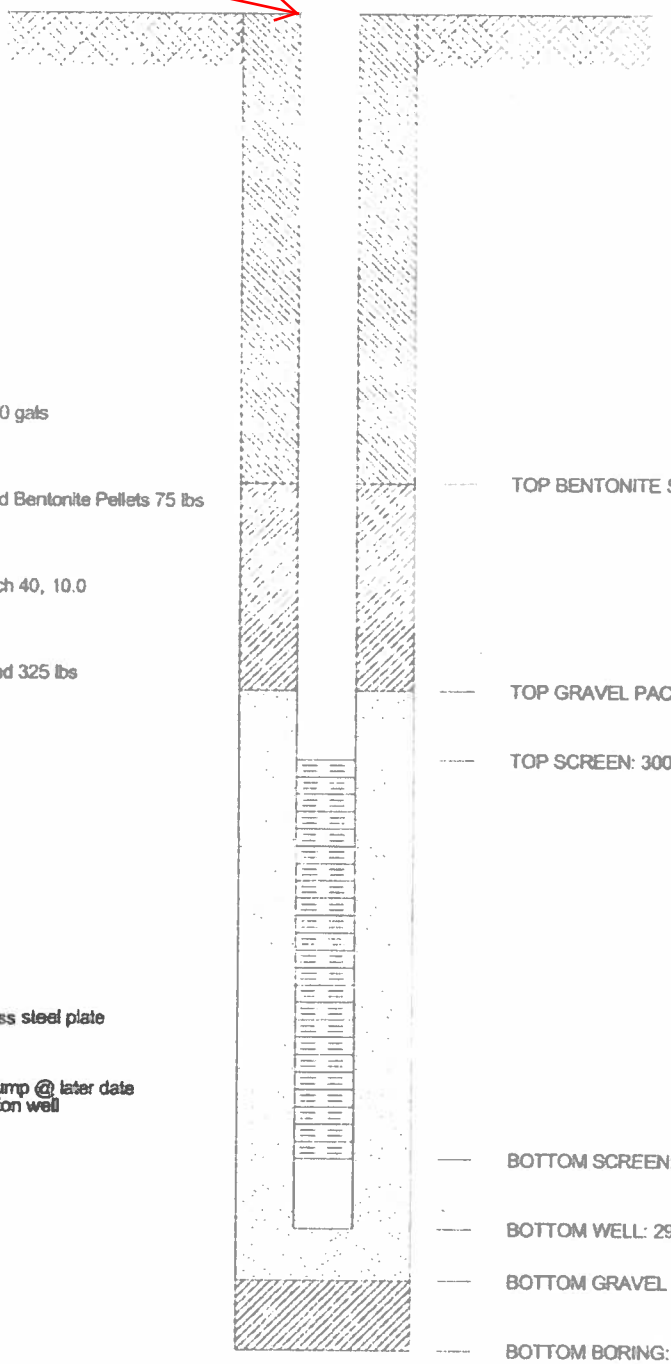
WELL No D-21 BORING No. B-0821D INSTALLED 1/13/09

MW-21D

5/31/2016
Reference Point
400.67
(top of 2" PVC pipe)

5/31/2016
Top of Ground 398.58

GROUND ELEVATION 398.62 FT.



GROUT SEAL: Quick Grout 650 gals

BENTONITE SEAL: 3/8" Coated Bentonite Pellets 75 lbs

SCREEN: 2" dia., 0.020 Slot Sch 40, 10.0

GRAVEL PACK: #4 Quartz Sand 325 lbs

RISER PIPE: 2", dia., Sch 40

SPACERS, DEPTH: 80', 30'

-Drilled w/6.25" HSA's w/stainless steel plate
-SWL @ Install N/A
-Added water to hydrate pellets
-Developed well
-Installing well wizard bladder pump @ later date
-Drill water from on site production well

GEO/CNST ROCKPORT LANDFILL.GPJ AEP.GDT 2/10/09

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER 40881154-01

COMPANY AMERICAN ELECTRIC POWER

PROJECT ROCKPORT LANDFILL

COORDINATES N 161,298.3 E 520,300.3

GROUND ELEVATION 398.6 SYSTEM State Plane using NAD27/29

Water Level, ft	▽	▼	▼
TIME			
DATE			

BORING NO. B-0821 DATE 4/29/09 SHEET 1 OF 5

BORING START 1/6/09 BORING FINISH 1/13/09

PIEZOMETER TYPE _____ WELL TYPE _____

HGT. RISER ABOVE GROUND _____ DIA _____

DEPTH TO TOP OF WELL SCREEN _____ BOTTOM _____

WELL DEVELOPMENT _____ BACKFILL _____

FIELD PARTY ZLR / RMP RIG D-120

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
	AUGER	0.0	1.9							OVERBURDEN		SAMPLES COLLECTED JAN 6-13, 2009, BY AEP DRILLERS AND LOGGED ON JAN 30, 2009, BY M K ADKINS.
1	SPT	1.9	3.4	4-7-11	1.5					CLAY STIFF, SILTY, ABUNDANT Fe STAINING, MINOR ROOT TRACES, MINOR SIDERITE CONCRETIONS, 5Y 7/2		
							5					NOTE #1: NO REFERENCE TO MOISTURE CONTENT BECAUSE ALL SAMPLES WERE DAMP TO SATURATED AND HAD BEEN IN STORAGE.
2	SPT	6.9	8.4	3-3-5	1.5					SAND MEDIUM TO DARK BROWN, SILTY, MINOR CLAY, FINE GRAIN, 5YR 5/2 TO 5YR 3/2		
							10					NOTE #2: NO REFERENCE TO SORTING BECAUSE SAMPLES HAD BEEN DISTURBED DURING COLLECTION.
3	SPT	11.9	13.4	3-4-5	1.2					SAND MEDIUM DARK BROWN, SLIGHTLY SILTY, FINE GRAIN, 5YR 3/2		
							15					
4	SPT	16.9	18.4	6-9-11	1.2					SAND MEDIUM DARK BROWN, SLIGHTLY SILTY, MINOR FINE TO MEDIUM GRAIN, VERY MINOR (<1%) WELL ROUNDED QUARTZ PEBBLES, ~0.25 CM DIAMETER, 5YR 3/2		NOTE #3: SAMPLES WERE COLLECTED OVER 1.5' INTERVALS SPACED @ 2.5'.

TYPE OF CASING USED

	NQ-2 ROCK CORE	
	6" x 3.25 HSA	
	9" x 6.25 HSA	
	HW CASING ADVANCER	4"
	NW CASING	3"
	SW CASING	6"
	AIR HAMMER	8"

Continued Next Page

PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC

WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON

RECORDER MKA

AEP ROCKPORT LANDFILL.GPJ AEP.GDT 4/29/09

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER 40881154-01

COMPANY AMERICAN ELECTRIC POWER

PROJECT ROCKPORT LANDFILL

BORING NO. B-0821 DATE 4/29/09 SHEET 2 OF 5

BORING START 1/6/09 BORING FINISH 1/13/09

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
5	SPT	21.9	23.4	11-14-18	1.3		25			SAND MEDIUM DARK BROWN, SLIGHTLY SILTY, FINE TO MEDIUM GRAIN, W/ ~15% WELL ROUNDED QUARTZ PEBBLES, UP TO 1 CM DIAMETER, 5YR 3/2		
6	SPT	26.9	28.4	8-11-14	1.3		30			SAND MEDIUM DARK BROWN, SLIGHTLY SILTY, FINE TO COARSE GRAIN, W/ ~1% WELL ROUNDED QUARTZ PEBBLES, UP TO 1 CM DIAMETER, 5YR 3/2		
7	SPT	31.9	33.4	7-8-12	1.4		35			SAND MEDIUM DARK BROWN, SLIGHTLY SILTY, FINE TO COARSE GRAIN, W/ ~10-15% WELL ROUNDED QUARTZ PEBBLES, UP TO 1 CM DIAMETER, 5YR 3/2		
8	SPT	36.9	38.4	9-10-9	1.5		40			SAND MEDIUM DARK BROWN, SLIGHTLY SILTY, FINE TO COARSE GRAIN, W/ ~30% WELL ROUNDED QUARTZ PEBBLES, UP TO 1 5 CM DIAMETER, 5YR 3/2		
9	SPT	41.9	43.4	5-7-11	1.2		45			SAND MEDIUM DARK BROWN SLIGHTLY SILTY, FINE TO COARSE GRAIN, W/ ~5-10% WELL ROUNDED QUARTZ PEBBLES, UP TO 1 CM DIAMETER, 5YR 3/2		

Continued ext Page

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER 40881154-01

COMPANY AMERICAN ELECTRIC POWER

PROJECT ROCKPORT LANDFILL

BORING NO. B-0821 DATE 4/29/09 SHEET 3 OF 5

BORING START 1/6/09 BORING FINISH 1/13/09

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
10	SPT	46.9	48.4	5-7-14	1.5					SAND MEDIUM DARK BROWN, SLIGHTLY SILTY, FINE TO COARSE GRAIN, W/ ~5-10% WELL ROUNDED QUARTZ PEBBLES, UP TO 1 CM DIAMETER, 5YR 3/2		
11	SPT	51.9	53.4	5-9-13	1.3		50			SAND MEDIUM DARK BROWN, SLIGHTLY SILTY, FINE TO COARSE GRAIN, W/ ~5-10% WELL ROUNDED QUARTZ PEBBLES, UP TO 1 CM DIAMETER, 5YR 3/2		
12	SPT	56.9	58.4	8-6-14	1.3		55			SAND MEDIUM DARK BROWN, SLIGHTLY SILTY, FINE TO COARSE GRAIN, FRAGMENTS UP TO 2 CM DIAMETER, 5YR 3/2		
13	SPT	61.9	63.4	5-6-11	1.5		60			SAND MEDIUM DARK BROWN, SLIGHTLY SILTY, FINE TO COARSE GRAIN, W/ ~15% WELL ROUNDED QUARTZ PEBBLES, UP TO 0.5 CM DIAMETER, 5YR 3/2		
14	SPT	66.6	68.1	4-11-18	1.5		65			SAND MEDIUM DARK BROWN, SLIGHTLY SILTY, FINE TO COARSE GRAIN, W/ ~15% WELL ROUNDED QUARTZ PEBBLES, UP TO 0.5 CM DIAMETER, 5YR 3/2		
							70					

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER 40881154-01

COMPANY AMERICAN ELECTRIC POWER

PROJECT ROCKPORT LANDFILL

BORING NO. B-0821 DATE 4/29/09 SHEET 4 OF 5

BORING START 1/6/09 BORING FINISH 1/13/09

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
15	SPT	71.9	73.4	12-28-7	1.5					SAND FINE TO MEDIUM GRAIN, 5YR 3/2, W/SANDSTONE FRAGMENTS, POORLY CEMENTED, OLIVE GRAY 5GY 6/1		
16	SPT	76.9	78.4	7-11-12	1.5		75			SAND FINE TO COARSE GRAIN, W/15-20% WELL ROUNDED QUARTZ PEBBLES, UP TO 0.5 CM DIAMETER, 5YR 3/2		
17	SPT	81.9	83.4	2-5-5	1.5		80			SAND FINE TO COARSE GRAIN, W/15-20% WELL ROUNDED QUARTZ PEBBLES, UP TO 0.5 CM DIAMETER, 5YR 3/2		
18	SPT	86.9	88.4	2-3-7	1.5		85			SAND FINE TO COARSE GRAIN, W/15-20% WELL ROUNDED QUARTZ PEBBLES, UP TO 0.5 CM DIAMETER, 5YR 3/2		
19	SPT	91.9	93.4	3-5-9	1.5		90			SAND FINE TO COARSE GRAIN, W/5-10% WELL ROUNDED QUARTZ PEBBLES, W/~ 0.5 CM DIAMETER, 5YR 3/2		
20	SPT	96.9	98.4	5-6-9	.9		95			SAND FINE TO COARSE GRAIN, W/5-10% WELL ROUNDED QUARTZ PEBBLES, W/~ 0.5		

Continued Next Page

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER 40881154-01

COMPANY AMERICAN ELECTRIC POWER

PROJECT ROCKPORT LANDFILL

BORING NO. B-0821 DATE 4/29/09 SHEET 5 OF 5

BORING START 1/6/09 BORING FINISH 1/13/09

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
										CM DIAMETER, 5YR 3/2		
							100					
21	SPT	101.9	103.4	3-3-6	1.0					SAND FINE GRAIN, W/5-10% WELL ROUNDED QUARTZ PEBBLES, W/~ 0.5 CM DIAMETER, 5YR 4/4		
							105					
22	SPT	108.9	108.4	5-5-17	1.5					SAND FINE TO COARSE GRAIN, W/~15% WELL ROUNDED QUARTZ PEBBLES, W/~ 0.25 CM DIAMETER, 10YR 4/2		
23	SPT	108.9	109.8	2-50/.4	.7					SAND FINE TO COARSE GRAIN, W/5-10% WELL ROUNDED QUARTZ PEBBLES, W/~ 0.25 CM DIAMETER, 10YR 4/2		
							110					
24	SPT	111.9	112.2	50/.3	.3					SANDSTONE POORLY CEMENTED W/INTERBEDDED CLAY/CLAYSTONE, 5B 7/1 TO 5B 5/1		

AEP ROCKPORT LANDFILL.GPJ AEP GDT 4/29/09

APPENDIX D

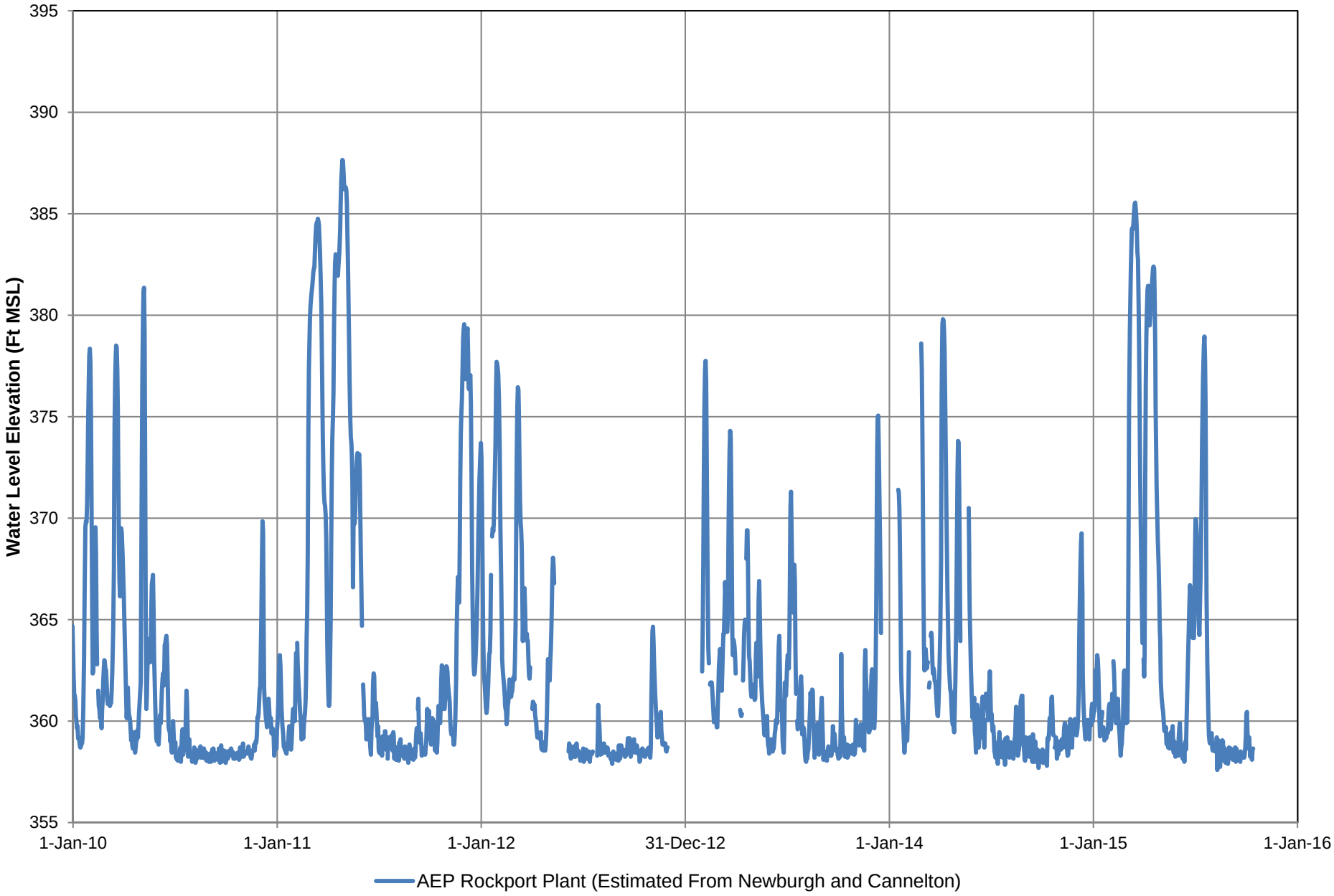
PIEZOMETRIC DATA

Appendix D-1

Ohio River Hydrograph, 2010-2015

AEP Rockport Plant

Ohio River Hydrograph, 2010-2015

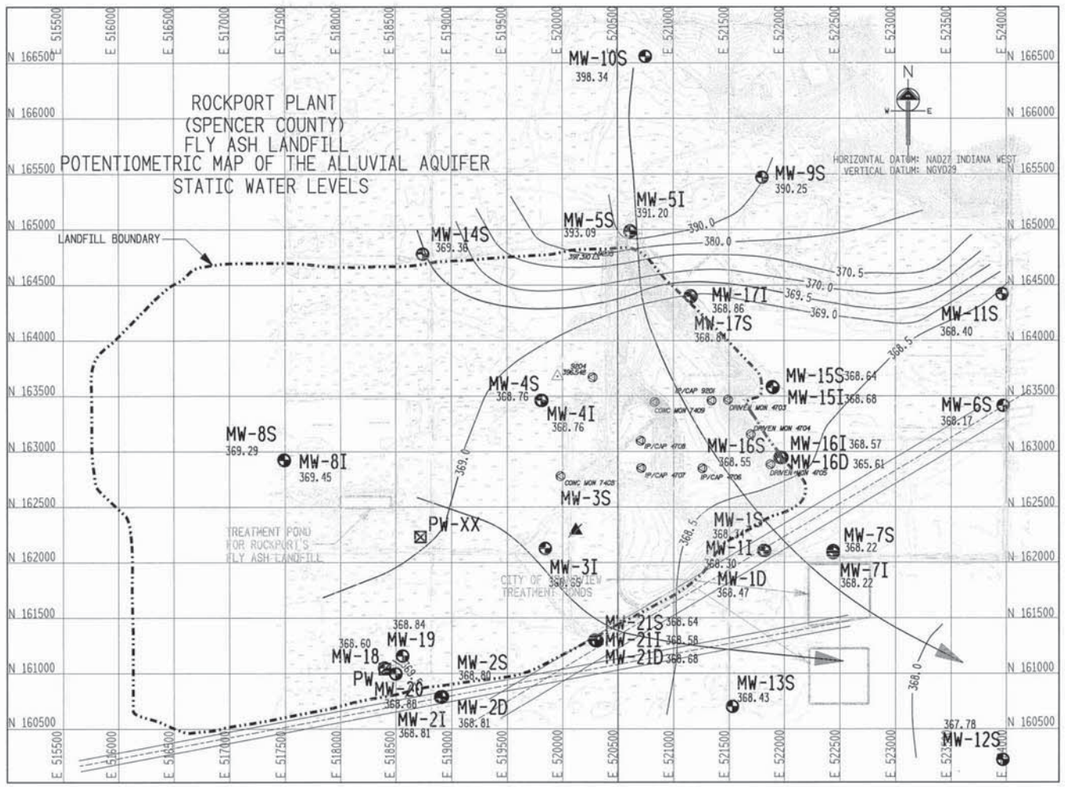


Appendix D-2

Landfill Piezometric Maps, 2010-2013

DWG. NO. 12-30105

MAY 18, 2010



AMERICAN ELECTRIC POWER
ROCKPORT PLANT FLYASH LANDFILL GROUNDWATER SAMPLING
SAMPLED BY: CAREY SANDERS HAHUS
DATE/FIELD CONDITIONS: May 18, 2010/CLOUDY, 60 DEGREES F, STATIC WATER LEVELS MEASURED May 18, 2010.

	WELL NO.	REF. DATUM POINT FT. (A)	** FEET TO STATIC LEVEL (B)	CALC. STATIC LEVEL (C)	*** 3 WELL VOLUMES (GAL)	ACTUAL AMT. PURGED GAL.	FIELD pH (S.U.)	FIELD Temp (Deg F)	FIELD COND (umhos)	TIME OF SAMPLING	NOTES
INTRA WELL	1S	397.29	28.95	368.34	5.9	7.5	7.46	60.0	608	1204	Clear
	1I	397.34	29.04	368.30	17.2	25.8	7.39	59.9	517	1136	Clear
	1D	397.32	28.85	368.47	28.9	34.0	7.39	59.9	563	1200	Clear
	15S	392.62	23.98	368.64	8.9	13.9	7.59	61.4	686.5	1331	Clear
	15I	392.82	24.14	368.68	20.7	22.4	7.30	61.2	2318	1321	Clear
	16S	394.39	25.84	368.55	7.0	7.8	7.27	64.2	639	1243	Clear
	16I	394.37	25.80	368.57	20.5	22.1	7.49	60.9	660	1325	Clear
	16D	394.49	28.88	365.61	34.6	45.2	7.37	62.0	600	1321	Clear
	17S	395.49	26.65	368.84	7.8	8.5	7.49	60.2	722	1403	Clear
	17I	395.36	26.50	368.86	20.7	22.2	7.02	61.8	1677	1440	Clear
STATIC ONLY	2S	399.24	30.44	368.80							
	2I	399.26	30.45	368.81							
	2D	399.28	30.47	368.81							
	3S	396.81	CLOSED	5-8-08							
	3I	397.05	28.40	368.65							
	4S	396.58	27.82	368.76	6.5	7.1	5.61	59.4	204.8	845	Clear
	4I	397.02	28.26	368.76	17.9	18.4	6.97	57.7	470.6	911	Clear
	5S	396.00	2.91	393.09	13.2	17.0	7.39	59.8	2645	948	Clear
	5I	392.10	0.90	391.20							
	6S	394.89	26.72	368.17							
	7S	393.66	25.44	368.22							
	7I	393.62	25.40	368.22							
	8S	393.91	24.62	369.29	8.3	11.2	7.50	57.5	545	853	Clear
	8I	393.70	24.25	369.45	20.8	23.8	7.31	58.7	606	1001	Clear
	9S	403.08	12.83	390.25							
	10S	408.41	10.07	398.34							
	11S	399.98	31.58	368.40							
	12S	403.65	35.87	367.78							
	13S	399.92	31.49	368.43							
	14S	394.68	25.32	369.36							
	18	400.38	31.78	368.60							
	19	401.24	32.40	368.84							
	20	400.52	31.64	368.88							
	21S	400.76	32.12	368.64	2.1	2.7	7.56	58.1	623.5	1028	Slightly turbid, brown
	21I	400.63	32.05	368.58	13.2	14	7.05	59.9	523.5	1004	Clear
	21D	400.73	32.05	368.68	34.8	48.6	7.68	59.1	575.1	1150	Clear

**STATIC LEVELS ARE TO BE TAKEN ON EACH WELL AT EVERY SAMPLING EVENT (A-B=C)
***(REF. DATUM POINT - FEET TO STATIC LEVEL) -BOTTOM OF WELL ELEV.) X .16 X 3 = 3 WELL VOLUMES (GAL)

LEGEND

- IP/CAP 4706 — FIELD BENCHMARK
- MW-8S — MONITORING WELL
- 371 — POTENTIOMETRIC CONTOUR (BASED ON SHALLOW "S" WELLS)
- DIRECTION OF GROUNDWATER FLOW
- WATER SUPPLY WELL
- CLOSED MONITORING WELL
- LANDFILL BOUNDARY
- TRANSMISSION LINES

REFERENCE DRAWINGS

12-30104	WELL LOCATION PLAN
12-30101	ASH AREA MONITORING WELLS CONSTRUCTION DETAILS TABLE
12-30550	ASH AREA AS BUILT MAPPING

DATE	NO.	DESCRIPTION	APPD.
7/9/2010	Y	STATIC WATER LEVELS MEASURED MAY 18, 2010.	PJA
1/7/10	X	DELETED PREVIOUS REVISIONS A THRU W. REVISED TO SHOW STATIC WATER LEVELS MEASURED NOV. 9, 2009.	PJA

REVISIONS

S:/RK/12/Geo_Hydro_Site/30105.dgn

INDIANA MICHIGAN POWER CO

ROCKPORT PLANT

ROCKPORT INDIANA

POTENTIOMETRIC MAP

DWG. NO. 12-30105-Y

SCALE: AS SHOWN | CIVIL ENGINEERING

DR: KM
CH: JT 9-9
ENGR:
PROJ. ENGR:
DATE: 12-1-09
APPROVED BY: J J Massey-Nolan

AMERICAN ELECTRIC POWER

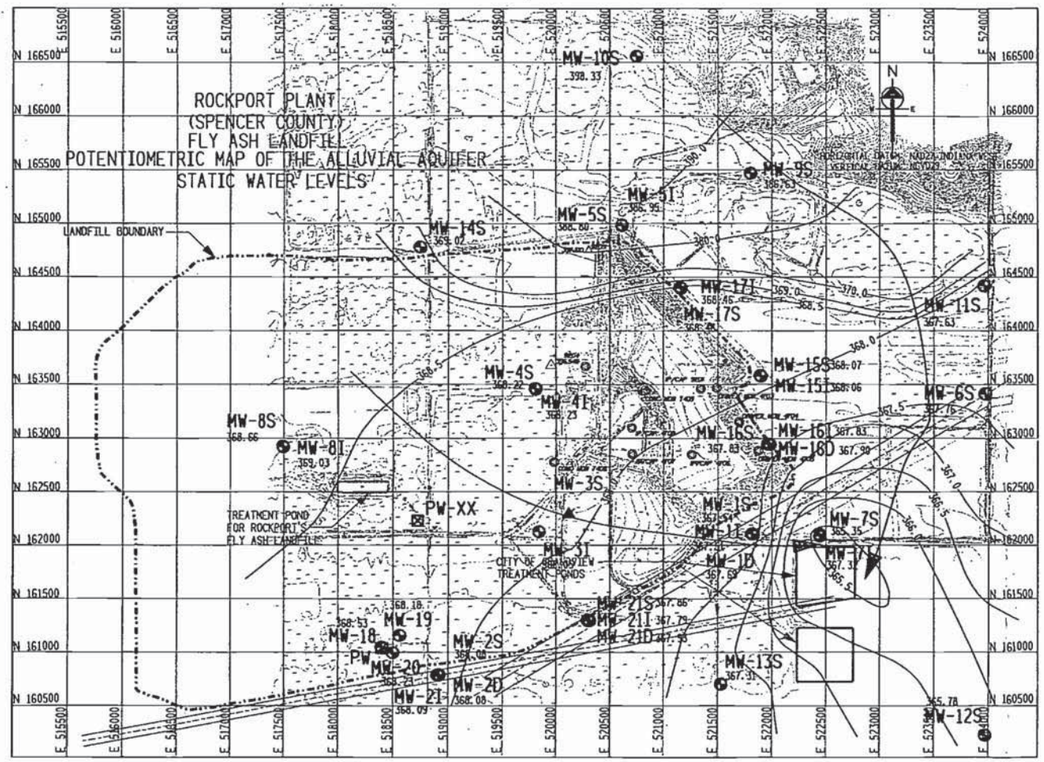
AEP SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

IGS0694

SYSTEM DATE: 7/9/2010
SYSTEM TIME: 8:14:22 AM

DWG. NO. 12-30105

NOVEMBER 2, 2010



AMERICAN ELECTRIC POWER
ROCKPORT PLANT FLYASH LANDFILL GROUNDWATER SAMPLING
SAMPLED BY: CURT SANDERS RAMEN
DATE/FIELD CONDITIONS: NOV. 3, 2010/CLOUDY/WINDY, 53 DEGREES F, STATIC WATER LEVELS MEASURED NOV 3, 2010.

	WELL NO.	REF. DATUM POINT FT. (A)	** FEET TO STATIC LEVEL (B)	CALC. STATIC LEVEL (C)	*** 3 WELL VOLUMES (GAL)	ACTUAL AMT. PURGED GAL.	FIELD pH (S.U.)	FIELD Temp (Deg F)	FIELD COND (umhos)	TIME OF SAMPLING	NOTES
INTRAWELL	1S	397.29	29.75	367.54	5.5	7.0	7.61	56.7	646	1104	Clear
	1I	397.34	29.83	367.51	16.8	18.5	7.40	57.2	542	1136	Clear
	1D	397.32	29.63	367.69	28.6	30.7	7.39	57.7	585	1208	Clear
	15S	392.62	24.55	368.07	8.7	9.6	7.29	57.4	706	1239	Clear
	15I	392.82	24.76	368.06	20.4	22.8	7.24	57.4	1912	1324	Clear
	16S	394.39	26.56	367.83	6.7	7.2	7.60	57.8	672	1200	Clear
	16I	394.37	26.54	367.83	20.2	21.2	7.74	58.7	667	1243	Clear
	16D	394.49	26.59	367.90	35.7	36.9	7.66	58.5	640	1308	Clear
	17S	395.49	27.03	368.46	7.6	8.0	7.37	56.9	840	1345	Clear
	17I	395.36	26.90	368.46	20.5	20.9	7.14	57.5	1607	1420	Clear
STATIC ONLY	2S	399.24	31.16	368.08							
	2I	399.26	31.17	368.09							
	2D	399.28	31.20	368.08							
	3S	396.81	CLOSED	5-8-08							
	3I	397.05	29.00	368.05							
	4S	396.58	28.36	368.22	6.2	7.5	7.80	56.0	191	902	Clear
	4I	397.02	28.79	368.23	17.7	19.0	7.45	56.0	481	930	Clear
	5S	396.00	7.20	388.80	11.2	14.8	7.34	56.0	2060	1036	Clear
	5I	392.10	5.15	386.95							
	6S	394.89	27.13	367.76							
	7S	393.66	28.31	365.35							
	7I	393.62	26.30	367.32							
	8S	393.91	25.25	368.66	7.9	9.2	8.05	56.0	542	944	Clear
	8I	393.70	24.67	369.03	20.6	21.8	7.57	56.9	675	955	Clear
	9S	403.08	16.45	386.63							
	10S	408.41	10.08	398.33							
	11S	399.98	32.35	367.63							
	12S	403.65	37.87	365.78							
	13S	399.92	32.61	367.31							
	14S	394.68	25.66	369.02							
	18	400.38	31.85	368.53							
	19	401.24	33.06	368.18							
	20	400.52	32.29	368.23							
	21S	400.76	32.90	367.86	1.7	2.7	7.94	57.0	516	1028	Clear
	21I	400.63	32.84	367.79	12.8	14.3	7.63	57.0	530	1034	Clear
	21D	400.73	32.80	367.93	34.4	36.0	7.81	56.8	592	1130	Clear

**=STATIC LEVELS ARE TO BE TAKEN ON EACH WELL AT EVERY SAMPLING EVENT (A-B=C)
***=(CASE, DATUM POINT - FEET TO STATIC LEVEL) =BOTTOM OF WELL ELEV.) X .16 X 3 = 3 WELL VOLUMES (GAL)

LEGEND

- FIELD BENCHMARK
- MW-8S — MONITORING WELL
- 371 — POTENTIOMETRIC CONTOUR (BASED ON SHALLOW "S" WELLS)
- DIRECTION OF GROUNDWATER FLOW
- WATER SUPPLY WELL
- CLOSED MONITORING WELL
- LANDFILL BOUNDARY
- TRANSMISSION LINES

REFERENCE DRAWINGS

12-30104	WELL LOCATION PLAN
12-30101	ASH AREA MONITORING WELLS CONSTRUCTION DETAILS TABLE
12-30550	ASH AREA AS BUILT MAPPING

DATE	NO.	DESCRIPTION	APPD.
11/22/2010	Z	STATIC WATER LEVELS MEASURED NOV. 3, 2010.	MFE
7/9/10	Y	STATIC WATER LEVELS MEASURED MAY 18, 2010.	PJA
1/7/10	X	DELETED PREVIOUS REVISIONS A THRU W. REVISED TO SHOW STATIC WATER LEVELS MEASURED NOV. 5, 2009.	PJA

REVISIONS

S:/RK/12/Geo_Hydro_Site/30105.dgn

INDIANA MICHIGAN POWER CO
ROCKPORT PLANT
ROCKPORT INDIANA

POTENTIOMETRIC MAP

DWG. NO. 12-30105-Z

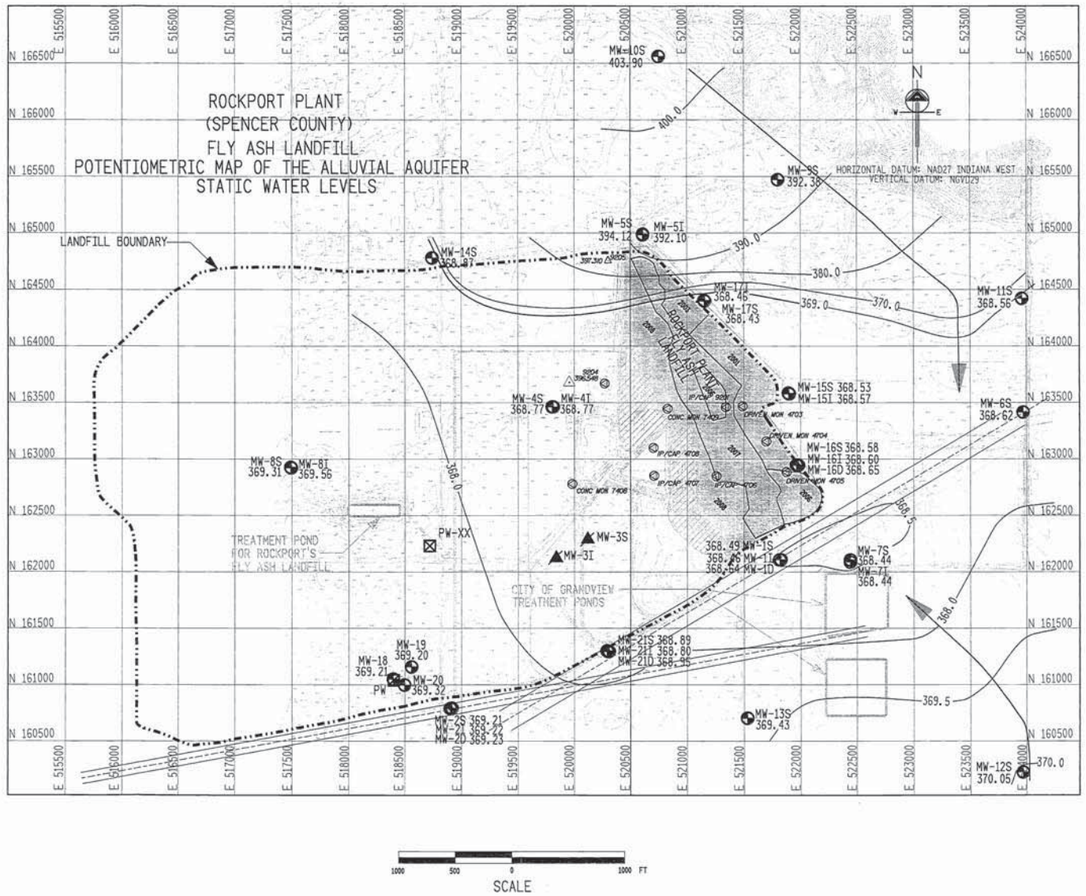
SCALE: AS SHOWN — CIVIL ENGINEERING
DRN: CJY
CHK: JT 9-8
ENGR:
PROJ. ENGR:
DATE: 12-1-10
APPROVED

AEP AMERICAN ELECTRIC POWER
AEP SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

SYSTEM DATE: 12/02/2010
SYSTEM TIME: 01:01:49 PM

DWG. NO. 12-30105

MAY 10, 2011



AMERICAN ELECTRIC POWER
ROCKPORT PLANT FLYASH LANDFILL GROUNDWATER SAMPLING
SAMPLED BY: CAREY SANDERS HANUS
DATE/FIELD CONDITIONS: MAY 12, 2011/CLEAR 72 DEG F, STATIC WATER LEVELS MEASURED MAY 10, 2011.

	WELL NO.	REF. DATUM POINT FT. (A)	** FEET TO STATIC LEVEL (B)	CALC. STATIC LEVEL (C)	*** 3 WELL VOLUMES (GAL)	ACTUAL AMT. PURGED GAL.	FIELD pH (S.U.)	FIELD Temp (Deg F)	FIELD COND (umhos)	TIME OF SAMPLING	NOTES
INTRA WELL	1S	397.29	28.80	368.49	5.9	6.9	7.29	61.9	580	1019	Clear
	1I	397.34	28.88	368.46	17.3	19.1	7.32	66.4	580	1118	Clear
	1D	397.32	28.68	368.64	29.0	31.2	7.31	65.7	557	1018	Clear
	15S	392.62	24.09	368.53	8.9	9.6	7.38	63.2	689	1205	Clear
	15I	392.82	24.25	368.57	20.7	22.8	7.17	62.8	1870	1245	Clear
	16S	394.39	25.81	368.58	7.0	8.5	7.63	63.2	714	1155	Clear
	16I	394.37	25.77	368.60	20.5	21.5	7.54	63.0	662	1306	Clear
	16D	394.49	25.84	368.65	36.1	38.9	7.56	63.0	645	1115	Clear
	17S	395.49	27.06	368.43	7.6	9.6	7.20	63.2	756	1315	Clear
	17I	395.36	26.90	368.46	20.5	22.3	7.14	60.8	1561	1320	Clear
STATIC ONLY	2S	399.24	30.03	369.21							
	2I	399.26	30.04	369.22							
	2D	399.28	30.05	369.23							
	3S	396.81	CLOSED	5-8-08							
	3I	397.05	CLOSED	4-25-11							
	4S	396.58	27.81	368.77	6.5	7.6	7.25	59.1	217.2	718	Clear
	4I	397.02	28.25	368.77	17.9	19.8	7.04	60.8	470.0	745	Clear
	5S	396.00	1.88	394.12	13.7	18.7	7.32	62.0	3110	920	Clear
	5I	392.10	0.00	392.10							
	6S	394.89	26.27	368.62							
	7S	393.66	25.22	368.44							
	7I	393.62	25.18	368.44							
	8S	393.91	24.60	369.31	8.3	10.7	7.62	59.2	526	720	Clear
	8I	393.70	24.14	369.56	20.9	21.9	7.45	60.1	681.5	752	Clear
	9S	403.08	10.70	392.38							
	10S	408.41	4.51	403.90							
	11S	399.98	31.42	368.56							
	12S	403.65	33.60	370.05							
	13S	399.92	30.49	369.43							
	14S	394.68	25.81	368.87							
	18	400.38	31.17	369.21							
	19	401.24	32.04	369.20							
	20	400.52	31.20	369.32							
	21S	400.76	31.87	368.89	2.2	3.5	7.46	61.8	435	818	Clear
	21I	400.63	31.83	368.80	13.3	14.1	7.36	63.3	526	853	Clear
	21D	400.73	31.78	368.95	34.9	36.4	7.53	64.1	581	953	Clear

**STATIC LEVELS ARE TO BE TAKEN ON EACH WELL AT EVERY SAMPLING EVENT (A-B=C)
***CREF. DATUM POINT - FEET TO STATIC LEVEL) *BOTTOM OF WELL ELEV.) X .16 X 3 = 3 WELL VOLUMES (GAL)

LEGEND

- FIELD BENCHMARK (BVCAP 4706)
- MW-8S MONITORING WELL
- 371 POTENTIOMETRIC CONTOUR (BASED ON SHALLOW "S" WELLS)
- DIRECTION OF GROUNDWATER FLOW
- WATER SUPPLY WELL
- CLOSED MONITORING WELL
- LANDFILL BOUNDARY
- TRANSMISSION LINES
- 30" COVER PLACED

REFERENCE DRAWINGS

12-30104	WELL LOCATION PLAN
12-30101	ASH AREA MONITORING WELLS CONSTRUCTION DETAILS TABLE
12-30550	ASH AREA AS BUILT MAPPING

DATE	NO.	DESCRIPTION	APPD.
7/11/11	AB	CLOSED WELL MW-3I. STATIC WATER LEVELS MEASURED MAY 10, 2011.	GFZ
4/5/11	AA	ADDED 2010 AS-BUILT MAPPING.	GFZ
2/20/10	Z	STATIC WATER LEVELS MEASURED NOV. 3, 2010.	GFZ
7/9/10	Y	STATIC WATER LEVELS MEASURED MAY 18, 2010.	PJA
1/7/10	X	DELETED PREVIOUS REVISIONS A THRU W. REVISED TO SHOW STATIC WATER LEVELS MEASURED NOV. 9, 2009.	PJA

REVISIONS

S:/RK/12/Geo_Hydro_Site/30105.dgn

INDIANA MICHIGAN POWER CO
ROCKPORT PLANT
ROCKPORT INDIANA

POTENTIOMETRIC MAP

DWG. NO. 12-30105-AB

SCALE: AS SHOWN | CIVIL ENGINEERING
DR: KH
CH: JT 9-16
ENGR:
PROJ ENGR:
DATE: 12-1-09
APPROVED AS CONSTRUCTED: J. T. Massey-Norton

AEP AMERICAN ELECTRIC POWER
AEP SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

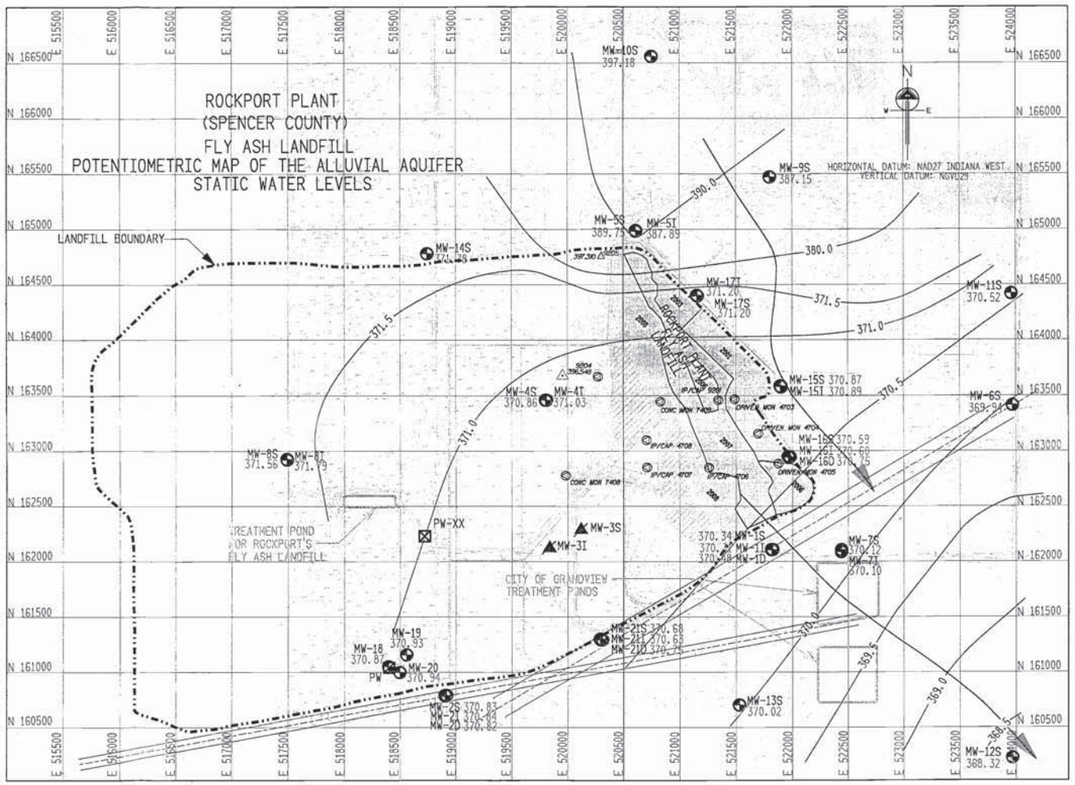
74-02

RECEIVED
JUL 12 2011
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
OFFICE OF LAND QUALITY

DRAWING NUMBER: 12-30105

CROSS REFS:

NOVEMBER 8, 2011



AMERICAN ELECTRIC POWER
ROCKPORT PLANT FLYASH LANDFILL GROUNDWATER SAMPLING
SAMPLED BY:CAREY SANDERS HAHUS
DATE/FIELD CONDITIONS: NOV. 10,2011/SUNNY, WINDY, 48 DEG F, STATIC WATER LEVELS MEASURED NOV. 8, 2011.

	WELL NO.	REF. DATUM POINT FT. (A)	** FEET TO STATIC LEVEL (B)	CALC. STATIC LEVEL (C)	*** 3 WELL VOLUMES (GAL)	ACTUAL AMT. PURGED GAL.	FIELD pH (S.U.)	FIELD Temp (Deg F)	FIELD COND (umhos)	TIME OF SAMPLING	NOTES
INTRA WELL	1S	397.29	26.95	370.34	6.8	8.2	7.58	57.2	630.7	939	Clear
	1I	397.34	27.03	370.31	18.1	20.5	7.21	58.1	536.6	1006	Clear
	1D	397.32	26.84	370.48	29.9	34.8	7.34	58.1	573.7	1043	Clear
	1SS	392.62	21.75	370.87	10.0	10.5	7.30	57.9	690	1204	Clear
	1SI	392.82	21.93	370.89	21.8	23.8	7.26	57.3	1805	1245	Clear
	16S	394.39	23.80	370.59	8.0	8.5	7.50	58.3	644	1033	Clear
	16I	394.37	23.77	370.60	21.5	22.8	7.71	58.0	648	1112	Clear
	16D	394.49	23.74	370.75	37.1	40.8	7.66	57.6	649	1136	Clear
	17S	395.49	24.29	371.20	8.9	9.2	7.28	56.3	789	1250	Clear
	17I	395.36	24.16	371.20	21.8	22.3	7.35	55.8	1428	1318	Clear
STATIC ONLY	2S	399.24	28.41	370.83							
	2I	399.26	28.42	370.84							
	2D	399.28	28.46	370.82							
	3S	396.81	CLOSED	5-8-08							
	3I	397.05	CLOSED	4-25-11							
	4S	396.58	25.72	370.86	7.5	8.2	6.30	56.5	225	831	Clear
	4I	397.02	25.99	371.03	19.0	19.4	7.21	55.6	505.9	858	Clear
	5S	396.00	6.25	389.75	11.6	15.6	7.39	57.2	2286	953	Clear
	5I	392.10	4.21	387.89							
	6S	394.89	24.95	369.94							
	7S	393.66	23.54	370.12							
	7I	393.62	23.52	370.10							
	8S	393.91	22.35	371.56	9.3	13.6	7.03	56.7	538.5	835	Clear
	8I	393.70	21.91	371.79	21.9	24.1	7.41	56.8	698.2	852	Clear
	9S	403.08	15.93	387.15							
	10S	408.41	11.23	397.18							
	11S	399.98	29.46	370.52							
	12S	403.65	35.33	368.32							
	13S	399.92	29.90	370.02							
	14S	394.68	22.90	371.78							
	18	400.38	29.51	370.87							
	19	401.24	30.31	370.93							
	20	400.52	29.58	370.94							
	21S	400.76	30.08	370.68	3.1	3.6	7.53	57.4	540.9	1145	Clear
	21I	400.63	30.00	370.63	14.2	14.8	7.71	57.5	499.6	1125	Clear
	21D	400.73	29.98	370.75	35.8	38.0	7.61	56.5	595.8	1220	Clear

**STATIC LEVELS ARE TO BE TAKEN ON EACH WELL AT EVERY SAMPLING EVENT (A-B=C)
***CDREF, DATUM POINT - FEET TO STATIC LEVEL) -BOTTOM OF WELL ELEV.) X .16 X 3 = 3 WELL VOLUMES (GAL)

LEGEND

- FIELD BENCHMARK
- MW-8S — MONITORING WELL
- 371 — POTENTIOMETRIC CONTOUR (BASED ON SHALLOW "S" WELLS)
- DIRECTION OF GROUNDWATER FLOW
- WATER SUPPLY-WELL
- CLOSED MONITORING WELL
- LANDFILL BOUNDARY
- TRANSMISSION LINES
- 30" COVER PLACED

REFERENCE DRAWINGS

12-30104	WELL LOCATION PLAN
12-30T01	ASH AREA MONITORING WELLS CONSTRUCTION DETAILS TABLE
12-30550	ASH AREA AS-BUILT MAPPING

RECEIVED
JAN 05 2012
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT OFFICE OF LAND QUALITY

DATE	NO.	DESCRIPTION	APPD.
120911	BC	STATIC WATER LEVELS MEASURED NOV. 10, 2010.	JAN GFC

REVISIONS

THIS DRAWING IS CLASSIFIED AS:
AEP PUBLIC
REFERENCE AEP's CORPORATE INFORMATION SECURITY POLICY

INDIANA MICHIGAN POWER COMPANY
ROCKPORT PLANT
ROCKPORT INDIANA
GEOTECHNICAL
POTENTIOMETRIC MAP

UNIT	DRAWING NUMBER	REV
12	30105	ac

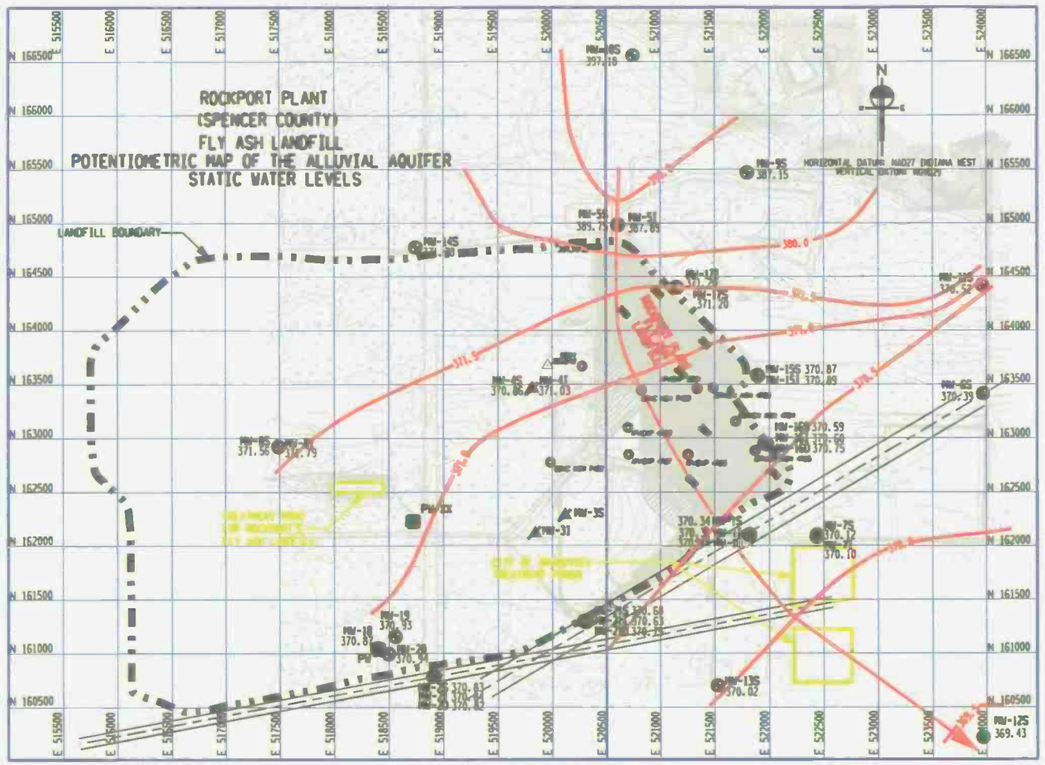
SCALE: AS SHOWN — CIVIL ENGINEERING
DR: GV
DN: JT 11-6
SUR:
ENG:
DATE: SEE REV'D
APPROVED BY: J.T. Massey-Norton

AEP AMERICAN ELECTRIC POWER
AEP SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

74-02
AI 100126
Spencer Co.

CROSS REFS:

MAY 7, 2012



AMERICAN ELECTRIC POWER
ROCKPORT PLANT FLYASH LANDFILL GROUNDWATER SAMPLING
SAMPLED BY: CAREY SANDERS HANUS
DATE/FIELD CONDITIONS: 8AM 6, 2012/SUNNY, 70 DEG F, STATIC WATER LEVELS MEASURED MAY 7, 2012.

	WELL NO.	REF. DATUM POINT FT. (A)	** FEET TO STATIC LEVEL (B)	CALC. STATIC LEVEL (C)	*** 3 WELL VOLUMES (GAL)	ACTUAL AMT. PURGED GAL.	FIELD pH (S.U.)	FIELD Temp (Deg F)	FIELD COND (umhos)	TIME OF SAMPLING	NOTES
INTRAWELL	1S	397.29	26.72	370.57	6.9	11.0	7.28	60.7	613	1033	Clear
	1I	397.34	26.80	370.54	18.3	22.0	7.44	60.0	521	1100	Clear
	1D	397.32	26.62	370.70	30.0	1.2	7.27	59.7	550	1131	Clear
	15S	392.62	21.62	371.00	10.1	11.5	7.28	60.6	700	1139	Clear
	15I	392.82	21.81	371.01	21.8	23.0	7.28	59.4	1793	1157	Clear
	16S	394.39	23.55	370.84	6.1	10.1	7.49	61.7	665	1058	Clear
	16I	394.37	23.54	370.83	21.6	23.4	7.60	51.5	632	1119	Clear
	16D	394.49	23.59	370.90	37.1	39.0	4.54	60.9	627	1028	Clear
	17S	395.49	24.28	371.21	6.9	11.0	7.27	59.9	759	1218	Clear
	17I	395.36	24.11	371.25	21.8	23.0	7.17	59.4	1397	1226	Clear
STATIC ONLY	2S	399.24	28.30	370.94							
	2I	399.26	28.30	370.96							
	2D	399.28	28.33	370.95							
	3S	396.81	CLOSED	5-8-08							
	3I	397.05	CLOSED	4-25-11							
	4S	396.58	CLOSED	4-17-12							
	4I	397.02	CLOSED	4-17-12							
	5S	396.00	4.54	391.46	12.5	16.1	7.67	61.2	2177	1002	Clear
	5I	392.10	2.55	389.55							
	6S	394.89	24.50	370.39							
	7S	393.66	23.25	370.41							
	7I	393.62	23.21	370.41							
	8S	393.91	22.45	371.46	9.3	12.1	7.82	58.7	479	852	Clear
	8I	393.70	22.00	371.70	21.9	23.2	7.51	59.9	664	926	Clear
	9S	403.08	14.47	388.61							
	10S	408.41	7.23	401.18							
	11S	399.98	29.23	370.75							
	12S	403.65	34.22	369.43							
	13S	399.92	29.41	370.51							
	14S	394.68	23.08	371.60							
	18	400.38	29.34	371.04							
	19	401.24	30.25	370.99							
	20	400.52	29.48	371.04							
	21S	400.76	29.95	370.81	3.1	3.6	7.43	60.3	453	1154	Clear
	21I	400.63	29.90	370.73	14.2	16.5	7.56	60.0	526	1254	Clear
	21D	400.73	29.88	370.85	35.8	38.0	7.69	62.5	546	1325	Clear

*STATIC LEVELS ARE TO BE TAKEN ON EACH WELL AT EVERY SAMPLING VISIT (4-QTR)
**(REF. DATUM POINT - FEET TO STATIC LEVEL) =BOTTOM OF WELL ELEV.) 3 X .65 X 3 = 3 WELL VOLUMES (GAL)

LEGEND

- SPOT ELEVATION
- INTERMEDIATE CONTOUR
- INDEX CONTOUR
- DEPRESSION CONTOUR
- INDEX AND BASELINE
- STRUCTURE AND BUILDING
- FENCE
- POLE
- GUARD
- EDGE OF WATER
- MANHOLES / CATCH BASIN
- POWER POLE
- PIPES
- MINOR
- FIELD BOUNDARY
- MONITORING WELL
- PIEZOMETER OR OTHER GROUNDWATER MONITORING WELLS
- DIRECTION OF GROUNDWATER FLOW
- WATER SUPPLY WELL
- CLOSED MONITORING WELL
- LANDFILL BOUNDARY
- PROPERTY LINES
- 20' CONTOUR

REFERENCE DRAWINGS

12-30097A	BASELINE GROUND WATER QUALITY & POTENTIOMETRIC ELEVATIONS FOR 9/10/05
12-30550	ASH AREA AS BUILT MAPPING
12-30100	ASH AREA BORING LOCATION PLAN ACTIVE FILL AREA 1993
12-30101	ASH AREA MONITORING WELLS CONSTRUCTION DETAILS TABLE
12-30104	WELL LOCATION PLAN

NO.	DESCRIPTION	APVD
ad	STATIC WATER LEVELS MEASURED MAY 9, 2012. CLOSED MONITORING WELL MW-4S & MW-4I. UPDATED REFERENCES.	

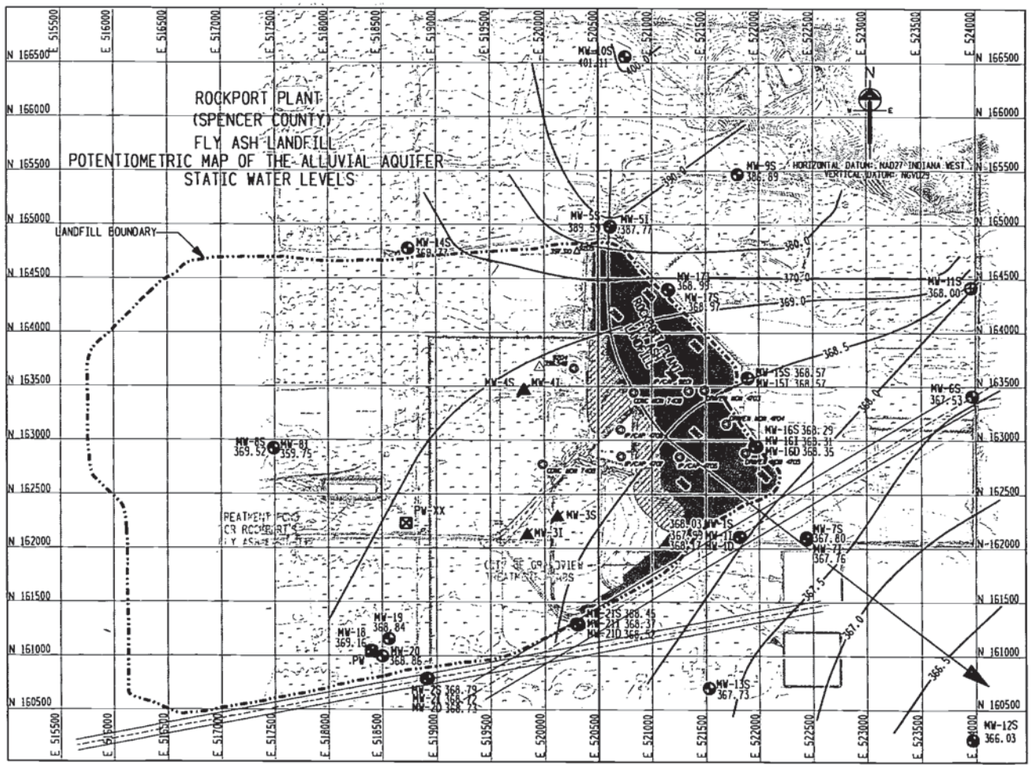
REVISIONS

AEP PUBLIC

INDIANA MICHIGAN POWER COMPANY
ROCKPORT PLANT
ROCKPORT INDIANA
GEOTECHNICAL
POTENTIOMETRIC MAP

DRAWING NUMBER: 12-30105 ad
SCALE: 1" = 500'
DR. KM
DES. JJM
CHK.
DATE: SEE REV'S
CIVIL ENGINEERING
J. J. Massey-Norton
AEP SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

NOVEMBER 5, 2012



AMERICAN ELECTRIC POWER
ROCKPORT PLANT FLYASH LANDFILL GROUNDWATER SAMPLING
SAMPLED BY: CAREY SANDERS HAHUS
DATE/FIELD CONDITIONS: NOV 7, 2012/CLOUDY, WINDY, COOL 58 DEG F, STATIC WATER LEVELS MEASURED NOV 5, 2012.

	WELL NO.	REF. DATUM POINT FT. (A)	** FEET TO STATIC LEVEL (B)	CALC. STATIC LEVEL (C)	*** 3 WELL VOLUMES (GAL)	ACTUAL AMT. PURGED GAL.	FIELD pH (S.U.)	FIELD Temp (Deg F)	FIELD COND (umhos)	TIME OF SAMPLING	NOTES
INTRA WELL	1S	397.29	29.26	368.03	5.7	8.2	8.18	57.2	637	1024	Clear
	1I	397.34	29.35	367.99	17.0	19.4	8.04	24.3	529	955	Clear
	1D	397.32	29.15	368.17	28.8	32.7	8.00	56.7	552	1030	Clear
	1SS	392.62	24.05	368.57	8.9	11.8	7.21	57.5	719	1107	Clear
	1SI	392.82	24.25	368.57	20.7	24.6	7.24	57.5	1485	1102	Clear
	16S	394.39	26.10	368.29	6.9	9.0	7.42	59.0	684	1002	Clear
	16I	394.37	26.06	368.31	20.4	28.5	7.54	59.0	650	935	Clear
	16D	394.49	26.14	368.35	35.9	37.8	7.58	58.5	627	954	Clear
	17S	395.49	26.52	368.97	7.9	9.0	7.22	57.5	816	1149	Clear
	17I	395.36	26.37	368.99	20.7	21.8	7.13	57.0	1393	1223	Clear
STATIC	2S	399.24	30.45	368.79							
	2I	399.26	30.54	368.72							
	2D	399.28	30.55	368.73							
	3S	396.81	CLOSED	5-8-08							
	3I	397.05	CLOSED	4-25-11							
	4S	396.58	CLOSED	4-17-12							
	4I	397.02	CLOSED	4-17-12							
	5S	396.00	6.41	389.59	11.6	15.1	7.44	58.5	2100	922	Clear
	5I	392.10	4.33	387.77							
	6S	394.89	27.36	367.53							
	7S	393.66	25.86	367.80							
	7I	393.62	25.86	367.76							
	8S	393.91	24.39	369.52	8.4	13.1	7.87	54.5	545	841	Clear
	8I	393.70	33.95	359.75	16.1	19.3	7.96	52.8	642	846	Clear
	9S	403.08	16.19	386.89							
	10S	408.41	7.30	401.11							
	11S	399.98	31.98	368.00							
	12S	403.65	37.62	366.03							
	13S	399.92	32.19	367.73							
	14S	394.68	24.91	369.77							
	18	400.38	31.22	369.16							
	19	401.24	32.40	368.84							
	20	400.52	31.66	368.86							
	21S	400.76	32.31	368.45	2.0	8.5	7.69	54.3	482	1105	Clear
	21I	400.63	32.26	368.37	13.1	14.8	7.92	57.3	530	1121	Clear
	21D	400.73	32.21	368.52	34.7	35.6	7.89	57.0	579	1237	Clear

**=STATIC LEVELS ARE TO BE TAKEN ON EACH WELL AT EVERY SAMPLING EVENT (A-B=C)
***=(CASE, DATUM POINT - FEET TO STATIC LEVEL) =BOTTOM OF WELL ELEV.) X .16 X 3 = 3 WELL VOLUMES (GAL)

7402

LEGEND

- x505.5 SPOT ELEVATION
- 505 INTERMEDIATE CONTOUR
- 505 INDEX CONTOUR
- DEPRESSION CONTOUR
- TREES AND TREELINE
- STRUCTURE AND BUILDING
- FENCE
- POLE
- ROADS
- EDGE OF WATER
- MANHOLES / CATCH BASIN
- POWER POLE
- PIPES
- TOWER
- FIELD BENCHMARK
- MONITORING WELL
- 337 POTENTIOMETRIC CONTOUR (BASED ON SHALLOW "S" WELLS)
- DIRECTION OF GROUNDWATER FLOW
- WATER SUPPLY WELL
- CLOSED MONITORING WELL
- LANDFILL BOUNDARY
- TRANSMISSION LINES
- 30" COVER PLACED

REFERENCE DRAWINGS

12-30097A	BASELINE GROUND WATER QUALITY & POTENTIOMETRIC ELEVATIONS FOR 9/10/85
12-30550	ASH AREA AS BUILT MAPPING
12-30100	ASH AREA BORING LOCATION PLAN ACTIVE FILL AREA 1993
12-30101	ASH AREA MONITORING WELLS CONSTRUCTION DETAILS TABLE
12-30104	WELL LOCATION PLAN

DATE	NO.	DESCRIPTION	APPD.
12/05/12	AE	STATIC WATER LEVELS MEASURED NOV. 5, 2012.	

REVISIONS

THIS DRAWING IS CLASSIFIED AS:

AEP PUBLIC

REFERENCE AEP'S CORPORATE INFORMATION SECURITY POLICY

INDIANA MICHIGAN POWER COMPANY

ROCKPORT PLANT

ROCKPORT — INDIANA

GEOTECHNICAL

POTENTIOMETRIC MAP

UNIT:	DRAWING NUMBER:	REV:
12	30105	AE

SCALE: AS SHOWN — CIVIL ENGINEERING

DR: KJ
CH: JT
SUP:
ENG:
DATE: SEE REV'S

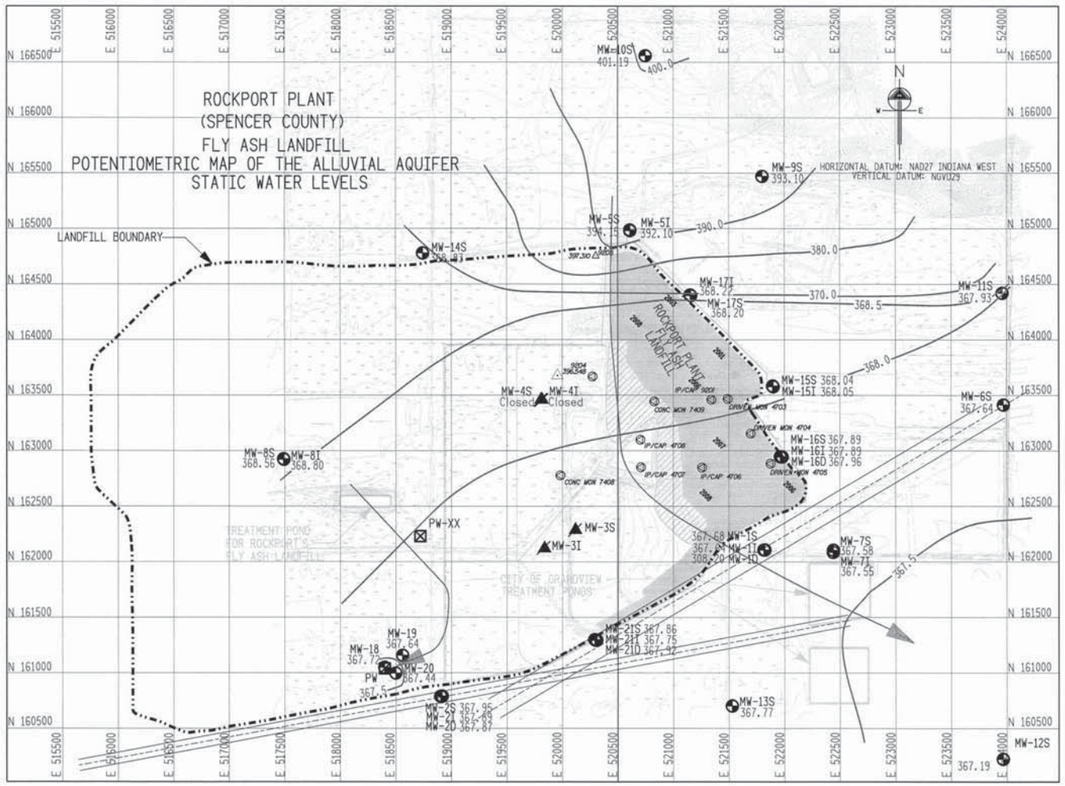
APPROVED BY: J. T. Murray-Nolan

AMERICAN ELECTRIC POWER
AEP SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

CROSS REFS:

DRAWING NUMBER: 12-30105

MAY 13, 2013



AMERICAN ELECTRIC POWER
ROCKPORT PLANT FLYASH LANDFILL GROUNDWATER SAMPLING
SAMPLED BY:CAREY SANDERS HAAGS
DATE/FIELD CONDITIONS: MAY 10,2013/SUNNY, WARM 80 DEG F, STATIC WATER LEVELS MEASURED MAY 13, 2013.

	WELL NO.	REF. DATUM POINT FT. (A)	** FEET TO STATIC LEVEL (B)	CALC. STATIC LEVEL (C)	*** 3 WELL VOLUMES (GAL)	ACTUAL AMT. PURGED GAL.	FIELD pH (S.U.)	FIELD Temp (Deg F)	FIELD COND (umhos)	TIME OF SAMPLING	NOTES
INTRA WELL	1S	397.29	29.61	367.68	5.6	6.3	7.28	60.2	622	917	Clear
	1I	397.34	29.70	367.64	16.9	20.9	7.53	60.0	528	1026	Clear
	1D	397.32	29.50	367.82	28.6	31.9	7.58	59.6	546	1033	Clear
	15S	392.62	24.58	368.04	8.7	8.7	7.17	59.0	727	1128	Clear
	15I	392.82	24.77	368.05	20.4	21.2	7.21	58.7	1675	1134	Clear
	16S	394.39	26.50	367.89	6.7	7.5	7.39	60.5	682	949	Clear
	16I	394.37	26.48	367.89	20.2	21.3	7.67	60.0	657	1048	Clear
	16D	394.49	26.53	367.96	35.7	36.8	7.47	59.5	636	1057	Clear
	17S	395.49	27.29	368.20	7.5	7.9	7.31	58.4	778	1208	Clear
	17I	395.36	24.14	368.22	20.4	21.1	7.23	58.2	1411	1200	Clear
STATIC ONLY	2S	399.24	31.29	367.95	5.1	5.7	7.58	59.0	382.5	1108	Clear
	2I	399.26	31.37	367.89	16.1	16.4	8.00	58.90	481.3	1156	Clear
	2D	399.28	31.41	367.87	28.1	29.6	7.73	58.4	591.7	1208	Clear
	3S	396.81	CLOSED	5/8/2008							
	3I	397.05	CLOSED	4/25/2011							
	4S	396.58	CLOSED	4/17/2012							
	4I	397.02	CLOSED	4/17/2012							
	5S	396.00	1.85	394.15	13.8	17.9	7.59	59.5	2970	1010	Clear
	5I	392.10	0.00	392.10							
	6S	394.89	27.25	367.64							
	7S	393.66	26.08	367.58							
	7I	393.62	26.07	367.55							
	8S	393.91	25.35	368.56	7.9	11.1	7.66	58.5	586	850	Clear
	8I	393.70	24.90	368.80	20.5	21.2	7.55	58.5	622	910	Clear
	9S	403.08	11.14	393.10							
	10S	408.41	7.22	401.19							
	11S	399.98	32.05	367.93							
	12S	403.65	36.46	367.19							
	13S	399.92	32.15	367.77							
	14S	394.68	25.85	368.83							
	18	400.38	32.66	367.72							
	19	401.24	33.60	367.64							
	20	400.52	33.08	367.44							
	21S	400.76	32.90	367.86	1.7	1.8	8.04	59.7	505	1215	Clear
	21I	400.63	32.88	367.75	12.8	13.2	7.53	59.8	531	1258	Clear
	21D	400.73	32.81	367.92	34.4	37.0	7.86	59.3	577	1350	Clear

**STATIC LEVELS ARE TO BE TAKEN ON EACH WELL AT EVERY SAMPLING EVENT (A-B=C)
***(REF. DATUM POINT - FEET TO STATIC LEVEL) -BOTTOM OF WELL ELEV.) X .16 X 3 = 3 WELL VOLUMES (GAL)

LEGEND

- SPOT ELEVATION
- INTERMEDIATE CONTOUR
- INDEX CONTOUR
- DEPRESSION CONTOUR
- TREES AND TREELINE
- STRUCTURE AND BUILDING
- FENCE
- POLE
- ROADS
- EDGE OF WATER
- MANHOLES / CATCH BASIN
- POWER POLE
- PIPES
- TOWER
- FIELD BENCHMARK
- MONITORING WELL
- POTENTIOMETRIC CONTOUR (BASED ON SHALLOW "S" WELLS)
- DIRECTION OF GROUNDWATER FLOW
- WATER SUPPLY WELL
- CLOSED MONITORING WELL
- LANDFILL BOUNDARY
- TRANSMISSION LINES
- 30" COVER PLACED

REFERENCE DRAWINGS

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12-30100	ASH AREA BORING LOCATION PLAN ACTIVE FILL AREA 1993
12-30101	ASH AREA MONITORING WELLS CONSTRUCTION DETAILS TABLE
12-30104	WELL LOCATION PLAN

DATE	NO.	DESCRIPTION	APPD.
07/02/13	AF	STATIC WATER LEVELS MEASURED MAY 13, 2013.	JMN GFD

REVISIONS

THIS DRAWING IS CLASSIFIED AS:

AEP PUBLIC

REFERENCE AEP's CORPORATE INFORMATION SECURITY POLICY

INDIANA MICHIGAN POWER COMPANY

ROCKPORT PLANT

ROCKPORT INDIANA

GEOTECHNICAL

POTENTIOMETRIC MAP

UNIT:	DRAWING NUMBER:	REV:
12	30105	AF

SCALE: AS SHOWN — CIVIL ENGINEERING
DR: KRJ
CH: JT W-N
SUP:
ENG:
DATE: SEE REV 0
APPROVED BY: J. T. Massey-Norton

AEP AMERICAN ELECTRIC POWER

AEP SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

CROSS REFS:

12-30105

Appendix D-3

Landfill Piezometric Data

Appendix D-3
Landfill Monitoring Well Piezometric Data
AEP Rockport Plant, Indiana

Well ID	1S	1I	1D	2S	2I	2D	3S	3I
Min	365.88	365.84	365.89	366.86	366.94	366.96	366.81	366.84
Max	371.54	371.48	371.53	370.94	370.96	370.95	370.69	370.7
Date								
11/18/1992								
5/5/1995								
11/28/1995								
6/6/1996								
11/12/1998					370.09	370.09		
5/27/1999	368.88	368.90	368.90					
11/17/1999		367.13	367.17					
5/10/2000	366.90	366.85	366.91	367.59	367.59	367.59	367.29	367.35
11/8/2000	366.32	365.84	366.33	366.86	366.94	366.96	366.81	366.84
12/29/2000					366.94			
5/8/2001	366.57	366.54	366.57	367.15	367.17	367.14	366.92	367.00
5/29/2001								
11/7/2001	365.88	365.84	365.89					
11/13/2001								
5/29/2002	367.39	367.64	367.70					
8/1/2002								
11/13/2002	367.78	367.75	367.78					
5/14/2003	368.62	368.62	368.63					
11/6/2003	369.39	369.35	369.41					
5/19/2004	370.48	370.44	370.47	370.84	370.85	370.85	370.69	370.70
11/9/2004	370.02	369.99	370.03					
5/17/2005	371.54	371.48	371.53					
11/8/2005	369.15	369.13	369.16	369.74	369.75	369.73	369.70	369.74
5/9/2006	367.99	367.94	368.27					
11/8/2006	367.24	367.20	367.25					
5/9/2007	369.19	369.15	369.20					
11/12/2007	367.68	367.65	367.71	368.24				
5/6/2008	369.68	369.62	369.65					
11/20/2008	369.12	369.07	369.12					
5/20/2009	368.02	368.00	368.04					
7/14/2009								
9/9/2009								
11/10/2009	367.62	367.59	367.74					
1/19/2010								
3/17/2010								
5/18/2010	368.34	368.30	368.47					
11/3/2010	367.54	367.51	367.69					
1/4/2011								
1/10/2011								
1/17/2011								
2/8/2011								
2/14/2011								
3/2/2011								
3/22/2011								
5/12/2011	368.49	368.46	368.64					
11/10/2011	370.34	370.31	370.48					
5/8/2012	370.57	370.54	370.70	370.94	370.96	370.95		
11/7/2012	368.03	367.99	368.17	368.72	368.72	368.73		
5/16/2013	367.68	367.64	367.82	367.88	367.89	367.87		
8/21/2013				368.49	368.48	368.46		
11/4/2013	367.46	367.40	367.59	367.74	367.74	367.73		
1/20/2014				367.52	367.49	367.52		
5/7/2014	368.37	368.35	368.52	368.34	368.21	368.23		
11/11/2014	367.98	367.95	368.13	368.28	368.28	368.29		
5/5/2015	367.59	367.55	367.73	368.25	368.21	368.20		

Note: Elevations in feet above Mean Sea Level (MSL, equivalent to NGVD29)

Appendix D-3
Landfill Monitoring Well Piezometric Data
AEP Rockport Plant, Indiana

Well ID	4S	4I	5S	5I	6S	7S	7I	8S
Min	366.52	366.5	388.8	387.63	365.95	366.15	366.31	367.1
Max	371.89	371.86	394.52	392.9	370.65	370.41	371.9	371.56
Date								
11/18/1992								
5/5/1995								
11/28/1995								
6/6/1996								
11/12/1998	370.28	370.26	390.41					370.87
5/27/1999	369.35	369.47	392.50					370.05
11/17/1999	367.99	367.99	389.20					368.71
5/10/2000	367.39	367.40	392.93	391.00	366.61	366.79	366.78	368.06
11/8/2000	367.05	367.04	391.56	389.63	365.95	366.15	366.31	367.70
12/29/2000								
5/8/2001	367.13	367.13	392.11	390.34	366.33	366.41	366.40	367.72
5/29/2001								
11/7/2001	366.52	366.50	391.51					367.10
11/13/2001								
5/29/2002	368.01	368.00	393.72					368.58
8/1/2002								
11/13/2002	368.40	368.42	390.96					368.91
5/14/2003	368.98	368.98	394.52					369.53
11/6/2003	369.92	369.90	390.61					370.32
5/19/2004	370.76	370.78	393.85	391.95	370.65	370.37	370.35	371.21
11/9/2004	370.96	370.65		390.87				371.20
5/17/2005	371.89	371.86		392.90			371.90	
11/8/2005	369.97	369.97	389.50	387.63	368.75	368.98	368.94	370.61
5/9/2006	368.45	368.45	393.30					369.02
11/8/2006	367.66	367.64	394.29					368.17
5/9/2007	369.37	369.38	392.90					369.81
11/12/2007	368.44	368.47	389.40					369.45
5/6/2008	369.68	368.69	392.81					370.22
11/20/2008	369.85	369.87	389.49					370.50
5/20/2009	368.58	368.59	394.29					369.24
7/14/2009								
9/9/2009								
11/10/2009	368.28	368.31	393.55					368.91
1/19/2010								
3/17/2010								
5/18/2010	368.76	368.76	393.09					369.29
11/3/2010	368.22	368.23	388.80					368.66
1/4/2011								
1/10/2011								
1/17/2011								
2/8/2011								
2/14/2011								
3/2/2011								
3/22/2011								
5/12/2011	368.77	368.77	394.12					369.31
11/10/2011	370.86	371.03	389.75					371.56
5/8/2012			391.46	389.55	370.39	370.41	370.41	371.46
11/7/2012			389.59	387.77	367.53	367.80	367.76	369.52
5/16/2013				392.10	367.64	367.58	367.55	368.56
8/21/2013								
11/4/2013			390.76	388.96	367.33	367.32	367.29	368.23
1/20/2014								
5/7/2014			394.43					368.59
11/11/2014			390.60					368.84
5/5/2015			393.54					368.34

Appendix D-3
Landfill Monitoring Well Piezometric Data
AEP Rockport Plant, Indiana

Well ID	8I	9S	10S	11S	12S	13S	14S	15S
Min	367.23	386.89	400.09	366.33	364.85	366.2	367.85	366.24
Max	372.48	393.1	402.92	370.75	370.05	370.56	371.6	371.76
Date								
11/18/1992				368.96				
5/5/1995								
11/28/1995								
6/6/1996								
11/12/1998	371.00							
5/27/1999	370.20							369.18
11/17/1999	368.85							367.58
5/10/2000	368.25	390.35	400.79	366.76	366.59	367.15	368.05	367.11
11/8/2000	367.85	389.11	400.09	366.33	364.85	366.20	367.85	366.75
12/29/2000								
5/8/2001	367.96	390.01	400.65	366.65	365.75	366.62	367.90	366.86
5/29/2001								367.88
11/7/2001	367.23							366.24
11/13/2001								368.21
5/29/2002	368.76							367.88
8/1/2002								369.23
11/13/2002	369.09							368.21
5/14/2003	369.70							368.87
11/6/2003	370.49							369.82
5/19/2004	371.38	391.89	402.92	370.67	370.05	370.56	371.29	370.82
11/9/2004	371.34							370.40
5/17/2005	372.48							371.76
11/8/2005	370.79	387.77	402.81	369.32	367.11	368.87	370.95	369.65
5/9/2006	369.19							368.29
11/8/2006	368.33							367.54
5/9/2007	369.96							369.38
11/12/2007	369.18							368.14
5/6/2008	370.38							369.67
11/20/2008	370.65							369.63
5/20/2009	369.40							368.37
7/14/2009								
9/9/2009								
11/10/2009	369.09							368.07
1/19/2010								
3/17/2010								
5/18/2010	369.45							368.64
11/3/2010	369.03							368.07
1/4/2011								
1/10/2011								
1/17/2011								
2/8/2011								
2/14/2011								
3/2/2011								
3/22/2011								
5/12/2011	369.56				370.05			368.53
11/10/2011	371.79				368.32			370.87
5/8/2012	371.70	388.61	401.18	370.75	369.43	370.51	371.60	371.00
11/7/2012		386.89	401.11	368.00	366.03	367.73	369.77	368.57
5/16/2013	368.80	393.10	401.19	367.93	367.19	367.77	368.83	368.04
8/21/2013								
11/4/2013	368.65	388.04	401.18	367.78	365.97	367.26	368.70	367.99
1/20/2014								
5/7/2014	368.89							368.69
11/11/2014	369.14							368.56
5/5/2015	368.62							367.86

Appendix D-3
Landfill Monitoring Well Piezometric Data
AEP Rockport Plant, Indiana

Well ID	15I	16S	16I	16D	17S	17I	18	19
Min	366.25	366.09	366.11	366.14	366.55	366.56	367.64	367.64
Max	371.79	371.73	371.75	370.9	371.88	371.25	367.72	367.79
Date								
11/18/1992								
5/5/1995			368.02					
11/28/1995		368.30	368.33	368.33	368.84	368.85		
6/6/1996						369.66		
11/12/1998								
5/27/1999	369.16	369.08	369.08	369.11	369.41	369.42		
11/17/1999	367.65	367.38	367.38	367.44	367.97	367.98		
5/10/2000	367.12	367.05	367.06	367.10	367.23	367.27		
11/8/2000	366.76	366.58	366.62	366.61	367.08	367.05		
12/29/2000								
5/8/2001	366.88	366.76	366.77	366.79	367.08	367.05		
5/29/2001								
11/7/2001	366.25	366.09	366.11	366.14	366.55	366.56		
11/13/2001								
5/29/2002	367.90	367.86	367.92	367.94	367.92	367.91		
8/1/2002	369.25			369.23		369.26		
11/13/2002	368.22	368.04	367.98	368.09	368.50	368.51		
5/14/2003	368.90	368.85	368.83	368.90	368.95	368.98		
11/6/2003	369.86	369.70	369.64	369.72	370.04	370.08		
5/19/2004	370.73	370.67	370.71	370.74	370.84	370.81		
11/9/2004	370.45	370.28	370.28	370.34	370.69	370.71		
5/17/2005	371.79	371.73	371.75	370.80	371.88			
11/8/2005	369.68	369.43	369.44	369.49	370.06	370.06		
5/9/2006	368.33	368.20	368.19	368.24	368.49	368.52		
11/8/2006	367.57	367.49	367.43	367.50	367.74	367.76		
5/9/2007	369.42	369.34	369.39	369.48	369.42	369.44		
11/12/2007	368.18	367.98	367.97	368.04	368.54	368.55		
5/6/2008	369.67	369.80	369.82	369.84	369.59			
11/20/2008	369.65	369.40	369.34	369.45	369.98	369.95		
5/20/2009	368.42	368.25	368.26	368.32	368.64	368.65		
7/14/2009								
9/9/2009								
11/10/2009	368.10	367.88	367.86	367.93	368.49	368.51		
1/19/2010								
3/17/2010								
5/18/2010	368.68	368.55	368.57		368.84	368.86		
11/3/2010	368.06	367.83	367.83	367.90	368.46	368.46		
1/4/2011				367.15				
1/10/2011				367.03				
1/17/2011		366.99	366.98	367.03				
2/8/2011		366.58	366.59	366.63				
2/14/2011		366.59	366.59	366.64				
3/2/2011		366.40	366.41	366.46				
3/22/2011		366.79	366.79	366.84				
5/12/2011	368.57	368.58	368.60	368.65	368.43	368.46		
11/10/2011	370.89	370.59	370.60	370.75	371.20	371.20		
5/8/2012	371.01	370.84	370.83	370.90	371.21	371.25		
11/7/2012	368.57	368.29	368.31	368.35	368.97	368.99		
5/16/2013	368.05		367.89	367.96	368.20	368.22	367.72	367.64
8/21/2013								
11/4/2013	367.98	367.73	367.75	367.82	368.35	368.27	367.64	367.79
1/20/2014								
5/7/2014	368.68	368.61	368.63	368.69	368.81	368.81		
11/11/2014	368.57	368.29	368.30	368.38	368.94	368.94		
5/5/2015	367.83	367.77		367.84	367.87	367.87		

Appendix D-3
Landfill Monitoring Well Piezometric Data
AEP Rockport Plant, Indiana

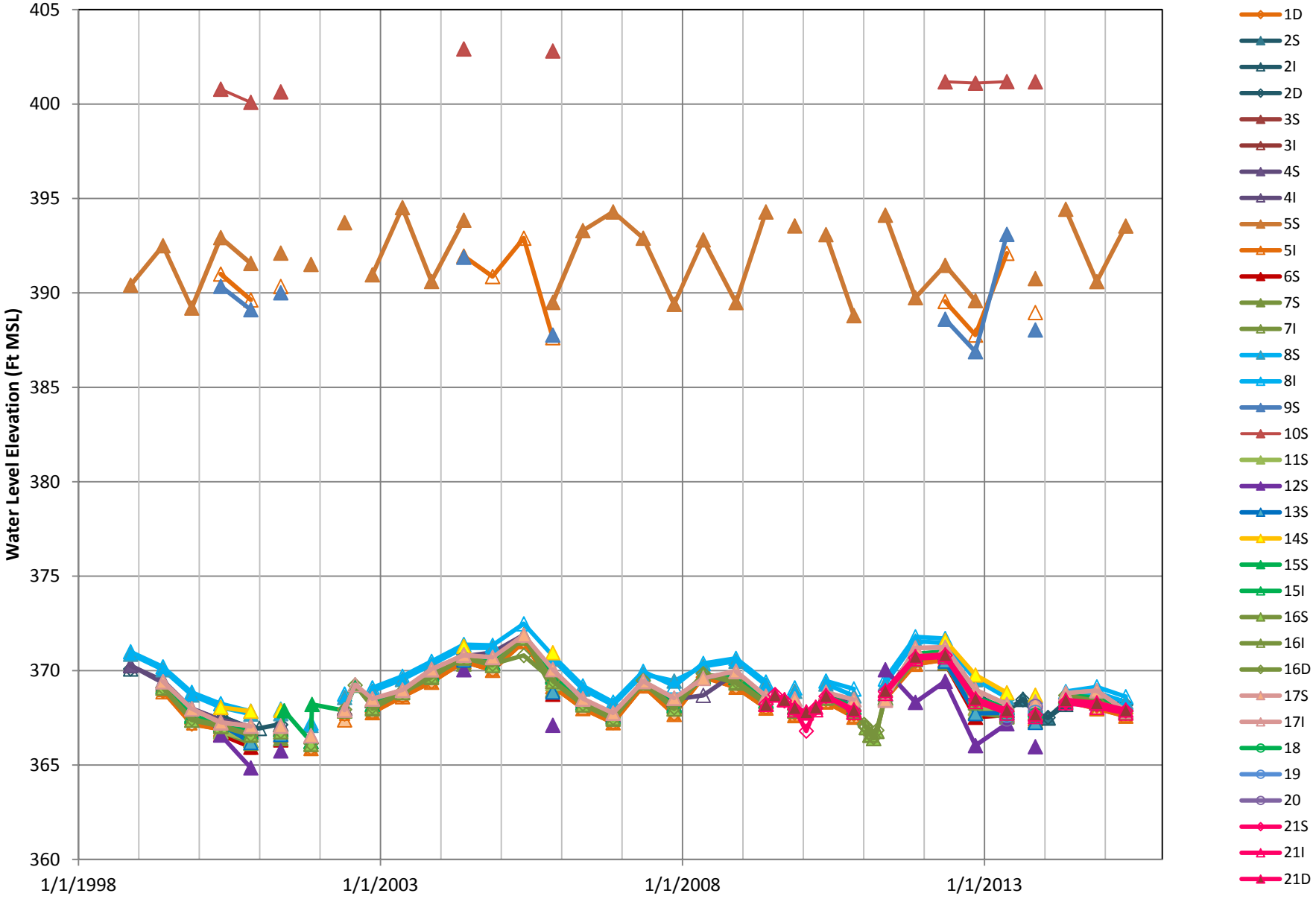
Well ID	20	21S	21I	21D
Min	367.44	366.8	367.57	367.7
Max	368.11	370.81	370.73	370.85
Date				
11/18/1992				
5/5/1995				
11/28/1995				
6/6/1996				
11/12/1998				
5/27/1999				
11/17/1999				
5/10/2000				
11/8/2000				
12/29/2000				
5/8/2001				
5/29/2001				
11/7/2001				
11/13/2001				
5/29/2002				
8/1/2002				
11/13/2002				
5/14/2003				
11/6/2003				
5/19/2004				
11/9/2004				
5/17/2005				
11/8/2005				
5/9/2006				
11/8/2006				
5/9/2007				
11/12/2007				
5/6/2008				
11/20/2008				
5/20/2009		368.23	368.22	368.21
7/14/2009		368.73	368.72	368.72
9/9/2009		368.40	368.46	368.46
11/10/2009		367.98	367.92	368.04
1/19/2010		366.80	367.76	367.82
3/17/2010		368.01	367.93	368.07
5/18/2010		368.64	368.68	368.68
11/3/2010		367.86	367.79	367.93
1/4/2011				
1/10/2011				
1/17/2011				
2/8/2011				
2/14/2011				
3/2/2011				
3/22/2011				
5/12/2011		368.89	368.80	368.95
11/10/2011		370.68	370.63	370.75
5/8/2012		370.81	370.73	370.85
11/7/2012		368.45	368.37	368.52
5/16/2013	367.44	367.86	367.75	367.92
8/21/2013				
11/4/2013	368.11	367.66	367.57	367.70
1/20/2014				
5/7/2014		368.33	368.30	368.45
11/11/2014		368.20	368.06	368.30
5/5/2015		367.87	367.75	367.92

Appendix D-4

Landfill Monitoring Well Hydrographs

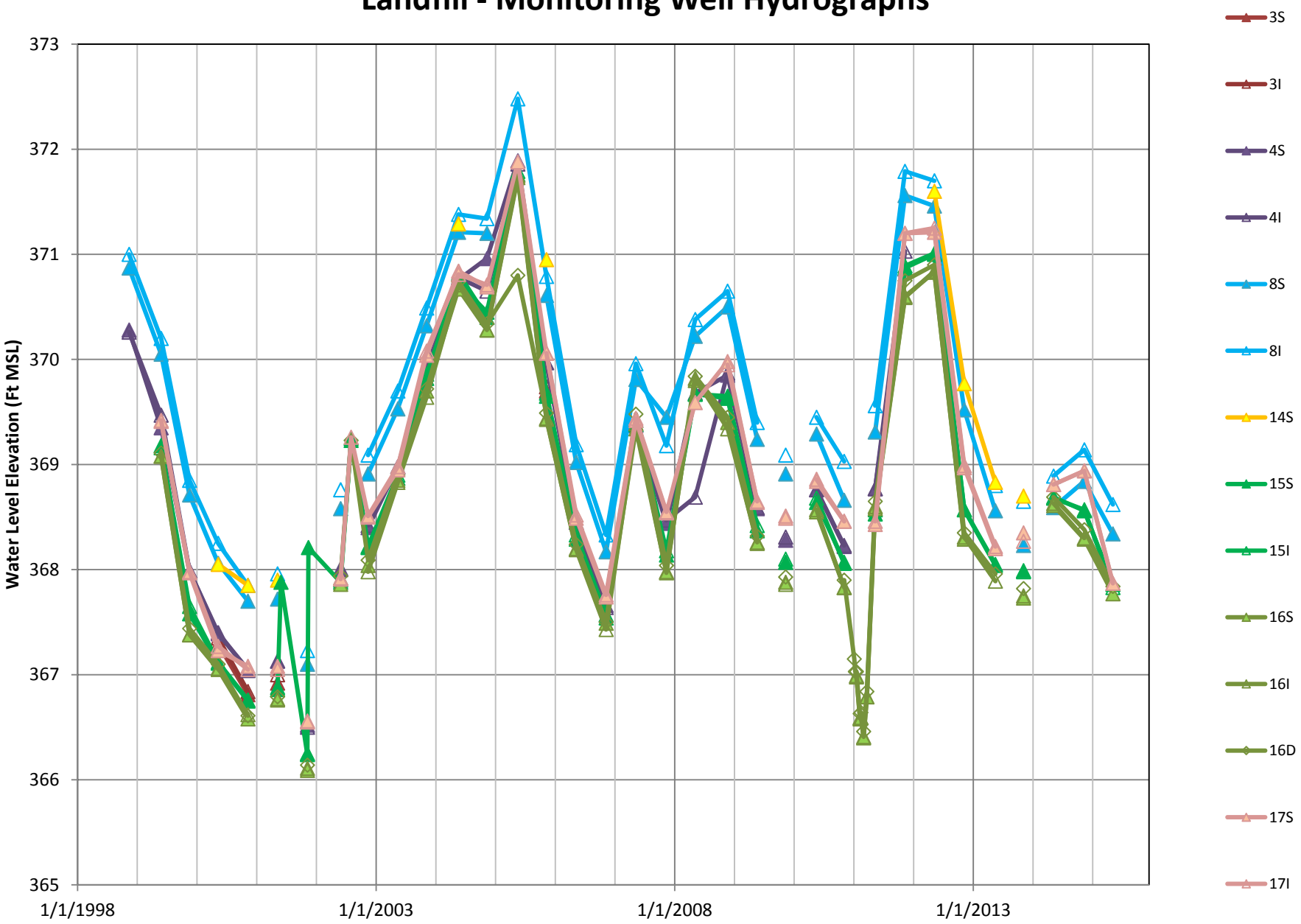
AEP Rockport Plant

Landfill - Monitoring Well Hydrographs (All)



AEP Rockport Plant

Landfill - Monitoring Well Hydrographs



AEP Rockport Plant

Landfill - Monitoring Well Hydrographs