

REPORT ON OBSERVATION WELL INSTALLATION
HAZELWOOD INTERIM STORAGE SITE
ST. LOUIS COUNTY, MISSOURI

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1.0 INTRODUCTION

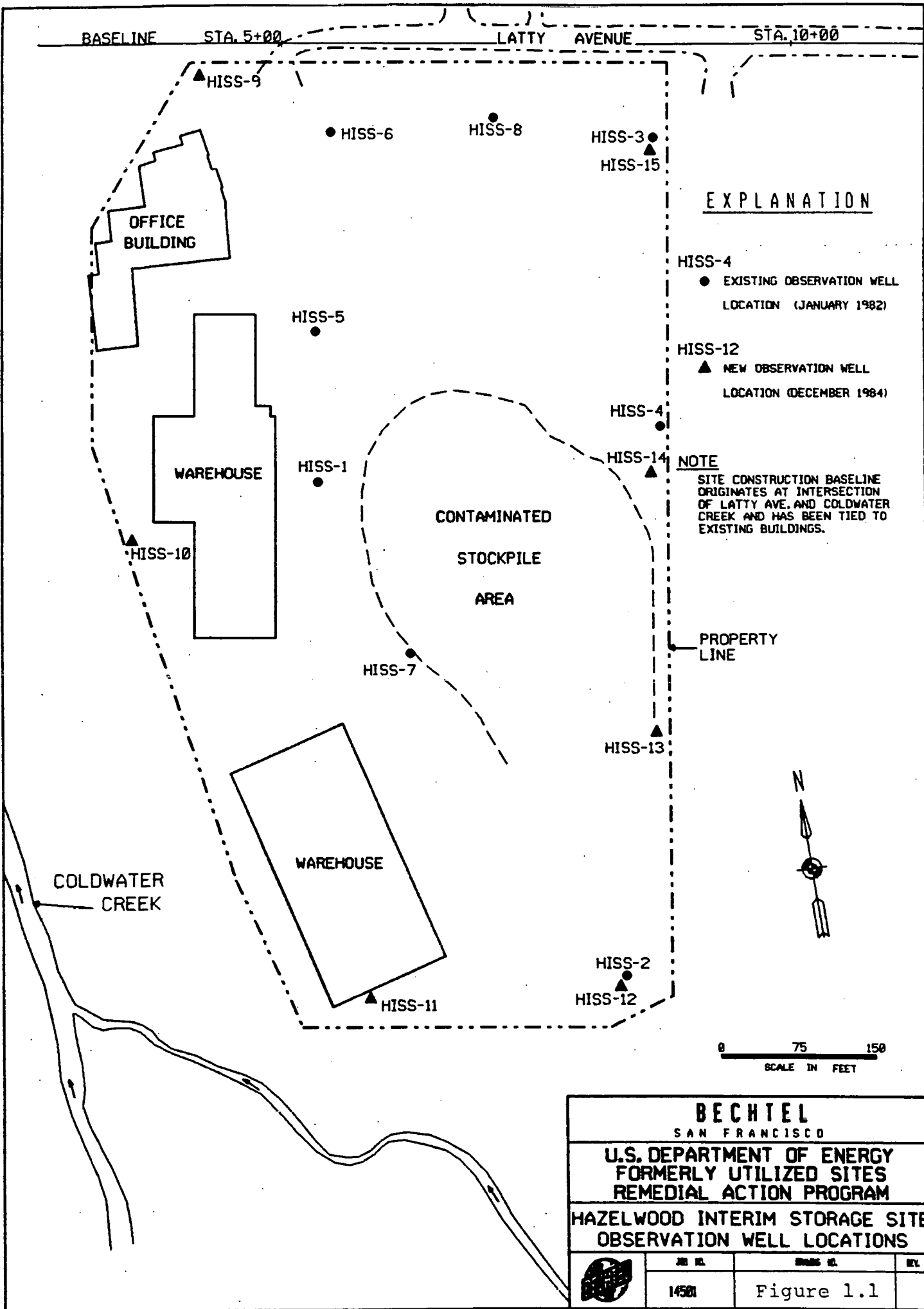
This report presents the results of the observation well installation program conducted at the Hazelwood Interim Storage Site (HISS) near St. Louis, Missouri, as part of the U.S. Department of Energy's (DOE) Formerly Utilized Sites Remedial Action Program (FUSRAP). Eight holes were drilled and seven observation wells were installed at the site between December 11 and 18, 1984. Summary data for the drill holes are presented in Table 1-1 and the location of the observation wells (HISS-9 through HISS-15) is shown in Figure 1.1. The drilling and well installation was performed by John Mathes and Associates, Inc. of Columbia, Illinois, under the supervision of a Bechtel geologist.

TABLE 1-1
DRILL HOLE SUMMARY

Drill Hole	Location ^a		Ground Elevation	Depth of Hole (ft)	Elevation at Bottom of Hole
	Station	Offset (ft rt)			
HISS-9	4+19.2	30.3	517.3	28.5	488.8
HISS-9A ^b	4+15.0	24.7	517.3	60.0	457.3
HISS-10	3+53.2	486.9	517.2	25.0	492.2
HISS-11	5+84.8	942.1	515.7	23.8	491.9
HISS-12	8+28.9	927.4	517.5	20.0	497.5
HISS-13	8+65.9	677.5	521.7	25.0	496.7
HISS-14	8+63.6	420.2	520.4	30.0	490.4
HISS-15	8+64.5	101.9	515.9	20.5	495.4

^aLocation of drill holes referenced to site construction baseline shown in Figure 1.1.

^bHISS-9A was drilled to determine the general site stratigraphy.



2.0 PURPOSE AND SCOPE

The observation wells were installed to monitor for radioactive contamination of the ground water and to measure ground-water levels. The scope of the well installation program included:

- a. Taking and classifying standard penetration test (SPT) samples to determine the soil types encountered during drilling
- b. Installing observation wells based on site geology and prescribed well construction methods
- c. Performing tests to determine the permeability of the zone being monitored
- d. Performing laboratory gradation tests on selected representative soil samples to verify the visual classifications made during drilling

3.0 SITE GEOLOGY

3.1 TOPOGRAPHY AND DRAINAGE

The HISS is in an area of low, rolling terrain that is drained by Coldwater Creek and its tributaries, which flow to the Missouri River. Current ground-surface elevations across the HISS range from about 512 ft in the southwest corner to about 520 ft on the northeast side. Superimposed on this topography in the central and east-central portions of the site is a stockpile of excavated material that reaches a maximum height of about 25 ft above the surrounding ground surface. This stockpile is a result of previous construction and recent cleanup activity at the site and its location is only temporary.

The HISS drains generally to the north and to the southwest. Because of the relatively flat topography, precipitation often ponds on the site but eventually runs off either surficially or through drainage/storm ditches to Coldwater Creek or one of its tributaries, which are west and south of the site (Figure 1.1). During periods of heavy precipitation, local flooding may occur in the southwest corner because of overflow from Coldwater Creek, or along the northern site boundary because of the current inability of drainage ditches in this area to accept the runoff being transmitted to them along Latty Avenue.

3.2 STRATIGRAPHY

The HISS lies within a subsurface, shallow, oval-shaped depression known as the Florissant Basin (Ford, Bacon & Davis Utah, 1978). This basin fill resulted from blocked drainages during glacial times that formed a lake in which over 100 ft of silts, clays, and fine sands were deposited. Following deposition of the lake sediments, glacially derived wind-blown loess covered the area. The loess was, in turn, covered in places by a thin veneer of alluvium deposited by Coldwater Creek and its tributaries. Underlying the overburden material at the site is bedrock consisting of Mississippian age

limestone. Because of the relatively shallow depth of the observation wells installed at HISS, bedrock was not encountered while performing the work reported here.

The overburden material at the site generally consists of a layer of topsoil or fill material less than 6 ft thick overlying loess composed of yellowish brown silty clays and clayey silts. The loess generally extends to depths of approximately 20 to 25 ft across the site. Beneath the loess, to an undetermined depth, are greenish to olive gray clayey silt and silty clay lacustrine (lake bed) deposits.

4.0 WELL DESIGN

The observation wells at HISS were designed to facilitate monitoring ground-water levels and obtaining water samples to determine radionuclide contamination characteristics. The well design was based on accepted standards for the installation of wells intended for these purposes. The wells were installed to monitor shallow ground water.

The initial boring (HISS-9A) was drilled to a depth of 60 ft to determine the general site stratigraphy. Based on the visual inspection of soil samples, it was determined that shallow ground water is present beneath the site at a depth of less than 30 ft. Below this depth, there is a zone of what appears to be more impermeable material that may inhibit the downward movement of ground water. Although the materials above 30 ft exhibit only slight variations in grain size, there are some siltier zones containing more interstitial water that may indicate a relatively greater potential for ground-water flow. Therefore, the observation wells were installed to permit ground-water monitoring at depths of less than 30 ft. Based on the visual inspection of soil samples from succeeding holes, the depth of the observation well installation was adjusted according to the soil types encountered and the parameters established from the initial 60-ft deep hole. At the time of installation, all wells were installed a minimum of 10 ft below the current ground-water level to account for seasonal fluctuations that may result in a lowering of the water level.

5.0 TESTING

To characterize subsurface conditions, several activities were performed during the observation well installation program at the site. These activities included obtaining soil samples using the SPT method, performing permeability tests in the zones in which the observation wells were constructed, and obtaining initial ground-water level measurements. In addition, laboratory sieve and hydrometer tests were performed on selected representative SPT soil samples. A description of these activities is presented in the following subsections.

5.1 MATERIALS

During drilling, soil samples were obtained to determine the soil types underlying the site. Several of these samples were submitted for laboratory testing as a check on the classifications assigned visually. The classification and testing procedures are described below.

5.1.1 Soil Classification

Split-spoon soil samples were obtained by the SPT method during the observation well drilling program. These samples were classified visually in the field. The classifications are presented in the drill logs in Appendix A. The sample classifications generally include a description of the soil type (sand, silt, clay, etc.), color, moisture content, consistency, and plasticity. The alpha-numeric notations in parenthesis following the color descriptions in the drill logs refer to hue, value, and chroma designations based on the Munsell color system. The consistency descriptions (medium stiff, stiff, etc.) are based on the N values as determined from the SPT sampling method performed according to ASTM Specification D1586. The N value is the sum of the number of blows required to drive the SPT split-spoon sampler the last two 6-in. increments of an 18-in. penetration.

The soil descriptions presented in the boring logs in Appendix A are subjective classifications. Because silt and clay comprise a majority of the soils, a precise classification was difficult. Because no laboratory index tests were performed on these samples, the visual classifications could not be verified. Therefore, the classification of the soils as silty clays or clayey silts may not accurately reflect the actual relative amounts of silt and clay.

5.1.2 Laboratory Testing

Following completion of the observation well installation program, four split-spoon soil samples were submitted to the John Mathes and Associates, Inc. soils laboratory for gradation testing. The samples were:

<u>Observation Well No.</u>	<u>Sample No.</u>	<u>Depth (ft)</u>
HISS-10	5	23.5 - 25.0
HISS-11	3	12.3 - 13.8
HISS-12	2	8.5 - 10.0
HISS-15	3	14.0 - 15.5

The samples were wet sieved, and all of the material passed the No. 200 U.S. Standard sieve, indicating that the soil consists entirely of silt- and clay-size particles. Although hydrometer tests were performed on the sieved samples, the data obtained are limited because the hydrometer test does not provide a true indication of the soil's behavioral characteristics.

The samples submitted for testing are considered to be representative of the soil types encountered in all eight borings drilled at the site. The sample from observation well HISS-10 was considered to be representative of the relatively impermeable material underlying the shallow ground-water zone at the site. The remaining samples were taken from more permeable layers in the shallow ground-water zone. These three samples were selected to provide a representative sampling of this zone from widely spaced wells to determine whether any significant changes in material type occur across the site. A review of the laboratory data indicates

that no such change occurs. The gradation tests show that all of the material tested consists of silt- and clay-size particles. However, the relative mixture of the silt- and clay-size fractions could result in subtle changes that cannot be detected by the laboratory test methods used.

5.2 PERMEABILITY

Permeability tests were conducted in the seven observation wells constructed at HISS. These tests were performed to determine the approximate in situ permeability of the materials in the monitored intervals. The results of these tests are presented in Table 5-1.

The permeability tests were conducted using the rising head test method. This method involves lowering the water level in the wells and then monitoring the time required for it to recover to near static conditions. Lowering of the water level was accomplished by the use of a hand bailer. The volume of water to be removed was based on the volume of water in the 2-in. diameter well casing. Using this volume and the volume of the bailer, the approximate number of bails to be removed could be calculated. An initial ground-water level was determined in each well before bailing operations began. The time at the start and end of the bailing operation was recorded, as was the time of the first water-level reading following the end of bailing. Water-level readings were then taken at 1-min intervals for the first 10 min following bailing, and then at 2-min intervals for the next 10 min. Following this initial series of 1- and 2-min readings, additional readings were taken at 5- and 10-min intervals for up to about 1 hour after the initial reading. Depending on the amount of time required for the water level to return to near-equilibrium conditions, readings in some wells were stopped at about 45 minutes after the initial reading. To determine the final status of the well, at least one additional water level reading was taken in all of the wells approximately 24 hours after the initial reading. All of these subsequent readings showed a return to the pre-test water levels.

TABLE 5-1
PERMEABILITY DATA

Observation Well	Monitored Interval (Elevation)	Permeability	
		(cm/sec)	(ft/yr)
HISS-9	497.9 - 488.8	1.80×10^{-4}	186.3
HISS-10	503.1 - 493.7	2.67×10^{-4}	275.9
HISS-11	503.0 - 493.4	1.15×10^{-4}	118.7
HISS-12	507.7 - 499.0	1.36×10^{-4}	141.0
HISS-13	511.7 - 498.2	3.51×10^{-5}	36.3
HISS-14	511.1 - 491.9	1.08×10^{-5}	11.2
HISS-15	505.6 - 496.9	1.03×10^{-3}	1063.8

units

The results of the rising head tests for the materials in the monitored intervals beneath HISS are shown in Table 5-1. These values fall within the range of those that could be expected for the site's fine-grained cohesive soils.

5.3 GROUND-WATER MONITORING

Monitoring of ground water beneath HISS has been conducted since January 1982. A brief discussion of the observation wells installed for ground-water monitoring at the site is presented in the following subsections.

5.3.1 Existing Wells

Eight observation wells were installed at HISS in January 1982 as part of the Radiological Site Assessment Program being conducted by Oak Ridge Associated Universities. The locations of the wells (HISS-1 through HISS-8) are shown in Figure 1.1.

The existing wells consist of 4-in. diameter PVC casing and extend to depths ranging from about 15 to 32 ft below the ground surface. No well construction records have been obtained by Bechtel which could supply details on the type of well construction employed or the nature of the materials in the monitored zone of the well. The wells appear to have been located to monitor potential ground-water contamination on the eastern portion of HISS.

Radiological analysis of ground-water samples from these existing wells has been conducted on a quarterly basis by Bechtel National, Inc. during 1984. Ground-water levels in the wells have been monitored weekly since August 1984, when preliminary site cleanup began, and will be continued for 1 year.

5.3.2 New Wells

The seven recently constructed observation wells at HISS were installed to supplement the existing wells and to correlate their data with more complete records of well construction and subsurface material types. The locations of the wells (HISS-9 through HISS-15) are shown in Figure 1.1.

The new wells provide a more complete network for monitoring potential ground-water contamination beneath HISS. Three wells (HISS-9 through HISS-11) were installed on the western side of the site to monitor any potential contamination that may be migrating beneath the commercial buildings in this area. The remaining wells were installed on the east side of the site to provide more complete coverage than previously existed and to obtain a better idea of the type(s) of materials in which the existing wells were constructed.

When practical, water-level readings were obtained in the new wells during the installation program. A summary of these readings is contained in Table 5-2. Readings were generally taken shortly after construction of the well, before and after permeability testing in the wells, and upon completion of the observation well installation program.

TABLE 5-2
OBSERVATION WELL DATA

Observation Well	Ground Surface Elevation	Top of Riser Casing Elevation	Monitored Interval (Depth Below Ground Surface)	Water Level Readings* (Depth Below Ground Surface in Feet)							
				12/12	12/13	12/14	12/15	12/17	12/18	12/19	12/20
HISS-9	517.3	519.2	19.4 - 28.5	6.6	6.7	--	5.5	--	--	--	6.3
HISS-10	517.2	519.5	14.1 - 23.5	--	3.0	2.3	2.3	--	--	2.3	2.4
HISS-11	515.7	518.6	12.7 - 22.3	--	8.6	7.0	6.4	--	--	6.7	6.8
HISS-12	517.5	520.3	9.8 - 18.5	--	--	--	--	--	--	7.7	7.7
HISS-13	521.7	524.4	10.0 - 23.5	--	--	--	--	11.1	10.9	--	10.8
HISS-14	520.4	523.0	9.3 - 28.5	--	--	--	--	9.3	9.4	--	9.3
HISS-15	515.9	518.9	10.3 - 19.0	--	--	--	4.6	--	4.7	--	4.7

*Water level readings were taken on consecutive days from December 12, 1984, to December 20, 1984.

6.0 DRILLING

Drilling for the observation well installation program at HISS was performed by John Mathes and Associates, Inc. of Columbia, Illinois. Before beginning the work, the subcontractor contacted all appropriate utility companies to verify that the proposed hole locations were clear of any existing utilities.

The drill rig used was a CME model 550 mounted on an all-terrain vehicle. The borings were advanced using 7-in. outside diameter hollow-stem augers. Split-spoon samples were obtained by performing the SPT method at 5-ft intervals before advancing successive auger flights. The samples were placed in plastic bags, marked for identification, and stored at HISS. During their advance, a center plug was used in the augers to prevent soil from rising up the hollow portion of the auger. Following the advance of a single 5-ft auger flight, the center plug was removed and the SPT sampler was inserted in its place. The sampler was advanced in 6-in. increments for a total of 18 in. by driving it with a 140-lb hammer falling a distance of 30 in. The hammer was supported over the SPT sampler by a hemp rope running through a system of pulleys to a rotating cathead on the side of the drill rig. By wrapping the rope around it, the driller used the cathead to raise the hammer.

All holes except HISS-9A were converted to observation wells to monitor the shallow ground-water zone. Because HISS-9A was drilled to a depth of 60 ft, primarily to determine the site stratigraphy, it was decided during the drilling program that it would be more advantageous to grout this hole and drill a shallow hole next to it for installation of an observation well. Therefore, following its completion, HISS-9A was tremie grouted to the ground surface using a thick cement/bentonite grout slurry.

During the drilling, the auger cuttings were removed from around the boring and placed in approved 55-gal storage drums for disposal in the contaminated stockpile area.

7.0 WELL CONSTRUCTION

The recently installed observation wells at HISS were constructed according to generally accepted practice and the method described in the technical specifications. Logs showing the construction of each well are contained in Appendix B.

The observation wells were constructed following the completion of the drilling of each hole. The construction sequence was initiated by inserting a 2-in. inside diameter, threaded PVC well screen and riser casing through the hollow-stem auger to the bottom of the augered hole. Once set on the bottom of the hole, the riser casing was cut off so that 2 to 3 ft remained above the ground surface. The screens had a minimum 2-ft long sump at the bottom, with a cap to prevent material in the hole from rising into the screen. The sump provides a reservoir for collecting any sediment which may enter the well through the screen openings. All screens were about 5 ft long except for the one in HISS-14, which was about 10 ft long. Bechtel's geologist determined the screen and sump lengths at the time of installation based on the log of the materials encountered during the drilling operation and the depth of the hole.

Following insertion of the screen and riser pipe, the hollow-stem augers were lifted about 1 to 2 ft off the bottom of the hole. The filter pack was then poured from the top of the hollow-stem augers into the annulus between the screen and the sides of the augered hole. The majority of the holes were dry or nearly dry during the placement of the filter pack. Backwashing of the filter pack was attempted in well HISS-15 by flushing water down the riser casing, but this was halted because too much disturbance was occurring to the hole -- as evidenced by very dirty water returning to the surface around the outside of the augers and from out of the riser casing. This method of setting the well screen and filter pack eliminated the need for centralizers on the screen and casing, because the augers served to keep them centered in the hole. The augers were lifted a maximum of 5 ft at a time as the filter pack was poured into the hole and reached the proximity of the bottom of

the augers. To avoid "bridging," the filter pack was slowly poured into the augers. Bridging did not occur, as evidenced by the easy withdrawal of the augers from the hole (without lifting the riser casing) and by the amount of filter pack placed in the hole. Using the described method, the filter pack was placed approximately 2 ft above the top of the well screen, as determined by "sounding" the top of the filter pack with a tape measure.

Once the filter pack reached the prescribed depth, the augers were withdrawn completely from the hole. This action was possible because the fine-grained, cohesive material in which the holes were drilled provided a relatively stable opening with very little sloughing. Removal of the augers facilitated placing of the annular seal above the filter pack; removal provided a larger opening and eliminated the possibility for the sealing material to adhere to the wall of the augers, thus avoiding bridging. The seal, consisting of bentonite pellets, was poured slowly into the annulus above the filter pack. Soundings were taken with the tape measure until the bentonite pellets were about 2 ft above the top of the filter pack.

Following placement of the annular seal, a thick mixture of cement/bentonite grout was prepared in a 55-gal drum and used to backfill the remainder of the annulus to complete the seal to the ground surface. Depending upon the presence or absence of water in the annulus, this slurry either was poured directly into the hole from the drum or was tremied from the seal up using a rubber hose and the pump on the drill rig.

Following placement of the cement/bentonite backfill material, the operation of all observation wells (except HISS-15) was confirmed. Confirmation was accomplished by pumping the wells using a rubber hose and the pump on the drill rig. The hose was inserted to the bottom of the observation well and the pump was run at a speed sufficient to withdraw the water from the well without damaging the screen or the filter pack. The well was considered pumped dry when little or no water flowed from the discharge hose. Following initial pumping, the water level in the well was allowed to recover

for a short time and then pumping was repeated. This process of pumping and recovery was performed about three times for each well. For some of the wells, water from the discharge hose was collected in a 5-gal bucket and a rough estimate of the total amount of water withdrawn from the well was made. Water-level readings, the times for each reading, and total well depth measurements were taken before and after the pumping operation in each well.

After completion of the placement of backfill in the upper annulus, a 5-ft long section of 6-in. outside diameter steel surface casing was set around all the observation wells. This casing was set so that its top was just a few inches below the top of the PVC riser casing. This placement facilitates taking measurements in the observation well and the surveying of the top of the riser casing. A cement seal was placed around the outside of the surface casing to anchor it in place and to provide a seal to prevent water on the surface from seeping around the outside of the casing down into the well. A steel cap was placed on the surface casing and secured with a padlock. Setting the surface casing and cap marked the end of the observation well construction sequence.

8.0 RADIOLOGICAL MONITORING

Radiological monitoring, which involved both pre- and post-drilling surveys as well as interim checks during the drilling operation, was performed by Eberline Analytical Corporation (EAC) of Albuquerque, New Mexico. Before the start of drilling operations, a briefing was held by EAC to acquaint the drill crew and others involved with the drilling program with site safety procedures and the hazards of radioactive contamination. At this time, individual dosimeter badges were distributed to monitor the total amount of radiation exposure received by each person during their stay at the site. Urine specimens also were collected for initial testing.

8.1 PRE-DRILLING SURVEYS

All hole locations outside the contaminated area were checked by an EAC representative before the drilling operation began. This check was done primarily to determine the type of safety precautions to be followed by the drill crew to prevent or limit contamination.

8.2 INTERIM DRILLING SURVEYS

During the drilling, EAC performed interim random radiological monitoring on soil samples and auger cuttings removed from holes outside the contaminated area. These surveys were performed primarily on material removed from the near-surface portions of the holes. No significant contamination was detected during these surveys. While drilling inside the contaminated area, all personnel and equipment were monitored upon their exit from the area by an EAC representative. At this time, all protective clothing was removed and discarded or decontaminated. No equipment or personnel were found to be contaminated during this monitoring.

8.3 POST-DRILLING SURVEYS

Following completion of the drilling and observation well installation program in the contaminated area, the drill rig and all drilling equipment were decontaminated on-site at the decontamination pad. The drill rig and equipment were monitored by EAC to determine whether sufficient decontamination was accomplished before the subcontractor was permitted to demobilize its equipment. In addition, the four soil samples sent to the subcontractor's testing laboratory (see Subsection 5.1.2) were cleared through an EAC representative before they were allowed to leave the site. Upon completion of the observation well installation program, dosimeter badges were returned to EAC personnel and exit urine samples were taken for testing.

9.0 CONCLUSIONS

The HISS observation well installation program successfully established seven monitoring wells. The depth of the wells was based primarily on subsurface stratigraphy as determined by the geologist during the drilling of holes for the wells. Generally, the materials in which the wells were constructed were visually classified as clayey silts. Rising head permeability tests conducted in the wells following their construction indicated in situ permeabilities ranging from 1×10^{-3} to 1×10^{-5} cm/sec.

Drilling for the observation well installation program was conducted quickly and efficiently with no major problems encountered. Well construction was performed according to the method described in the technical specifications, and no significant problems were encountered. Radiological monitoring conducted by EAC did not detect any problems with regard to radioactive contamination.

REFERENCE

1. Ford, Bacon and Davis Utah, Inc. Engineering Evaluation of the Latty Avenue Site, Hazelwood, Missouri, Draft, 1978.

APPENDIX A

GEOLOGIC DRILL LOGS

NOTE: Drill hole locations are referenced to site construction baseline shown in Figure 1.1.



GEOLOGIC DRILL LOG				PROJECT FUSRAP		JOB NO. 14501	SHEET NO. 1 OF 1	HOLE NO. HISS-9				
SITE HAZELWOOD INTERIM STORAGE SITE			LOCATION STA. 4+19.2 OFFSET 30.3 FT. RT.				ANGLE FROM HORIZ. 90°	BEARING N.A.				
BEGUN 12/12/84	COMPLETED 12/12/84	DRILLER J. MATHES AND ASSOCIATES		DRILL MAKE AND MODEL CME 550 ATV		HOLE SIZE 7 IN.	OVERBURDEN (FT.) 28.5	ROCK (FT.) N.A.	TOTAL DEPTH 28.5 FT.			
CORE RECOVERY(FT./%) N.A.		CORE BOXES N.A.	SAMPLES N.A.	EL. TOP OF CASING 519.2	GROUND EL. 517.3	DEPTH/EL. GROUND WATER 6.3 FT./511.0		DEPTH/EL. TOP OF ROCK N.A.				
SAMPLE HAMMER WEIGHT/FALL N.A.		CASING LEFT IN HOLE: DIA./LENGTH 2 IN. PVC/30.3 FT.				LOGGED BY: L. MATTHEWS						
SAMPLE TYPE AND DIAMETER	SAMPLER ADVANCE LENGTH CORE RUN	SAMPLE RECOVERY CORE RECOVERY	SAMPLE BLOWS IN PERCENT CORE RECOVERY	SAMPLE BLOWS			ELEVATION	DEPTH (FT.)	GRAPHIC LOG	SAMPLE NO.	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
				1ST 8 IN.	2ND 6 IN.	3RD 6 IN.						
7-IN. O.D. HOLLOW-STEM AUGERS							517.3				SEE GEOLOGIC DRILL LOG HISS-9A FOR DESCRIPTION OF OVERBURDEN MATERIALS.	BORING ADVANCED FROM 0 TO 28.5 FT. USING 7-IN. O.D. HOL- LOW-STEM AUGERS. GROUND-WATER LEVEL AT 6.3 FT. ON 12/20/84.
							488.8				BOTTOM OF HOLE AT 28.5 FT. HOLE CONVERTED TO OBSERVATION WELL. SEE OBSERVATION WELL LOG FOR CONSTRUCTION DETAILS.	

SS=SPLIT SPOON; ST=SHELBY TUBE; D=DENNISON; P=PITCHER; O=OTHER	SITE HAZELWOOD INTERIM STORAGE SITE	HOLE NO. HISS-9
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GEOLOGIC DRILL LOG				PROJECT		JOB NO.		SHEET NO.		HOLE NO.			
				FUSRAP		14501		1 OF 2		HISS-9A			
SITE				LOCATION				ANGLE FROM HORIZ.		BEARING			
HAZELWOOD INTERIM STORAGE SITE				STA. 4+15.0 OFFSET 24.7 FT. RT.				90°		N.A.			
BEGUN		COMPLETED		DRILLER		DRILL MAKE AND MODEL		HOLE SIZE		OVERBURDEN (FT.)			
12/11/84		12/11/84		J. MATHES AND ASSOCIATES		CME 550 ATV		7 IN.		60.0			
CORE RECOVERY (FT./%)		CORE BOXES		SAMPLES		EL. TOP OF CASING		GROUND EL.		DEPTH/EL. GROUND WATER			
N.A.		N.A.		12		N.A.		517.3		7.8 FT./509.5			
SAMPLE HAMMER WEIGHT/FALL				CASING LEFT IN HOLE: DIA./LENGTH				LOGGED BY:					
140 LBS./30 IN.				NONE				L. MATTHEWS					
SAMPLE TYPE AND DIAMETER	SAMPLER ADVANCE LENGTH CORE RUN	SAMPLE RECOVERY CORE RECOVERY	SAMPLE BLOWS IN	PERCENT CORE RECOVERY	SAMPLE BLOWS			ELEVATION	DEPTH (FT.)	GRAPHIC LOG	SAMPLE NO.	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
					1ST 6 IN.	2ND 6 IN.	3RD 6 IN.						
								517.3				0.0 - 6.0 FT. <u>CLAYEY SILT (ML)</u> : MODERATE BROWN (5YR3/4), DAMP, STIFF, TRACE OF FINE SAND AND ORGANIC MATERIAL (ROOTS).	BORING ADVANCED FROM 0 TO 58.5 FT. USING 7-IN. O.D. HOLLOW-STEM AUGERS.
2" SS	18"	16"	10		3	6	4		5		1		
								511.3				6.0 - 17.0 FT. <u>CLAYEY SILT (ML)</u> : MOTTLED MODERATE YELLOWISH BROWN (10YR5/4) AND PALE YELLOWISH BROWN (10YR6/2), DAMP TO MOIST, MEDIUM STIFF, TRACE OF FINE SAND.	GROUND-WATER LEVEL AT 7.8 FT. ON 12/12/84.
2" SS	18"	18"	5		2	2	3		10		2		
2" SS	18"	18"	6		2	2	4		15		3		INCREASE IN MOISTURE CONTENT AT 13 FT.
								500.3				17.0 - 22.0 FT. <u>SILTY CLAY (CL)</u> : PALE YELLOWISH BROWN (10YR6/2) WITH SOME MODERATE YELLOWISH BROWN (10YR5/4), MOIST, SOFT.	SAMPLE NO. 3 APPEARS TO HAVE HIGHER SILT CONTENT THAN SAMPLE NO. 2.
2" SS	18"	18"	3		0	1	2		20		4		
								495.3				22.0 - 28.6 FT. <u>CLAYEY SILT (ML)</u> : GREENISH GRAY (5GY6/1), DAMP TO MOIST, STIFF, TRACE TO LITTLE FINE SAND.	SAMPLE NO. 6 CONTAINS MORE FINE SAND THAN SAMPLE NO. 5 AND EXHIBITS WET SURFACE WHEN SHAKEN.
2" SS	18"	18"	9		4	4	5		25		5		
								488.7				28.6 - 37.0 FT. <u>SILTY CLAY (CL)</u> : OLIVE GRAY (5Y4/1) TO GREENISH GRAY (5GY6/1), MOIST, STIFF, MEDIUM PLASTICITY, TRACE OF FINE SAND AND SOFT ROCK FRAGMENTS.	COLOR CHANGE TO OLIVE GRAY (5Y4/1) AT 28.6 FT. WITH TRACE OF ORGANIC MATERIAL.
2" SS	18"	18"	10		4	4	6		30		6		
									35		7		
2" SS	18"	18"	9		3	4	5						

SS=SPLIT SPOON; ST=SHELBY TUBE;
D=DENNISON; P=PITCHER; O=OTHER

SITE

HAZELWOOD INTERIM STORAGE SITE

HOLE NO.

HISS-9A



GEOLOGIC DRILL LOG							PROJECT		JOB NO.	SHEET NO.	HOLE NO.	
							FUSRAP		14501	2 OF 2	HISS-9A	
SAMPLE TYPE AND DIAMETER	SAMPLER ADVANCE LENGTH CORE RUN	SAMPLE RECOVERY CORE RECOVERY	SAMPLE BLOWS "N" PERCENT CORE RECOVERY	SAMPLE BLOWS			ELEVATION	DEPTH (FT.)	GRAPHIC LOG	SAMPLE NO.	DESCRIPTION AND CLASSIFICATION	NOTES ON WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
				1ST 6 IN.	2ND 6 IN.	3RD 6 IN.						
							480.3				28.6 - 37.0 FT. <u>SILTY CLAY (CL)</u> (SEE DESCRIPTION ON PREVIOUS PAGE)	SAMPLE NO. 8 EXHIBITS WET SURFACE WHEN SHAKEN.
2' SS	18'	18'	10	3	5	5		40		8	37.0 - 42.0 FT. <u>CLAYEY SILT (ML)</u> : GREENISH GRAY (5GY6/1), MOIST, STIFF, LOW TO MEDIUM PLASTICITY, TRACE OF VERY FINE SAND.	
							475.3					
2' SS	18'	18'	4	1	2	2		45		9	42.0 - 48.0 FT. <u>SILTY CLAY (CL)</u> : GREENISH GRAY (5GY6/1), MOIST, SOFT, MEDIUM TO HIGH PLASTICITY, TRACE OF SMALL WHITE SNAIL SHELLS AND ORGANIC MATERIAL (GRASS, ROOTS, ETC.)	
							469.3					
2' SS	18'		4	1	2	2		50		10	48.0 - 60.0 FT. <u>SILTY CLAY (CL-CH)</u> : GREENISH GRAY (5GY6/1) AND OLIVE GRAY (5Y4/1), MOIST, SOFT TO MEDIUM STIFF, HIGH PLASTICITY.	
2' SS	18'	18'	4	0	2	2		55		11		
2' SS	18'	18'	5	1	3	2	457.3	60		12		
											BOTTOM OF HOLE AT 60.0 FT. HOLE GROUTED FROM BOTTOM TO GROUND SURFACE WITH PORTLAND CEMENT/BAROID QUIK-GEL BENTONITE SLURRY.	

SS=SPLIT SPOON; ST=SHELBY TUBE;
D=DENNISON; P=PITCHER; O=OTHER

SITE

HAZELWOOD INTERIM STORAGE SITE

HOLE NO.

HISS-9A



GEOLOGIC DRILL LOG										PROJECT		JOB NO.	SHEET NO.	HOLE NO.
										FUSRAP		14501	1 OF 1	HISS -10
SITE					LOCATION					ANGLE FROM HORIZ.		BEARING		
HAZELWOOD INTERIM STORAGE SITE					STA. 3+53.2 OFFSET 486.9 FT. RT.					90°		N.A.		
BEGUN		COMPLETED		DRILLER		DRILL MAKE AND MODEL		HOLE SIZE		OVERBURDEN (FT.)		ROCK (FT.)	TOTAL DEPTH	
12/12/84		12/12/84		J. MATHES AND ASSOCIATES		CME 550 ATV		7 IN.		25.0		N.A.	25.0 FT.	
CORE RECOVERY(FT./%)		CORE BOXES		SAMPLES		EL. TOP OF CASING		GROUND EL.		DEPTH/EL. GROUND WATER		DEPTH/EL. TOP OF ROCK		
N.A.		N.A.		5		519.5		517.2		2.4 FT./514.8		N.A.		
SAMPLE HAMMER WEIGHT/FALL				CASING LEFT IN HOLE: DIA./LENGTH				LOGGED BY:						
140 LBS./30 IN.				2 IN. PVC/25.9 FT.				L. MATTHEWS						
SAMPLE TYPE AND DIAMETER	SAMPLER ADVANCE LENGTH CORE RUN	SAMPLE RECOVERY CORE RECOVERY	SAMPLE BLOWS PERCENT CORE RECOVERY	SAMPLE BLOWS			ELEVATION	DEPTH (FT.)	GRAPHIC LOG	SAMPLE NO.	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.		
				1ST 6 IN.	2ND 6 IN.	3RD 6 IN.								
							517.2				0.0 - 0.5 FT. ROCK FILL	BORING ADVANCED FROM 0 TO 23.5 FT. USING 7-IN. O.O. HOLLOW-STEM AUGERS.		
							516.7				0.5 - 7.0 FT. SILTY CLAY (CL): MODERATE YELLOWISH BROWN (10YR5/4) TO PALE YELLOWISH BROWN (10YR6/2) WITH DUSKY BROWN (5YR2/2) FLECKS, DAMP, STIFF, MEDIUM TO HIGH PLASTICITY.			
2' SS	18"	11"	9	2	4	5		5		1		GROUND-WATER LEVEL AT 2.4 FT. ON 12/20/84.		
							510.2				7.0 - 18.0 FT. CLAYEY SILT (ML): DARK YELLOWISH ORANGE (10YR6/6) TO PALE YELLOWISH BROWN (10YR6/2) WITH TRACE OF MODERATE YELLOWISH BROWN (10YR5/4) AND DUSKY BROWN (5YR2/2) FLECKS, MOIST, MEDIUM STIFF, LOW TO MEDIUM PLASTICITY.			
2' SS	18"	18"	8	2	4	4		10		2		SAMPLE NO. 1 SHOWS SLIGHT EVIDENCE OF BEDDING.		
2' SS	18"	18"	8	1	4	4		15		3		ENCOUNTERED WATER TABLE DURING DRILLING AT ABOUT 8.5 FT.		
							499.2							
2' SS	18"	18"	9	2	4	5		20		4		SAMPLE NOS. 2 AND 3 EXHIBIT WET SURFACE WHEN SHAKEN.		
							494.2				18.0 - 23.0 FT. SILTY CLAY (CL): PALE YELLOWISH BROWN (10YR6/2), MOTTLED WITH SOME MODERATE YELLOWISH BROWN (10YR5/4), DAMP TO MOIST, STIFF, MEDIUM PLASTICITY.			
2' SS	18"	18"	9	2	4	5		25		5		SAMPLE NO. 4 EXHIBITS VERY LITTLE REACTION TO SHAKING, CONTAINS MORE CLAY THAN SAMPLE NO. 3, AND IS NOT AS MOIST.		
							492.2				23.0 - 25.0 FT. CLAYEY SILT (ML): GREENISH GRAY (5GY6/1), DAMP, STIFF, MEDIUM PLASTICITY, TRACE OF SMALL WHITE SNAIL SHELLS.			
											BOTTOM OF HOLE AT 25.0 FT.		LABORATORY GRADATION TEST PERFORMED ON SAMPLE NO. 5.	
											HOLE CONVERTED TO OBSERVATION WELL. SEE OBSERVATION WELL LOG FOR CONSTRUCTION DETAILS.			

SS=SPLIT SPOON; ST=SHELBY TUBE;
O=DENNISON; P=PITCHER; 0=OTHER

SITE
HAZELWOOD INTERIM STORAGE SITE

HOLE NO.
HISS-10



GEOLOGIC DRILL LOG										PROJECT		JOB NO.		SHEET NO.		HOLE NO.	
										FUSRAP		14501		1 OF 1		HISS-11	
SITE					LOCATION					ANGLE FROM HORIZ.				BEARING			
HAZELWOOD INTERIM STORAGE SITE					STA. 5+84.8 OFFSET 942.1 FT. RT.					90°				N.A.			
BEGUN		COMPLETED		DRILLER			DRILL MAKE AND MODEL			HOLE SIZE		OVERBURDEN (FT.)		ROCK (FT.)		TOTAL DEPTH	
12/13/84		12/13/84		J. MATHES AND ASSOCIATES			CME 550 ATV			7 IN.		23.8		N.A.		23.8 FT.	
CORE RECOVERY(FT./%)			CORE BOXES		SAMPLES		EL. TOP OF CASING		GROUND EL.		DEPTH/EL. GROUND WATER			DEPTH/EL. TOP OF ROCK			
N.A.			N.A.		5		518.6		515.7		6.8 FT./508.9			N.A.			
SAMPLE HAMMER WEIGHT/FALL					CASING LEFT IN HOLE: DIA./LENGTH					LOGGED BY:							
140 LBS./30 IN.					2 IN. PVC/25.5 FT.					L. MATTHEWS							
SAMPLE TYPE AND DIAMETER	SAMPLER ADVANCE LENGTH CORE RUN	SAMPLE RECOVERY CORE RECOVERY	SAMPLE BLOWS IN PERCENT CORE RECOVERY	SAMPLE BLOWS			ELEVATION	DEPTH (FT.)	GRAPHIC LOG	SAMPLE NO.	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.					
				1ST 8 IN.	2ND 6 IN.	3RD 6 IN.											
							515.7				0.0 - 5.0 FT. <u>CLAYEY SILT (ML)</u> : DARK YELLOWISH BROWN (10YR4/2) TO DUSKY YELLOWISH BROWN (10YR2/2), DAMP, STIFF, SOME ORGANIC MATERIAL.	BORING ADVANCED FROM 0 TO 22.3 FT. USING 7-IN. O.D. HOL- LOW-STEM AUGERS. GROUND-WATER LEVEL AT 6.8 FT. ON 12/20/84. SAMPLE NO. 3 EX- HIBITS WET SUR- FACE WHEN SHAKEN. LABORATORY GRAD- ATION TEST PER- FORMED ON SAMPLE NO. 3.					
2" SS	18"		14	5	8	6			1								
							510.7	5			5.0 - 11.0 FT. <u>SILTY CLAY (CL)</u> : PALE YELLOWISH BROWN (10YR6/2) WITH SOME MODERATE YELLOWISH BROWN (10YR5/4), DAMP TO MOIST, MEDIUM STIFF, TRACE OF ORGANIC MATERIAL.						
2" SS	18"		7	3	3	4		10		2							
							504.7				11.0 - 17.0 FT. <u>CLAYEY SILT (ML)</u> : PALE YELLOWISH BROWN (10YR6/2) WITH TRACE OF MODERATE YELLOWISH BROWN (10YR5/4) AND DUSKY BROWN (5YR2/2), MOIST, MEDIUM STIFF, LOW TO MEDIUM PLASTICITY.						
2" SS	18"		6	2	3	3		15		3		BOTTOM OF HOLE AT 23.8 FT. HOLE CONVERTED TO OBSERVATION WELL. SEE OBSERVATION WELL LOG FOR CONSTRUCTION DETAILS.					
							498.7				17.0 - 22.0 FT. <u>SILTY CLAY (CL)</u> : PALE YELLOWISH BROWN (10YR6/2) WITH SOME MODERATE YELLOWISH BROWN (10YR5/4) AND MODERATE REDDISH BROWN (10R4/6), DAMP TO MOIST, MEDIUM STIFF, MEDIUM PLASTICITY, TRACE OF ORGANIC MATERIAL.						
2" SS	18"	17"	7	1	3	4		20		4							
							493.7										
2" SS	18"	13"	17	4	8	9				5							
							491.9				22.0 - 23.8 FT. <u>CLAYEY SILT (ML)</u> : GREENISH GRAY (5GY6/1), DAMP, VERY STIFF, LOW TO MEDIUM PLASTICITY, TRACE OF VERY FINE SAND.						

SS=SPLIT SPOON; ST=SHELBY TUBE;
D=DENNISON; P=PILLMER; O=OTHER

SITE

HAZELWOOD INTERIM STORAGE SITE

HOLE NO.

HISS-11



GEOLOGIC DRILL LOG				PROJECT		JOB NO.	SHEET NO.	HOLE NO.				
				FUSRAP		14501	1 OF 1	HISS-12				
SITE			LOCATION				ANGLE FROM HORIZ.	BEARING				
HAZELWOOD INTERIM STORAGE SITE			STA. 8+28.9 OFFSET 927.4 FT. RT.				90°	N.A.				
BEGUN	COMPLETED	DRILLER		DRILL MAKE AND MODEL		HOLE SIZE	OVERBURDEN (FT.)	ROCK (FT.)				
12/17/84	12/17/84	J. MATHES AND ASSOCIATES		CME 550 ATV		7 IN.	20.0	N.A.				
CORE RECOVERY (FT./%)		CORE BOXES	SAMPLES	EL. TOP OF CASING	GROUND EL.	DEPTH/EL. GROUND WATER		DEPTH/EL. TOP OF ROCK				
N.A.		N.A.	4	520.3	517.5	7.7 FT./509.8		N.A.				
SAMPLE HAMMER WEIGHT/FALL		CASING LEFT IN HOLE: DIA./LENGTH			LOGGED BY:							
140 LBS./30 IN.		2 IN. PVC/21.6 FT.			L. MATTHEWS							
SAMPLE TYPE AND DIAMETER	SAMPLER ADVANCE LENGTH CORE RUN	SAMPLE RECOVERY CORE RECOVERY	SAMPLE BLOWS IN PERCENT CORE RECOVERY	SAMPLE BLOWS			ELEVATION	DEPTH (FT.)	GRAPHIC LOG	SAMPLE NO.	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
				1ST 6 IN.	2ND 6 IN.	3RD 6 IN.						
							517.5				0.0 - 7.0 FT. <u>CLAYEY SILT</u> (ML-CL): MODERATE YELLOWISH BROWN (10YR5/4) WITH BLEBS OF LIGHT TO MODERATE BROWN (5YR5/6 TO 5YR4/4) AND DUSKY BROWN (5YR2/2) FLECKS, MOIST, STIFF, LOW TO MEDIUM PLASTICITY, TRACE OF VERY FINE SAND.	BORING ADVANCED FROM 0 TO 18.5 FT. USING 7-IN. O.D. HOLLOW-STEM AUGERS.
2' SS	18"	18"	11	3	5	6		5	1			
							510.5					
2' SS	18"	18"	9	3	4	5		10	2			
							506.5				7.0 - 11.0 FT. <u>CLAYEY SILT</u> (ML): PALE YELLOWISH BROWN (10YR6/2) WITH SOME MODERATE BROWN (5YR4/4), DAMP TO MOIST, STIFF, LOW TO MEDIUM PLASTICITY.	GROUND-WATER LEVEL AT 7.7 FT. ON 12/20/84.
2' SS	18"	18"	7	2	3	4		15	3		11.0 - 18.0 FT. <u>SILTY CLAY</u> (CL): PALE YELLOWISH BROWN (10YR6/2) WITH SOME MODERATE BROWN (5YR4/4), DAMP, MEDIUM STIFF, MEDIUM PLASTICITY, TRACE OF VERY FINE SAND.	SAMPLE NO. 2 EXHIBITS WET SURFACE WHEN SHAKEN.
							499.5					LABORATORY GRADATION TEST PERFORMED ON SAMPLE NO. 2.
2' SS	18"	18"	12	3	5	7	497.5	20	4		18.0 - 20.0 FT. <u>SILTY CLAY</u> (CL): LIGHT OLIVE GRAY (5Y6/1) WITH BLEBS OF MODERATE YELLOWISH BROWN (10YR5/4), DAMP, STIFF, MEDIUM TO HIGH PLASTICITY, TRACE OF VERY FINE SAND.	ENCOUNTERED WATER TABLE DURING DRILLING AT ABOUT 13.5 FT.
											BOTTOM OF HOLE AT 20.0 FT. HOLE CONVERTED TO OBSERVATION WELL. SEE OBSERVATION WELL LOG FOR CONSTRUCTION DETAILS.	

SS=SPLIT SPOON; ST=SHELBY TUBE;
D=DENNISON; P=PITCHER; O=OTHER

SITE
HAZELWOOD INTERIM STORAGE SITE

HOLE NO.
HISS-12



GEOLOGIC DRILL LOG				PROJECT		JOB NO.	SHEET NO.	HOLE NO.				
				FUSRAP		14501	1 OF 1	HISS-13				
SITE			LOCATION			ANGLE FROM HORIZ.		BEARING				
HAZELWOOD INTERIM STORAGE SITE			STA. 8+65.9 OFFSET 677.5 FT. RT.			90°		N.A.				
BEGIN	COMPLETED	DRILLER		DRILL MAKE AND MODEL		HOLE SIZE	OVERBURDEN (FT.)	ROCK (FT.)				
12/17/84	12/17/84	J. MATHES AND ASSOCIATES		CME 550 ATV		7 IN.	25.0	N.A.				
CORE RECOVERY(FT./%)		CORE BOXES	SAMPLES	EL. TOP OF CASING	GROUND EL.	DEPTH/EL. GROUND WATER		DEPTH/EL. TOP OF ROCK				
N.A.		N.A.	5	524.4	521.7	10.8 FT./510.9		N.A.				
SAMPLE HAMMER WEIGHT/FALL		CASING LEFT IN HOLE: DIA./LENGTH			LOGGED BY:							
140 LBS./30 IN.		2 IN. PVC/26.6 FT.			L. MATTHEWS							
SAMPLE TYPE AND DIAMETER	SAMPLER ADVANCE LENGTH CORE RUN	SAMPLE RECOVERY CORE RECOVERY	SAMPLE BLOWS "N" PERCENT CORE RECOVERY	SAMPLE BLOWS			ELEVATION	DEPTH (FT.)	GRAPHIC LOG	SAMPLE NO.	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
				1ST 6 IN.	2ND 6 IN.	3RD 6 IN.						
							521.7				0.0 - 9.0 FT. <u>SILTY CLAY (CL)</u> : MOTTLED PALE YELLOWISH BROWN (10YR6/2) AND MODERATE YELLOWISH BROWN (10YR5/4) WITH DUSKY BROWN (5YR2/2) FLECKS, DRY TO DAMP, STIFF.	BDRING ADVANCED FROM 0 TO 23.5 FT. USING 7-IN. O.D. HOLLOW-STEM AUGERS.
2" SS	18"	12"	15	6	8	7		5		1		
							512.7				9.0 - 13.0 FT. <u>CLAYEY SILT (ML)</u> : PALE YELLOWISH BROWN (10YR6/2) WITH STREAKS OF MODERATE YELLOWISH BROWN (10YR5/4). MOIST, MEDIUM STIFF, LOW PLASTICITY.	SAMPLE NO. 2 EXHIBITS WET SURFACE WHEN SHAKEN. GROUND-WATER LEVEL AT 10.8 FT. ON 12/20/84
2" SS	18"	18"	7	2	3	4		10		2		
							508.7				13.0 - 22.0 FT. <u>SILTY CLAY (CL)</u> : DARK YELLOWISH BROWN (10YR4/2) WITH BLEBS OF MODERATE YELLOWISH BROWN (10YR5/4). DAMP TO MOIST, STIFF. LOW TO MEDIUM PLASTICITY.	APPEARS TO BE INCREASING CLAY CONTENT FROM SAMPLE NO. 3 TO SAMPLE NO. 4.
2" SS	18"	18"	10	3	5	5		15		3		
							499.7				22.0 - 25.0 FT. <u>SILTY CLAY (CL)</u> : LIGHT OLIVE GRAY (5Y6/1) WITH BLEBS OF MODERATE YELLOWISH BROWN (10YR5/4) AND LIGHT BROWN (5YR5/6) AND DUSKY BROWN (5YR2/2) FLECKS, DAMP, STIFF, MEDIUM PLASTICITY.	BOTTOM OF HOLE AT 25.0 FT. HOLE CONVERTED TO OBSERVATION WELL. SEE OBSERVATION WELL LOG FOR CONSTRUCTION DETAILS.
2" SS	18"	18"	12	3	5	7	496.7	25		5		

SS=SPLIT SPOON; ST=SHELBY TUBE;
D=DENNISON; P=PITCHER; O=OTHER

SITE

HAZELWOOD INTERIM STORAGE SITE

HOLE NO.

HISS-13



GEOLOGIC DRILL LOG				PROJECT		JOB NO.	SHEET NO.	HOLE NO.						
				FUSRAP		14501	1 OF 1	HISS-14						
SITE			LOCATION			ANGLE FROM HORIZ.		BEARING						
HAZELWOOD INTERIM STORAGE SITE			STA. 8+63.6 OFFSET 420.2 FT. RT.			90°		N.A.						
BEGUN	COMPLETED	DRILLER		DRILL MAKE AND MODEL		HOLE SIZE	OVERBURDEN (FT.)	ROCK (FT.)						
12/14/84	12/14/84	J. MATHES AND ASSOCIATES		CME 550 ATV		7 IN.	30.0	N.A.						
CORE RECOVERY (FT./%)		CORE BOXES	SAMPLES	EL. TOP OF CASING	GROUND EL.	DEPTH/EL. GROUND WATER		DEPTH/EL. TOP OF ROCK						
N.A.		N.A.	6	523.0	520.4	9.3 FT./511.1		N.A.						
SAMPLE HAMMER WEIGHT/FALL			CASING LEFT IN HOLE DIA./LENGTH			LOGGED BY:								
140 LBS./30 IN.			2 IN. PVC/31.7 FT.			L. MATTHEWS								
SAMPLE TYPE AND DIAMETER	SAMPLER ADVANCE LENGTH CORE RUN	SAMPLE RECOVERY CORE RECOVERY	SAMPLE BLOWS "N" PERCENT CORE RECOVERY	SAMPLE BLOWS			ELEVATION	DEPTH (FT.)	GRAPHIC LOG	SAMPLE NO.	DESCRIPTION AND CLASSIFICATION	NOTES ON WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.		
				1ST 6 IN.	2ND 6 IN.	3RD 6 IN.								
							520.4				0.0 - 7.0 FT. <u>SILTY CLAY (CL)</u> : MOTTLED PALE YELLOWISH BROWN (10YR6/2), MODERATE YELLOWISH BROWN (10YR5/4) AND GREENISH GRAY (5GY6/1) WITH DUSKY BROWN (5YR2/2) FLECKS, DAMP, STIFF, MEDIUM PLASTICITY, TRACE OF VERY FINE SAND.	BORING ADVANCED FROM 0 TO 28.5 FT. USING 7-IN. O.D. HOLLOW-STEM AUGERS.		
2' SS	18"	18"	9	3	4	5			1					
							513.4			5				
2' SS	18"	18"	7	3	3	4			2				7.0 - 13.0 FT. <u>CLAYEY SILT (ML)</u> : GREENISH GRAY (5GY6/1) WITH SOME MODERATE YELLOWISH BROWN (10YR5/4) AND FLECKS OF DUSKY BROWN (5YR2/2), DAMP TO MOIST, MEDIUM STIFF, LOW TO MEDIUM PLASTICITY.	SAMPLE NO. 2 EXHIBITS SLIGHTLY WET SURFACE WHEN SHAKEN.
							507.4			10				
2' SS	18"	18"	7	2	3	4			3				13.0 - 22.0 FT. <u>SILTY CLAY (CL)</u> : MOTTLED PALE YELLOWISH BROWN (10YR6/2) AND MODERATE YELLOWISH BROWN (10YR5/4) WITH DUSKY BROWN (5YR2/2) FLECKS, DAMP TO MOIST, MEDIUM STIFF TO STIFF, MEDIUM PLASTICITY, TRACE OF VERY FINE SAND.	GROUND-WATER LEVEL AT 9.3 FT. ON 12/20/84.
										15				
2' SS	18"	18"	10	2	4	6			4			APPEARS TO BE INCREASING CLAY CONTENT FROM SAMPLE NO. 3 TO SAMPLE NO. 4.		
							498.4			20				
2' SS	18"	18"	11	3	5	6			5		22.0 - 30.0 FT. <u>SILTY CLAY (CL)</u> : MOTTLED GREENISH GRAY (5GY6/1) AND MODERATE TO PALE YELLOWISH BROWN (10YR5/4 TO 10YR6/2), DAMP, STIFF TO VERY STIFF, HIGH PLASTICITY.			
										25				
2' SS	18"	18"	17	2	8	9			6					
							490.4			30				
BOTTOM OF HOLE AT 30.0 FT.														
HOLE CONVERTED TO OBSERVATION WELL.														
SEE OBSERVATION WELL LOG FOR CONSTRUCTION DETAILS.														

SS=SPLIT SPOON; ST=SHELBY TUBE;
D=DENNISON; P=PITCHER; O=OTHER

SITE

HAZELWOOD INTERIM STORAGE SITE

HOLE NO.

HISS-14



GEOLOGIC DRILL LOG				PROJECT FUSRAP			JOB NO. 14501		SHEET NO. 1 OF 1		HOLE NO. HISS-15				
SITE HAZELWOOD INTERIM STORAGE SITE				LOCATION STA. 8+64.5 OFFSET 101.9 FT. RT.				ANGLE FROM HORIZ. 90°		BEARING N.A.					
BEGUN 12/14/84		COMPLETED 12/14/84		DRILLER J. MATHES AND ASSOCIATES		DRILL MAKE AND MODEL CME 550 ATV		HOLE SIZE 7 IN.		OVERBURDEN (FT.) 20.5		ROCK (FT.) N.A.		TOTAL DEPTH 20.5 FT.	
CORE RECOVERY(FT./%) N.A.		CORE BOXES N.A.		SAMPLES 4		EL. TOP OF CASINO 518.9		GROUND EL. 515.9		DEPTH/EL. GROUND WATER 4.7 FT./511.2		DEPTH/EL. TOP OF ROCK N.A.			
SAMPLE HAMMER WEIGHT/FALL 140 LBS./30 IN.				CASING LEFT IN HOLE: DIA./LENGTH 2 IN. PVC/22.0 FT.				LOGGED BY: L. MATTHEWS							
SAMPLE TYPE AND DIAMETER	SAMPLER ADVANCE LENGTH CORE RUN	SAMPLE RECOVERY CORE RECOVERY	SAMPLE BLOWS % PERCENT CORE RECOVERY	SAMPLE BLOWS			ELEVATION	DEPTH (FT.)	GRAPHIC LOG	SAMPLE NO.	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.			
				1ST 6 IN.	2ND 6 IN.	3RD 6 IN.									
							515.9				0.0 - 3.0 FT. <u>FILL</u> : ROCK, CONCRETE, AND ASPHALT FRAGMENTS, ETC.	BORING ADVANCED FROM 0 TO 19.0 FT. USING 7-IN. O.D. HOL- LOW-STEM AUGERS. GROUND-WATER LEVEL AT 4.7 FT. ON 12/20/84. SAMPLE NO. 3 EX- HIBITS WET SURFACE WHEN SHAKEN. LABORATORY GRAO- ATION TEST PER- FORMED ON SAMPLE NO. 3. SAMPLE NO. 4 EX- HIBITS SLIGHTLY WET SURFACE WHEN SHAKEN.			
							512.9				3.0 - 6.0 FT. <u>SILTY CLAY (CL)</u> : DARK YELLOWISH BROWN (10YR4/2) WITH TRACE OF MODERATE YELLOWISH BROWN (10YR5/4) AND DUSKY BROWN (5YR2/2). DAMP TO MOIST, SOFT, TRACE OF ROCK FRAGMENTS.				
2" SS	18"	18"	3	2	1	2	509.9	5	1		6.0 - 11.0 FT. <u>SILTY CLAY (CL)</u> : DUSKY YELLOWISH BROWN (10YR2/2), DAMP, MEDIUM STIFF, MEDIUM TO HIGH PLASTICITY, TRACE OF VERY FINE SAND.				
2" SS	18"	18"	6	2	3	3	504.9	10	2		11.0 - 15.0 FT. <u>CLAYEY SILT (ML)</u> : GREENISH GRAY (5GY6/1), MOIST, MEDIUM STIFF, LOW PLASTICITY.				
2" SS	18"	18"	7	2	3	4	500.9	15	3		15.0 - 20.5 FT. <u>CLAYEY SILT (ML-CL)</u> : DUSKY YELLOWISH BROWN (10YR2/2), MOIST, MEDIUM STIFF, LOW TO MEDIUM PLASTICITY, TRACE OF VERY FINE SAND AND ORGANIC MATERIAL.				
2" SS	18"	16"	8	2	4	4	495.4	20	4		BOTTOM OF HOLE AT 20.5 FT. HOLE CONVERTED TO OBSERVATION WELL. SEE OBSERVATION WELL LOG FOR CONSTRUCTION DETAILS.				

SS=SPLIT SPOON; ST=SHELBY TUBE;
D=DENNISON; P=PITCHER; O=OTHER

SITE
HAZELWOOD INTERIM STORAGE SITE

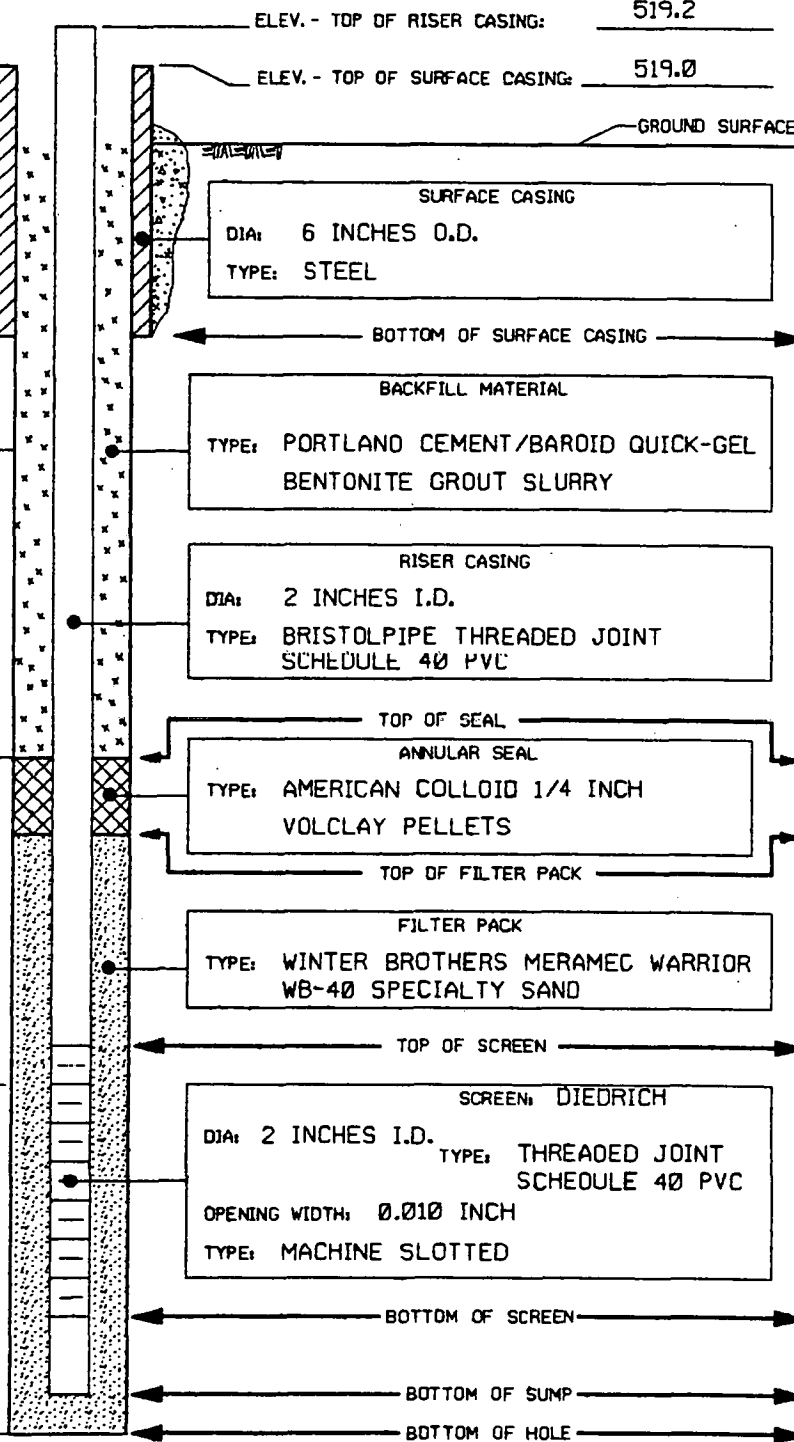
HOLE NO.
HISS-15

APPENDIX B

OBSERVATION WELL CONSTRUCTION LOGS

NOTE: Observation well locations are referenced to site construction baseline shown in Figure 1.1.



OBSERVATION WELL		PROJECT	WELL NO.	
		FUSRAP	HISS- 9	
JOB NO. 14501	SITE HAZELWOOD I.S.S.	LOCATION STA. 4+19.2 OFFSET 30.3 FT. RIGHT		
BEGUN 12/12/84	COMPLETED 12/12/84	PREPARED BY L. MATTHEWS	REFERENCE POINT FOR MEASUREMENTS TOP OF RISER CASING	
 <p>GENERALIZED GEOLOGIC LOG</p> <p>0.0 - 6.0 FT. <u>CLAYEY SILT</u>: MODERATE BROWN, DAMP, STIFF, TRACE OF FINE SAND AND ORGANIC MATERIAL.</p> <p>6.0 - 17.0 FT. <u>CLAYEY SILT</u>: MODERATE YELLOWISH BROWN AND PALE YELLOWISH BROWN, DAMP TO MOIST, MEDIUM STIFF, TRACE OF FINE SAND.</p> <p>17.0 - 22.0 FT. <u>SILTY CLAY</u>: PALE YELLOWISH BROWN, MOIST, SOFT.</p> <p>22.0 - 28.5 FT. <u>CLAYEY SILT</u>: GREENISH GRAY, DAMP TO MOIST, STIFF, TRACE TO LITTLE FINE SAND.</p>			DEPTH (FT)	ELEV. (FT)
ELEV. - TOP OF RISER CASING: 519.2				
ELEV. - TOP OF SURFACE CASING: 519.0				
GROUND SURFACE			0.0	517.3
SURFACE CASING DIA: 6 INCHES O.D. TYPE: STEEL				
BOTTOM OF SURFACE CASING			3.3	514.0
BACKFILL MATERIAL TYPE: PORTLAND CEMENT/BAROID QUICK-GEL BENTONITE GROUT SLURRY				
RISER CASING DIA: 2 INCHES I.D. TYPE: BRISTOLPIPE THREADED JOINT SCHEDULE 40 PVC				
TOP OF SEAL			16.7	500.6
ANNULAR SEAL TYPE: AMERICAN COLLOID 1/4 INCH VOLCLAY PELLETS			19.4	497.9
TOP OF FILTER PACK				
FILTER PACK TYPE: WINTER BROTHERS MERAMEC WARRIOR WB-40 SPECIALTY SAND				
TOP OF SCREEN			21.4	495.9
SCREEN: DIEDRICH DIA: 2 INCHES I.D. TYPE: THREADED JOINT SCHEDULE 40 PVC OPENING WIDTH: 0.010 INCH TYPE: MACHINE SLOTTED				
BOTTOM OF SCREEN			26.1	491.2
BOTTOM OF SUMP			28.4	488.9
BOTTOM OF HOLE			28.5	488.8
HOLE ADVANCED USING 7 IN. O.D. HOLLOW-STEM AUGERS. LOG IS FROM DESCRIPTION OF SPLIT-SPOON SAMPLES. TAKEN FROM BORING HISS-9A.				
HOLE DIA: 7 INCHES				



OBSERVATION WELL		PROJECT	WELL NO.	
		FUSRAP	HISS- 10	
JOB NO. 14501	SITE HAZELWOOD I.S.S.	LOCATION STA. 3+53.2 OFFSET 486.9 FT. RIGHT		
BEGUN 12/13/84	COMPLETED 12/13/84	PREPARED BY L. MATTHEWS	REFERENCE POINT FOR MEASUREMENTS TOP OF RISER CASING	
<p>GENERALIZED GEOLOGIC LOG</p> <p>0.0 - 0.5 FT. <u>ROCK FILL</u></p> <p>0.5 - 7.0 FT. <u>SILTY CLAY</u>: MODERATE TO PALE YELLOWISH BROWN, DAMP, STIFF, MEDIUM TO HIGH PLASTICITY.</p> <p>7.0 - 18.0 FT. <u>CLAYEY SILT</u>: DARK YELLOWISH ORANGE TO PALE YELLOWISH BROWN, MOIST, MEDIUM STIFF. LOW TO MEDIUM PLASTICITY.</p> <p>18.0 - 23.0 FT. <u>SILTY CLAY</u>: PALE YELLOWISH BROWN, DAMP TO MOIST, STIFF, MEDIUM PLASTICITY.</p> <p>23.0 - 25.0 FT. <u>CLAYEY SILT</u>: GREENISH GRAY.</p> <p>HOLE ADVANCED USING 7 IN. O.D. HOLLOW-STEM AUGERS. LOG IS FROM DESCRIPTION OF SPLIT-SPOON SAMPLES.</p>			DEPTH (FT)	ELEV. (FT)
			<p>ELEV. - TOP OF RISER CASING: 519.5</p> <p>ELEV. - TOP OF SURFACE CASING: 519.3</p> <p>GROUND SURFACE 0.0 517.2</p> <p>3.0 514.2</p> <p>12.0 505.2</p> <p>14.1 503.1</p> <p>16.6 500.6</p> <p>21.3 495.9</p> <p>23.6 493.6</p> <p>25.0 492.2</p>	
<p>SURFACE CASING</p> <p>DIA: 6 INCHES O.D.</p> <p>TYPE: STEEL</p> <p>BOTTOM OF SURFACE CASING</p> <p>BACKFILL MATERIAL</p> <p>TYPE: PORTLAND CEMENT/BARDID QUICK-GEL BENTONITE GROUT SLURRY</p> <p>RISER CASING</p> <p>DIA: 2 INCHES I.D.</p> <p>TYPE: BRISTOLPIPE THREADED JOINT SCHEDULE 40 PVC</p> <p>TOP OF SEAL</p> <p>ANNULAR SEAL</p> <p>TYPE: AMERICAN COLLOID 1/4 INCH VOLCLAY PELLETS</p> <p>TOP OF FILTER PACK</p> <p>FILTER PACK</p> <p>TYPE: WINTER BROTHERS MERAMEC WARRIOR WB-40 SPECIALTY SAND</p> <p>TOP OF SCREEN</p> <p>SCREEN: DIEDRICH</p> <p>DIA: 2 INCHES I.D.</p> <p>TYPE: THREADED JOINT SCHEDULE 40 PVC</p> <p>OPENING WIDTH: 0.010 INCH</p> <p>TYPE: MACHINE SLOTTED</p> <p>BOTTOM OF SCREEN</p> <p>BOTTOM OF SUMP</p> <p>BOTTOM OF HOLE</p> <p>HOLE DIA: 7 INCHES</p>				



OBSERVATION WELL		PROJECT	WELL NO.	
		FUSRAP	HISS- 11	
JOB NO.	SITE	LOCATION		
14501	HAZELWOOD I.S.S.	STA. 5+84.8 OFFSET 943.1 FT. RIGHT		
BEGUN	COMPLETED	PREPARED BY	REFERENCE POINT FOR MEASUREMENTS	
12/13/84	12/13/84	L. MATTHEWS	TOP OF RISER CASING	

GENERALIZED GEOLOGIC LOG		DEPTH (FT)	ELEV. (FT)
	ELEV. - TOP OF RISER CASING: 518.6		
	ELEV. - TOP OF SURFACE CASING: 518.3		
	GROUND SURFACE	0.0	515.7
0.0 - 5.0 FT. <u>CLAYEY SILT</u> : DARK YELLOWISH BROWN TO DUSKY YELLOWISH BROWN, DAMP, STIFF, SOME ORGANIC MATERIAL.		2.5	513.2
5.0 - 11.0 FT. <u>SILTY CLAY</u> : PALE YELLOWISH BROWN, DAMP TO MOIST, MEDIUM STIFF, TRACE OF ORGANIC MATERIAL.			
11.0 - 17.0 FT. <u>CLAYEY SILT</u> : PALE YELLOWISH BROWN, MOIST, MEDIUM STIFF, LOW TO MEDIUM PLASTICITY.		10.4	505.3
		12.7	503.0
17.0 - 22.0 FT. <u>SILTY CLAY</u> : PALE YELLOWISH BROWN, DAMP TO MOIST, MEDIUM STIFF, MEDIUM PLASTICITY, TRACE OF ORGANIC MATERIAL.		15.6	500.1
22.0 - 23.8 FT. <u>CLAYEY SILT</u> : GREENISH GRAY.		20.3	495.4
		22.6	493.1
		23.8	491.9
HOLE ADVANCED USING 7 IN. O.D. HOLLOW-STEM AUGERS. LOG IS FROM DESCRIPTION OF SPLIT-SPOON SAMPLES.			



OBSERVATION WELL		PROJECT	WELL NO.	
		FUSRAP	HISS- 12	
JOB NO. 14501	SITE HAZELWOOD I.S.S.	LOCATION STA. 8+38.9 OFFSET 927.4 FT. RIGHT		
BEGUN 12/17/84	COMPLETED 12/17/84	PREPARED BY L. MATTHEWS	REFERENCE POINT FOR MEASUREMENTS TOP OF RISER CASING	
<p>GENERALIZED GEOLOGIC LOG</p> <p>0.0 - 7.0 FT. <u>CLAYEY SILT</u>: MODERATE YELLOWISH BROWN, MOIST, STIFF, LOW TO MEDIUM PLASTICITY, TRACE OF VERY FINE SAND.</p> <p>7.0 - 11.0 FT. <u>CLAYEY SILT</u>: PALE YELLOWISH BROWN, DAMP TO MOIST, STIFF, LOW TO MEDIUM PLASTICITY.</p> <p>11.0 - 18.0 FT. <u>SILTY CLAY</u>: PALE YELLOWISH BROWN, DAMP, MEDIUM STIFF, MEDIUM PLASTICITY, TRACE OF VERY FINE SAND.</p> <p>18.0 - 20.0 FT. <u>SILTY CLAY</u>: LIGHT OLIVE GRAY.</p> <p>HOLE ADVANCED USING 7 IN. O.D. HOLLOW-STEM AUGERS. LOG IS FROM DESCRIPTION OF SPLIT-SPOON SAMPLES.</p>			DEPTH (FT)	ELEV. (FT)
<p>ELEV. - TOP OF RISER CASING: 520.3</p> <p>ELEV. - TOP OF SURFACE CASING: 520.1</p> <p>GROUND SURFACE</p>			0.0	517.5
<p>SURFACE CASING</p> <p>DIA: 6 INCHES O.D.</p> <p>TYPE: STEEL</p> <p>BOTTOM OF SURFACE CASING</p>			2.5	515.0
<p>BACKFILL MATERIAL</p> <p>TYPE: PORTLAND CEMENT/BAROID QUICK-GEL BENTONITE GROUT SLURRY</p>				
<p>RISER CASING</p> <p>DIA: 2 INCHES I.D.</p> <p>TYPE: BRISTOLPIPE THREADED JOINT SCHEDULE 40 PVC</p>				
<p>TOP OF SEAL</p> <p>ANNULAR SEAL</p> <p>TYPE: AMERICAN COLLOID 1/4 INCH VOLCLAY PELLETS</p> <p>TOP OF FILTER PACK</p>			8.3	509.2
<p>FILTER PACK</p> <p>TYPE: WINTER BROTHERS MERAMEC WARRIOR WB-40 SPECIALTY SAND</p> <p>TOP OF SCREEN</p>			9.8	507.7
<p>SCREEN: DIEDRICH</p> <p>DIA: 2 INCHES I.D.</p> <p>TYPE: THREADED JOINT SCHEDULE 40 PVC</p> <p>OPENING WIDTH: 0.010 INCH</p> <p>TYPE: MACHINE SLOTTED</p> <p>BOTTOM OF SCREEN</p>			12.1	505.4
<p>BOTTOM OF SUMP</p>			16.8	500.7
<p>BOTTOM OF HOLE</p>			18.9	498.6
<p>HOLE DIA: 7 INCHES</p>			20.0	497.5



OBSERVATION WELL		PROJECT	FUSRAP		WELL NO.
		HISS- 13			
JOB NO.	SITE	LOCATION			
14501	HAZELWOOD I.S.S.	STA. 8+65.9 OFFSET 677.5 FT. RIGHT			
BEGUN	COMPLETED	PREPARED BY	REFERENCE POINT FOR MEASUREMENTS		
12/17/84	12/17/84	L. MATTHEWS	TOP OF RISER CASING		

	DEPTH (FT)	ELEV. (FT)
ELEV. - TOP OF RISER CASING:		524.4
ELEV. - TOP OF SURFACE CASING:		523.9
GROUND SURFACE	0.0	521.7
GENERALIZED GEOLOGIC LOG		
0.0 - 9.0 FT. <u>SILTY CLAY</u> : MOTTLED PALE YELLOWISH BROWN AND MODERATE YELLOWISH BROWN, DRY TO DAMP, STIFF.		
SURFACE CASING DIA: 6 INCHES O.D. TYPE: STEEL		
BOTTOM OF SURFACE CASING		
BACKFILL MATERIAL TYPE: PORTLAND CEMENT/BAROID QUICK-GEL BENTONITE GROUT SLURRY		
RISER CASING DIA: 2 INCHES I.D. TYPE: BRISTOLPIPE THREADED JOINT SCHEDULE 40 PVC		
TOP OF SEAL		
ANNULAR SEAL TYPE: AMERICAN COLLOID 1/4 INCH VOLCLAY PELLETS		
TOP OF FILTER PACK		
FILTER PACK TYPE: WINTER BROTHERS MERAMEC WARRIOR WB-40 SPECIALTY SAND		
TOP OF SCREEN		
SCREEN: DIEDRICH DIA: 2 INCHES I.O. TYPE: THREADED JOINT SCHEDULE 40 PVC OPENING WIDTH: 0.010 INCH TYPE: MACHINE SLOTTED		
BOTTOM OF SCREEN		
BOTTOM OF SUMP		
BOTTOM OF HOLE		
HOLE DIA: 7 INCHES		
HOLE ADVANCED USING 7 IN. O.D. HOLLOW-STEM AUGERS. LOG IS FROM DESCRIPTION OF SPLIT-SPOON SAMPLES.		

9.0 - 13.0 FT. <u>CLAYEY SILT</u> : PALE YELLOWISH BROWN, MOIST, MEDIUM STIFF, LOW PLASTICITY.	2.8	518.9
13.0 - 22.0 FT. <u>SILTY CLAY</u> : DARK YELLOWISH BROWN, DAMP TO MOIST, STIFF, LOW TO MEDIUM PLASTICITY.	8.0	513.7
	10.0	511.7
22.0 - 25.0 FT. <u>SILTY CLAY</u> : LIGHT OLIVE GRAY.	12.8	508.9
	17.5	504.2
	23.9	497.8
	25.0	496.7



OBSERVATION WELL		PROJECT	WELL NO.
		FUSRAP	HISS- 14
JOB NO.	SITE	LOCATION	
14501	HAZELWOOD I.S.S.	STA. 8+63.6 OFFSET 420.2 FT. RIGHT	
BEGUN	COMPLETED	PREPARED BY	REFERENCE POINT FOR MEASUREMENTS
12/14/84	12/14/84	L. MATTHEWS	TOP OF RISER CASING

	DEPTH (FT)	ELEV. (FT)
ELEV. - TOP OF RISER CASING: 523.0		
ELEV. - TOP OF SURFACE CASING: 522.8		
GROUND SURFACE	0.0	520.4
GENERALIZED GEOLOGIC LOG		
0.0 - 7.0 FT. <u>SILTY CLAY</u> : MOTTLED PALE YELLOWISH BROWN, MODERATE YELLOWISH BROWN AND GREENISH GRAY, DAMP, STIFF, MEDIUM PLASTICITY, TRACE OF VERY FINE SAND.		
SURFACE CASING DIA: 6 INCHES O.D. TYPE: STEEL		
BOTTOM OF SURFACE CASING		
BACKFILL MATERIAL TYPE: PORTLAND CEMENT/BAROID QUICK-GEL BENTONITE GROUT SLURRY		
RISER CASING DIA: 2 INCHES I.D. TYPE: BRISTOLPIPE THREADED JOINT SCHEDULE 40 PVC		
TOP OF SEAL		
ANNULAR SEAL TYPE: AMERICAN COLLOID 1/4 INCH VOLCLAY PELLETS		
TOP OF FILTER PACK		
FILTER PACK TYPE: WINTER BROTHERS MERAMEC WARRIOR WB-40 SPECIALTY SAND		
TOP OF SCREEN		
SCREEN: DIEDRICH DIA: 2 INCHES I.D. TYPE: THREADED JOINT SCHEDULE 40 PVC OPENING WIDTH: 0.010 INCH TYPE: MACHINE SLOTTED		
BOTTOM OF SCREEN		
BOTTOM OF SUMP		
BOTTOM OF HOLE		
HOLE DIA: 7 INCHES		
HOLE ADVANCED USING 7 IN. O.D. HOLLOW-STEM AUGERS. LOG IS FROM DESCRIPTION OF SPLIT-SPOON SAMPLES.		

	DEPTH (FT)	ELEV. (FT)
	2.7	517.7
	6.5	513.9
	9.3	511.1
	11.6	508.8
	21.3	499.1
	29.1	491.3
	30.0	490.4



OBSERVATION WELL		PROJECT	WELL NO.	
		FUSRAP	HISS- 15	
JOB NO.	SITE	LOCATION		
14501	HAZELWOOD I.S.S.	STA. 8+64.5 OFFSET 101.9 FT. RIGHT		
BEGUN	COMPLETED	PREPARED BY	REFERENCE POINT FOR MEASUREMENTS	
12/14/84	12/14/84	L. MATTHEWS	TOP OF RISER CASING	

GENERALIZED GEOLOGIC LOG		DEPTH (FT)	ELEV. (FT)
0.0 - 3.0 FT. FILL: ROCK, CONCRETE, AND ASPHALT FRAGMENTS, ETC.		0.0	515.9
3.0 - 6.0 FT. SILTY CLAY: DARK YELLOWISH BROWN, DAMP TO MOIST, SOFT, TRACE OF ROCK FRAGMENTS.		2.3	513.6
6.0 - 11.0 FT. SILTY CLAY: DUSKY YELLOWISH BROWN, DAMP, MEDIUM STIFF, MEDIUM TO HIGH PLASTICITY, TRACE OF VERY FINE SAND.		8.2	507.7
11.0 - 15.0 FT. CLAYEY SILT: GREENISH GRAY, MOIST, MEDIUM STIFF, LOW PLASTICITY.		10.3	505.6
15.0 - 20.5 FT. CLAYEY SILT: DUSKY YELLOWISH BROWN, MOIST, MEDIUM STIFF, LOW TO MEDIUM PLASTICITY, TRACE OF VERY FINE SAND.		12.2	503.7
HOLE ADVANCED USING 7 IN. O.D. HOLLOW-STEM AUGERS. LOG IS FROM DESCRIPTION OF SPLIT-SPOON SAMPLES.		16.9	499.0
		19.0	496.9
		20.5	495.4

Casing and Screen Details		DEPTH (FT)	ELEV. (FT)
ELEV. - TOP OF RISER CASING:		518.9	
ELEV. - TOP OF SURFACE CASING:		518.6	
GROUND SURFACE		0.0	515.9
SURFACE CASING DIA: 6 INCHES O.D. TYPE: STEEL			
BOTTOM OF SURFACE CASING		2.3	513.6
BACKFILL MATERIAL TYPE: PORTLAND CEMENT/BAROID QUICK-GEL BENTONITE GROUT SLURRY			
RISER CASING DIA: 2 INCHES I.D. TYPE: BRISTOLPIPE THREADED JOINT SCHEDULE 40 PVC			
TOP OF SEAL ANNULAR SEAL TYPE: AMERICAN COLLOID 1/4 INCH VOLCLAY PELLETS		8.2	507.7
TOP OF FILTER PACK		10.3	505.6
FILTER PACK TYPE: WINTER BROTHERS MERAMEC WARRIOR WB-40 SPECIALTY SAND			
TOP OF SCREEN		12.2	503.7
SCREEN: DIEDRICH DIA: 2 INCHES I.D. TYPE: THREADED JOINT SCHEDULE 40 PVC OPENING WIDTH: 0.010 INCH TYPE: MACHINE SLOTTED			
BOTTOM OF SCREEN		16.9	499.0
BOTTOM OF SUMP		19.0	496.9
BOTTOM OF HOLE		20.5	495.4
HOLE DIA: 7 INCHES			

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Further Info?

☐

Operating Unit

North County

Site

HISS

Area

MARKS Number

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Author/Originator

Company

BNI

Date

7/1/1985

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Company (-ies)

USDOE

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Comments

Include in which AR(s)?

☒ North County

☐ Madison

☐ Downtown

☐ Iowa

ETL

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1

Bechtel ID

