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SLANT BOREHOLE DEMONSTRATION SUMMARY REPORT

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June 28, 2000

Prepared for CH2M Hill Hanford Group

by
Sampling and Well Services
Waste Management Technical Services

SLANT BOREHOLE DEMONSTRATION SUMMARY REPORT

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Abstract: This report provides a summary of the demonstration project for development of a slant borehole to retrieve soil samples from beneath the SX-108 single-shell tank. It provides a summary of the findings from the demonstration activities and recommendations for tool selection and methods to deploy into the SX Tank Farm. Daily work activities were recorded on Drilling and Sampling Daily Work Record Reports. The work described in this document was performed during March and April 2000.

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LIST OF TERMS

ALARA	as low as reasonable achievable
cm	centimeter
DOE	U.S. Department of Energy
ft	foot
ft lb	foot-pound
gal	gallon
HEPA	high efficiency particulate air
HPGe	High-purity Germanium
HPT	health physics technician
in.	inch
NCO	nuclear chemical operator
oz	ounce
PNNL	Pacific Northwest National Laboratory
psi	pounds per square inch
WMTS	Waste Management Technical Services

SLANT BOREHOLE DEMONSTRATION SUMMARY REPORT

1.0 INTRODUCTION

The U.S. Department of Energy (DOE) assigned the River Protection Project Single-Shell Tank Program the task of developing and implementing a strategy to safely, efficiently, and effectively retrieve single-shell tank and miscellaneous underground storage tank waste and transfer the waste to double-shell tanks. The vadose zone project collects and provides information and understanding on the distribution and movement of contaminants in the vadose zone in and around the tank farms to support plans for the eventual retrieval of the waste. A work plan was written which addresses the vadose zone characterization plans for collecting and analyzing soil samples from the waste management area S-SX (*Site-Specific SST Phase 1 RFI/CMS Work Plan Addendum for WMA S-SX*, HNF-5058, Rev. 0). One of the objectives identified in this addendum is to drill and sediment sample beneath Tank 241-SX-108 to provide additional information on contaminant movement within the vadose zone. An additional objective is to develop a viable alternative to the standard drilling and sampling methods currently utilized at the Hanford Site by driving a closed bottom casing, with a removable tip for sampling, ahead of the casing. A test plan was prepared (*Description of Work: Demonstration of Slant Borehole Installation and Sampling Methods*, Gardner and Simpson 2000) to support this objective which outlined the description of work for demonstrating and testing casing driving, sediment sampling, and data acquisition methods in a clean environment.

The purpose of the demonstration was to establish a viable method of retrieving sediment samples from beneath Tank 241-SX-108 and to provide hands-on training to members of the team that would enter the tank farm and perform the actual task to drive casing and collect samples.

This report is a summary of the findings from the demonstration activities and recommendations for tool selection and methods to deploy into the SX Tank Farm. Daily work activities were recorded on Drilling and Sampling (Slant Borehole) Daily Work Record Reports (see Attachment A). The work described in this document was performed during March and April 2000.

2.0 TASK EVALUATIONS

2.1 SITE SETUP

Mobilizing equipment into the SX Tank Farm is of key concern due to the dome loading restrictions and various surface and subsurface structures. A method of stabilizing the 40 ft long trailer mounted drill rig needed to be developed as well as plans for properly positioning the drilling rig over the starter casing. Prior to mobilizing equipment onto the demonstration site, the planned drill site within the tank farm was mapped. The demonstration site was then set up to mirror the selected location within tank farm. Lines were painted on the ground to represent underground tanks and various obstructions such as monitoring wells, transfer lines, stacks, and other structures. The drilling contractor provided a design of a single point anchor block that incorporated a starter casing. A pit was excavated and this anchor box was positioned in the pit and filled with concrete. The excavation was backfilled around the box. The box also incorporated an angle face onto which the casing jacks would be mounted. The initial calculations required the top of the box to be located approximately two feet below grade. This made for a large excavation, exceeding depth limitations for confined space entry. This was important, as the excavation within the tank farm would be dug by hand. The rig was positioned over the demonstration starter casing and anchor block. Observations were made as to which of the obstructions would be in the way of positioning the rig. The rig took several hours of maneuvering to align the drive head to the starter casing. The primary obstruction of concern was an aboveground transfer line. No other facility obstructions were deemed a problem in locating the rig. Ramps to clear the transfer line will be required to allow the rig to be positioned properly. Attachment C identifies the obstructions and tank locations relative to the rig positioning.

Rig motions during driving of casing, leveling and movement caused by use of hydraulic jacks to adjust casing; and wrench and drill pipe alignment with the drive head demonstrated the need for a solid anchoring point. The anchor will also allow for accuracy in aligning the drive mechanisms and provide a stable platform for the casing jacking equipment, as well as stabilization of the rig. Based on observations during the demonstration, it was determined that a smaller anchor block could be used as the rig remained fairly stable and did not move as much as originally estimated. Also, rig clearance would allow the anchor block to be closer to ground surface to accommodate the travel of the casing jacks. This will result in keeping the excavation within the tank farm within safety limits for hand excavation without the use of shoring. A smaller block has been designed for tank farm deployment (Attachment D is a drawing of the anchoring point [box] that will be placed over the drive point location adjacent to SX-108). The anchor box incorporates an 11-in. outside diameter starter casing aligned at 30° from vertical and an angled face on which to position the casing jacks.

Angle drilling rig on demonstration site.

2.2 SEISMIC MONITORING

Seismic monitoring was performed as part of the demonstration. A description of the findings is beyond the scope of this report. Refer to *SX-108 Slant Borehole Dynamic Load Test Evaluation Report* (COGEMA 2000) for the testing results.

2.3 MOCK-UP

The driving of casing at an angle, removal of a casing drive point while leaving the casing in place, and split spoon sampling at an angle have never been attempted within the tank farms, nor on the Hanford Site. In addition to testing and demonstrating these methods, it was determined that training of assigned personnel on tool handling and contamination control techniques was essential to the success of the project.

One full-scale mock-up of contamination control and as low as reasonably achievable (ALARA) based practice was conducted during a sample collection and removal exercise. The drill crew, health physics technician (HPT), and nuclear chemical operator (NCO) conducted a practice dress out, work zone action and undress in mock anti-contamination clothing. The purpose of this exercise was to identify methods to safely handle the sampling tools and removable tip, maintain contamination control and minimize personnel radiation exposure. Sleeving of the sampler and removable tip was practiced and requirements established as well as methods for taking smears of the inside of the casing.

In addition to the mock-up activity, tank farms support personnel participated in several tip removal and sampling exercises. Their observations and recommendations led to improved tool handling, such as adding a quick latch lanyard and hook for picking the split spoon sampler from the breakout wrenches and moving it to the transport drum. Lessons learned from these activities have been beneficial in achieving efficiencies and improving upon safe practices while handling tools.

2.4 FUELING

Refueling of the drill rig and associated equipment is an issue in regards to environmental concerns and access within the tank farms. Fuel consumption during the 33 days of demonstration activities was approximately 150 gal. The rig fuel tank capacity is 200 gal and did not require refueling. Approximately 9 gal of oil was added to the oil reservoir for lubricating the pile drive hammer. This reservoir holds approximately 10 gal of oil. Addition of this oil was accomplished using a 1-gal container. Fuel and oil consumption during the tank farm activities is expected to be the same. When necessary, refueling will be accomplished by walking in 5-gal cans of fuel. Addition of oil will also be by hand. This will eliminate the need for a fuel truck to enter the farm.

2.5 NOISE LEVELS

Drilling operations utilizing generators, compressors and casing hammers normally experience high levels of noise. These high noise levels are not usually constant, but specific to individual activities. To establish adequate hearing protection requirements, noise level monitoring was conducted on several occasions during the demonstration. Based on the results of the noise monitoring, the use of single protection was found to be quite sufficient to protect the workers from the "typical" noise sources encountered during this type of drilling. The drilling contractor's safety plan calls for double protection during casing hammering operations. A recommendation from Waste Management Technical Services (WMTS) safety officer is to consider lowering the requirement for double-hearing protection during percussion hammering operations. Other protection measures were quite sufficient and acceptable. Attachment E is a letter

of recommendations on required hearing protection from the WMTS safety officer. Data collected from the testing is maintained by WMTS.

2.6 CASING JACKS

Hydraulic casing jacks will be required for pulling the casing when sampling and when decommissioning the borehole as the drilling rig does not have the required pull back capability. During casing driving and sampling, the casing was back pulled several times using 100-ton jacks (every sample event and three to four times during difficult driving). For the majority of the demonstration activities, these jacks proved to be of sufficient capacity. After achieving total depth, the casing was not moved for approximately one week. After this period of inactivity, the casing apparently became sand hitched and the rig hydraulics did not have sufficient power to jack the casing. The installation of a separate power pack with greater pressure capacity was installed and the casing moved at 2800 psi (did not require maximum allowable jack pressure of 3000 psi). The casing was removed completely from the borehole with the casing shoe intact. The 100-ton casing jacks, with the addition of the power pack, will provide sufficient pull back capabilities for tank farm deployment.

2.7 CASING SELECTION

The casing was selected to withstand the driving force of the drill rig mounted ICE 40S diesel pile driver. This pile driver delivers approximately 35,000 ft lb of force at a 30° angle (manufacturer estimate). The casing selected was P-110 carbon steel, 18 cm (7-in.) OD X 13 cm (5-13/16-in.) ID with a pin pile thread. The majority of the casing string was composed of 5 ft joints with several 1, 2 and 3 ft joints for positioning at proposed sampling intervals. The thread pattern was selected, based on engineer calculations, to withstand the expected driving force as well as the maximum pull back capacity of the selected casing jacks. Tests were conducted on the threading by the manufacturer, which substantiated the calculations. During the demonstration activities, no problems, with handling or making up the casing, were encountered. The casing was made up to manufacturer's torque specifications (5000 ft lbs). Following removal of the casing from the borehole, the entire casing string was cleaned and visually inspected. No damage was found. Changes to thread design or make up/break out requirements will not be necessary.

2.8 CASING DRIVING

To accomplish the objectives of acquiring samples from beneath the SX-108 tank, the selected casing would have to be driven closed bottom approximately 180 ft on an angle, something never before attempted at Hanford. Required specifications for a casing hammer were unknown. The drilling contractors rig was equipped with an ICE 40 pile driver, which delivers approximately 40,000 ft lb of force in the vertical position. This is

the same pile driver used to drive closed bottom casing to a depth of 130 ft within the SX farm for a previous project. This pile driver provided adequate force in the demonstration to drive the casing at the predetermined 30° drive angle. The target depth of 150 ft vertical depth and 183 ft total casing length was easily achieved. The probe angle drifted up during driving. The starting angle was 30° and drifted up to approximately 40° from vertical at completion (See Section 2.4 for gyroscope survey details). Proper alignment and rig stabilization are essential at the initiation of driving to ensure proper angle of penetration. The method of casing advancement does not currently allow for adjustments to drive direction, once started.

Blow counts vs. time and advancement were recorded and, as expected, varied over depth. Charts of the blow counts at the various depths are provided in Attachment F. At 183.36 ft casing length (total depth) approximately 106 blows per ft were required to drive the casing. This resistance to driving was interpreted as being the Plio-Pleistocene interval and the point at which the borehole would be terminated.

No changes to driving methods are recommended. The current set up will be sufficient to accomplish the objectives of the tank farm deployment.

2.9 GYROSCOPIC SURVEYS

Based on data collected from the seismic monitoring, the casing will be required to clear the bottom of the tank by a minimum of 5 ft when driving the casing inside the tank farm. To verify the trajectory of the casing, and to ensure the target requirements are met, a borehole gyroscope survey will be utilized. Given a borehole slope of 30°, when 60 ft of casing is driven into the ground the vertical depth of the borehole should be about 52 ft and the horizontal displacement, 30 ft, if no appreciable deviation occurs. During the demonstration, borehole gyroscope survey's were conducted twice; first at approximately 76 ft casing length and second at total depth. Gyroscope data (Attachment G) obtained from the demonstration slant borehole shows the actual vertical depth was about 51.3 ft and the actual horizontal displacement about 31 ft.. This data indicates that at a depth corresponding to the depth of the base of single shell waste tank (approx. 53 ft), the borehole did not deviate more than 1.5 ft in any direction. These relationships are depicted in Attachment H, whereby the horizontal projection of the borehole casing represents the X axis, perpendicular movement in the ground plane the Y axis, and vertical depth the Z axis.

The gyroscope survey results support meeting target requirements ("window") for passing under the tank at approximately 55-60 ft vertical depth (65-75 ft casing length). During the tank farm deployment, a minimum of two surveys are recommended prior to reaching 55 ft vertical depth to ensure the window is achieved.

2.10 GEOPHYSICAL LOGGING

There are no current plans to conduct geophysical logging during a tank farm deployment; however, should the sampling ahead method prove unsuccessful and an alternate sampling method be deployed, geophysical logging would be conducted to identify sampling intervals. For this reason it was necessary to demonstrate that the logging tools could be deployed in an angle hole. Once total depth (183.36 ft of casing, 148.35 ft vertical depth) was achieved, a standard configuration of a high purity germanium (HPGe) logging tool was run to bottom and retrieved. No problems were encountered. Sleeving issues for contamination control were discussed with nuclear chemical operator and radiological control technician personnel assigned to the project. It is anticipated that logging can be performed without major impact to schedule, should it be desired.

2.11 REMOVABLE TIP AND CASING SHOE

The objective of HNF-5058, Rev. 0, *Site-Specific SST Phase 1 RFI/CMS Work Plan Addendum for WMA S-SX* is to collect sediment samples from beneath the SX-108 Tank. To accomplish this, a closed bottom casing will be driven on an angle. The preferred method to retrieve the samples is to sample ahead of the casing as it is driven using a split spoon sampler. To deploy this sampler, the casing shoe was designed to accommodate a removable tip. When a sampling interval is reached, the tip will be removed and the sampler run. This removable tip design had to meet several requirements, to be considered successful and a viable method for tank farm deployment. It had to be easily removed and re-inserted, be able to remain in place while the casing is driven, and hold up to being driven. The tip was designed as a "plug," eliminating elaborate latching mechanisms. A special drive head was fabricated which allowed adjustments for matching with the top of the casing. During driving operations, the casing and drive tip were driven together as a single unit. The tip was run on an inner string of pipe, which also was used to run the sampler.

The design proved to be very effective for driving as a unit. The adjustable drive head easily aligned to the top of the casing. The tip never showed signs of wear or damage when removed. Upon removal from the borehole at the end of the demonstration, the casing shoe was also undamaged.

The drive tip was removed and re-inserted 11 times during the demonstration. Difficulties were experienced during the first two removals of the tip. Camera surveys were run to determine the cause of the difficulty. Observation of fine material caked to the tip following removal, as well as material packed in the shoe opening as seen by the camera surveys, indicated the need for wiper o-rings. A tip was modified for the demonstration purposes to accept a single o-ring. This modification effectively sealed out fine materials from wedging into the gap between the tip and shoe. No further problems were experienced in removal or re-insertion of the tip.

Another problem experienced was with the centralizing of the inner string of pipe. Difficulties occurred getting the sampler through the opening in the shoe and, at times, the tip had to be rotated to get it in place. Centralizing of the drill string was improved upon during the demonstration, which alleviated some of the problem. Recommendations are to enlarge the center opening of the shoe and modify the tip to match the increased diameter to help reduce the centering difficulties experienced during the demonstration. This will allow easier passage of the sampler through the casing shoe reducing the potential for binding.

Based on these recommendations, the drive shoe will be bored out from 4 1/2-in. to 4 3/4-in. to facilitate insertion of the sampler for tank farm deployment. See Attachment I for final tip design. The larger diameter of the shoe will require the tip to be modified to match the increased diameter. These modifications will reduce tolerances between shoe opening and outside diameter of the sampler, which coupled with the additional centralizes, will further reduce potential for binding of the sampler as it passes through the shoe. The removable tip will also be fabricated to incorporate two wiper o-rings to help seal out fine materials and make for easier removal and re-insertion.

2.12 SPLIT SPOON SAMPLER

A 4-in. ID split spoon sampler was specially designed for collecting sediment samples ahead of the drive casing. This sampler collects a 2-in. X 1 ft driven sample. The sampler body is designed to house a lead liner, the split liner and the sample liners. The built-in lead shielding eliminates the need for a shielded container at the surface and reduces surface handling requirements. The sampler is run on an inner string of drill pipe. The demonstrations of various methods for driving the sampler were required; down hole casing hammer, surface casing hammer (both using Sandvik Rock Tools, Inc., Model SD-6 hammer), and pile driver (ICE 40-S diesel pile driver.) Based on the results the method providing the most efficient, safe and controllable operation was selected.

Sampling was attempted 14 times using a split spoon sampler. The split spoon was driven two times by casing hammer, one time with an up hole hammer, and 11 times with a down hole hammer. Of the 14 attempts, the first seven had alignment and core catcher resistance problems—only one of the seven had 100% recovery, two other attempts had 3 to 6 in. of material jammed into fingers of catcher. Of the final seven attempts, after removal of catcher and re-engineering the method for centralizing the samples, five had 100% recovery. During demonstration, it was determined that the casing needed to be pulled back approximately 3 in. to allow for soil heaving and to reduce the potential of the sampler binding in the shoe. One attempt failed to advance because the casing was not back pulled the required 2 to 3 in. to allow for soil displacement around sampler. One attempt only recovered 4 to 5 in. of material because of refusal to advance at 183.36 ft casing length (Plio-Pliocene layer).

Several tool modifications resulted from observations during the sampling attempts. The material used to fabricate the catcher fingers was found to be too stiff, preventing sample from entering the sampler. Once the catcher was removed, samples were able to be collected. The use of a catcher is important for sample recovery as well as contamination control (keep contaminated sediments from falling out in the casing and at surface when removed); therefore, the catcher will be redesigned for tank farm deployment.

While attempting to drive the sampler, difficulty was experienced in getting it to pass through the casing drive shoe. It was determined that the sampler was binding up due to minimal tolerances between the inner diameter of the shoe opening and the outside diameter of the sampler as well as inadequate tool string centralization. The centralizers were re-engineered resulting in success with this sampling method. Additional modifications to the centralizers will be made for tank farm deployment.

The sample recovery will be formation-dependent and not an engineering issue with proper sampling methods (see ResonantSonic® International procedure for sampling in Attachment J) and re-engineered centralizing devices shown in Attachment K. The only change to the sampler will be to secure the lead shield in the top head to prevent it from rotating and blocking off the breather tube. A second modification will be to change the thickness and strength of material for the fingers of the catcher.

All three methods for driving the sampler were successful. The preferred method is the use of the downhole hammer, as this provides for the most control. Using the hammer at the surface proved far less effective for energy transfer due to the flexibility of the inner string. The casing driver provides little or no control on driving force, as it is not designed for driving a split spoon sampler. Also, not enough force can be gained when activating the driver in a dry fire mode. Both of these last methods will drive the sampler and are adequate as alternatives for advancing the sampler.

The downhole hammer requires the use of compressed air. Release of this air within the casing raises contamination control concerns. A surface casing seal and air diverter were designed and demonstrated. A drill rod was polished to achieve a good casing seal. Field tests indicate the casing seal and diverter will provide the required controls. The air diverter will be attached to a discharge hose and high efficiency particulate air (HEPA) filter. Engineering calculations and field testing demonstrated successfully that excessive pressures and air volumes would not be experienced.

Sample handling will be minimized by capping the bottom of the split spoon sampler and placing it in a transport container using a remote handling arm (to maximize distance from personnel). The complete split spoon assembly will be placed in a transport drum and transported to Pacific Northwest National Laboratory (PNNL) with the sample intact in the split spoon. The laboratory will perform the breakout of the samples from the split spoon and extrude the soil from the liners. No onsite breakdown of the samples will be performed.

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2.13 ALTERNATIVE SAMPLING

There is a possibility that the removable tip will not function properly, or difficulties may be experienced when attempting to sample ahead of the casing. For this reason, alternative methods of sample collections are required as a back up to the split spoon method. Two alternate methods were demonstrated:

- Directional Rotary—The directional rotary sampling method was tested once. Approximately 4 in. of material was recovered. The sampler was substantially damaged when the directional diverter “slipped” during sampling. To improve this alternative sampler, it is recommended that a surface mockup be constructed for bench testing. Testing in the subsurface has a large number of variables, which creates too many unknown conditions to evaluate changes necessary to deploy this technique. Use of this sampling method as a backup during tank farm deployment is not recommended at this time.
- Rotational Scraper—A second sidewall method tested was a rotational scraper with sample basket. This method was attempted five times. After several modifications in configuration and operational methodology, the sampler successfully retrieved materials from the sidewall at a precisely measured depth. Approximately 20 rotations yielded 8-12 oz (227 – 340 grams) of material. The use of this sampling method is recommended as a backup to the split spoon sampling method during tank farm deployment. Add on shielding will be required to reduce personnel exposure.

2.14 BOREHOLE DECOMMISSIONING

Should a borehole be driven in the tank farm, it will require to be decommissioned at its conclusion. The casing selected cannot be perforated using mechanical means and Jet-Shot perforating is not permitted within the tank farms. The casing will require cutting and partial removal, coupled with pressure grouting to achieve the intent of the Washington Department of Ecology regulations (WAC 173-160). A variance to the regulations was granted to allow for a proper decommissioning using these methods.

The demonstration borehole was decommissioned by removal of all drive casing (the casing was not cut) and bentonite was added to fill all void spacing. Pressure grouting was not demonstrated due to time constraints. WMTS has operated packer-controlled pressure grouting operations numerous times in the tank farms; therefore, no operational problems are anticipated. A copy of the Water Well Report submitted to the WDOE is provided in Attachment B.

2.15 CASING CUTTER

To accomplish borehole decommissioning in the tank farms deployment, the casing will be cut several times and back pulled. A Bowen internal mechanical casing cutter will be used for cutting the casing. During the demonstration, this cutter experienced several failures. A total of five attempts were made to cut the casing. The first attempt at 174 ft resulted in broken knives. The cause of the failure was due to inadequate centralizing of the cutter. The second attempt was at the surface where its operation could be observed. It was determined that the cutter was not aligned properly at the 30° angle and was not dressed properly for the casing size. The cutter was dressed to the proper size and centralized. A third attempt following the modifications, also at the surface, resulted in a good parallel cut. The cutter knives traveled out 1 1/4 in. at 16 rotations per minute for 35 minutes to make a cut complete. The fourth attempt to cut the casing was at 172 ft casing length. A camera inspection showed a good cut but the casing would not part. It was determined that the driller may not have rotated long enough to complete the cut. The fifth cut was attempted at approximately 168 ft, but the cutter would not deploy. Upon removal and inspection the cutter was found to have been damaged during deployment.

The results of the attempts to cut the casing were reviewed and discussed with the manufacturer. The cutter is designed to operate in a vertical fluid-filled hole. No fluids were used because of radiological concerns; however, the manufacturer has indicated that the knives are capable of cutting dry. The knives held up, but damage to the rotational bearing surfaces, internal to the cutter, resulted. The equipment portions that were damaged have been redesigned to accommodate removable and replaceable sleeving/bearing surfaces. It is anticipated that the improved centralizing and bearing surface re-engineering will resolve cutter operation problems during tank farm deployment. If necessary, water will be added to the borehole during cutter operations should the redesign not be successful.

3.0 ENVIRONMENTAL HEALTH AND SAFETY

The ultimate goal of any field operation is to finish with no accidents or injuries. During the 41 days of yard preparation and field operations, this task experienced no recordable events or personal injury, including first aid cases. This equated to over 2100 safe work hours. During the field operations, the job site was surveyed for safety and health compliance. None of the surveys revealed significant deficiencies. Minor observations were promptly addressed (see Attachment L, Safety Surveillance Reports). In addition, noise monitoring was conducted to verify hazard assumptions in the safety-based analysis. The results are provided in Attachment E. CH2M Hill Tank Farm Industrial Hygiene and Safety personnel were on location numerous times during operations and no deficiencies were observed or noted.

Safety is enhanced with the remotely operated articulating mechanical arm, which is mounted on the drill rig to provide remote handling of the drill pipe, casing and samplers. This significantly reduces the potential for lifting-related injuries when handling the drilling tools on an angle entry. Also, personnel exposure to radiation from the removable tip and the samplers is reduced with the remote handling.

4.0 SUMMARY

The demonstration was considered a success. The casing was driven to the target depth at the predetermined 30° angle. Deviation was within acceptable tolerance. Based on the observations and results of the demonstration, the removable drive tip and sample ahead method is recommended for planned tank farm deployment.

Based on observations and lessons learned and discussions on demonstration activities, several modifications to methods, procedures and tool design were recommended. Some of the modifications were accomplished during the demonstration; the remainder should be completed prior to re-deployment. Recommendations, actions taken and future modifications are as follows:

- The downhole hammer is the preferred option to drive the split spoon samplers.
- The Bowen casing cutter has been fitted with re-designed wear bushings to reduce damage for heat buildup when running in a dry condition. Addition of water may be required to keep the cutter bearing surfaces cool during operation.
- The casing drive shoe and removable tip have been redesigned to provide a larger opening through the shoe.
- Slight modifications to the split spoon sampler will be required to prevent the top lead plug from rotating when being driven. In addition, the catcher basket will be fabricated using lighter, more flexible material.
- The anchor box and starter casing have been redesigned to reduce excavation requirements and still provide adequate rig stabilization.
- Additional drill rod stabilizers have been designed and fabricated to provide proper tool alignment in the casing.
- A section of drill rod has been polished and the casing seal and air diverter redesigned to control the air emitted from the casing during sampler driving operations using the down hole hammer.

- The "Rotational Scraper" is recommended as the alternative sampling method. Shielding requirements remain to be determined should this method require deployment.
- Slight modifications and refinements to the drill rig were made during the demonstration to accommodate lessons learned and recommendations from tank farm operations personnel for improved tool.

Evaluation of the demonstration activities continues and additional recommendations and adjustments to tool design and procedures may occur prior to re-deployment. It has been successfully demonstrated that the driving of a closed-bottom casing with a removable tip for collecting sediment samples ahead of the casing is a viable alternative to the standard drilling and sampling methods currently utilized at the Hanford Site. The benefits of using this method include waste minimization and reduced personnel exposure as well as providing for discrete, undisturbed sediment samples. For the purposes of the demonstration, the casing was driven at an angle of 30 degrees from vertical; however, the angle of deployment is variable. Consideration should be given to using this drive and sample method in future vadose investigation at the Hanford Site.

5.0 REFERENCES

- COGEMA, 2000, *SX-108 Slant Borehole Dynamic Load Test Evaluation Report*, COGEMA-RPT-002, Rev. 0, Richland, Washington.
- Gardner and Simpson, 2000. *Description of Work: Demonstration of Slant Borehole Installation and Sampling Methods*, WMTS-DOW-001, Rev.0, Richland, Washington.
- HNF-5058, Rev. 0, *Site-Specific SST Phase 1 RFI/CMS Work Plan Addendum for WMA S-SX*, Flour Daniel Hanford, Inc, Richland, Washington

6.0 ATTACHMENTS

- Attachment A. Drilling and Sampling (Slant Borehole) Daily Work Record.
- Attachment B. Water Well Report.
- Attachment C. Obstructions and Tank Locations Relative to the Rig Positioning.

ref.— WMTS-DOW-002, Rev. 0

Attachment D. Anchoring Point (Box) That Will Be Placed Over the Drive Point Location Adjacent to SX-108.

Attachment E. Letter from the WMTS Safety Officer for Noise Considerations.

Attachment F. Charts of the Blow Counts at the Various Depths.

Attachment G. The Gyroscopic Survey for the First Run at 76 ft and the Second Run at Total Depth.

Attachment H. Actual Verses Projected Path, Target Location, Tolerance, and Direction the Hole Deviated from a Straight Line.

| Attachment I. Final Tip and Shoe Design.

Attachment J. ResonantSonic® International Procedures for Various Operations Sampling.

| Attachment K. Centralizing Device.

Attachment L. Safety Surveillance Reports.

ATTACHMENT A

Drilling and Sampling (Slant Borehole) Daily Work Record

Page 1 of 1

DATE: 3/6/00

RIG MODEL/NO: # 106

LOCATION: S. OF SX

TOTAL SHIFT FOOTAGE: 1

START TIME 08:00 The Pub

END TIME 170500 1200

CONTRACTOR TIME _____

CONTRACT LINE ITEMS:

TOTAL TIME: 9

PERSONNEL:
OPERATOR: Wesley Worth
WA LICENSE NUMBER: 2273
OTHER: Mike Gomez
Marc Stidwell
D. Skagbee
K. Ploner
M. Hickey
K Reynolds
M. Sudner

PM - cool cloudy 51°

TO

DESCRIPTION OF OPERATIONS/REMARKS

12:00	12:30	Lunch
-------	-------	-------

		more jacks	Align jacks-rrg-pup-e-
--	--	------------	------------------------

5.00	weld jacket to block - Arrange CS & pipe racks
	Secure Area

SIGNATURE:

WASTE MANAGEMENT TECHNICAL SERVICES

DRILLING AND SAMPLING (SLANT BORING) DAILY WORK RECORD

Page 1 of 2

WELL I.D.: _____		WELL NUMBER: <u>C3070</u>		REPORT NUMBER: <u>2</u>		DATE: <u>3/7/00</u>	
CONTRACT NUMBER: <u>4850-8</u>		START CARD NO.: <u>500610</u>		RIG MODEL/NO: <u>#106 (RST)</u>			
PURPOSE: <u>Slant borehole demo</u>				REFERENCE: <u>WMTS - Dow-001</u>		LOCATION: <u>S. OF ST</u>	
REFERENCE MEASURING POINT: <u>Ground level</u>				TOTAL SHIFT FOOTAGE: <u>- 0 -</u>			
CONSTRUCTION DESCRIPTION:				BORING DEPTH:		START TIME: <u>0700</u>	
CASING SIZE	SET-AT DEPTH	TYPE CASING	DRIVE POINT DIMENSION	START DEPTH	END DEPTH	START:	END TIME: <u>1630</u>
<u>7</u> <u>4.5</u>		<u>.580 wall</u>				<u>0-</u> <u>0-</u>	CONTRACTOR TIME: <u>9 HR</u>
ODC FOR SUBCONTRACTOR:				LOG SUMMARY:		TOTAL TIME: <u>9.5 HR</u>	
WEATHER CONDITIONS (32716) AM - 7:00 clear cool (42°) PM - OVERCAST ~45°				PERSONNEL: OPERATOR: <u>W. Worth</u> WA LICENSE NUMBER: <u>2273</u> OTHER: <u>M Gomez</u> <u>M Stulwell</u> <u>K Flower</u> <u>M Massey</u> <u>K Reynolds</u> <u>D. Skoglie</u> <u>S. Garin</u>			

TIME		DESCRIPTION OF OPERATIONS/REMARKS	BLOW COUNTS
FROM	TO		
700	730	POD-	
730		Continue rig up - rig fails to start - jump	
	11:30	rig-workmen arrives -	
11:30	12:00	Lunch	
12:00	16:30	A sub (for center rod) is presently being fabricated in woodland, CA. The sub will be flown in to the Tri-City Airport this evening.	
		Pressure reducing valves were plumbed into the hydraulic rod clamps.	

REPORT BY: <u>D.E. SKOGLIE</u>	REVIEWED BY: <u>MB GARDNER</u>
TITLE: <u>SR. DRILLING ENGINEER</u>	TITLE: <u>Manager SWS</u> DATE: <u>3/20/00</u>
SIGNATURE: <u>Daniel Skoglie</u>	SIGNATURE: <u>MB Gardner</u>

WM

FIELD MEMORANDUM

Page 2 of 2

DATE: 3/7/00

WELL NUMBER: C3070

CONTRACT/WORK ORDER NUMBER: 4850-8

TO:

FROM:

PROJECT NUMBER: S/Int Demo

DESCRIPTION: P.O.D.

Discuss:

- Area control - parking of vehicles, keep area around rig clear of vehicles, place ropes - signs to keep everyone from working area
- measure every piece in string to .00 every time
op responsibility to check that every piece is recorded
- place new first aid kit in office trailer
- review SMA - PPE rules - watch for potential impacts of moving pipe -

Attending: M Gomez K Flower C Petty
W. Worth K Reynolds
M Massey M Stowell

ESTIMATE COST IMPACT:

YES

NO

NA

AMOUNT \$

SCHEDULE IMPACT:

YES

NO

ESTIMATE

WMTS SUPERINTENDENT:

Kent Reynolds

CUSTOMER:

CONTRACTOR:

NA

OTHER:

WASTE MANAGEMENT TECHNICAL SERVICES

DRILLING AND SAMPLING (SLANT BORING) DAILY WORK RECORD

Page 1 of 3

WELL I.D.: C3070		WELL NUMBER: N/A		REPORT NUMBER: 03		DATE: 03 08 00					
CONTRACT NUMBER: 4850-8		START CARD NO.: 500610		RIG MODEL/NO: RSI #106							
PURPOSE: SLANT BOREHOLE DEMO.				REFERENCE: WMTS DDW-001		LOCATION: 200 W (S of SK FARM)					
REFERENCE MEASURING POINT: GROUND LEVEL (CONSTANT 4.35 FT)				TOTAL SHIFT FOOTAGE: -0-							
CONSTRUCTION DESCRIPTION:				BORING DEPTH:		START TIME 0700					
CASING SIZE	SET-AT DEPTH	TYPE CASING	DRIVE POINT DIMENSION	START DEPTH	END DEPTH	END TIME 18:30					
7		5.80 WALL				CONTRACTOR TIME .5					
4.5						TOTAL TIME: 11 hr.					
ODC FOR SUBCONTRACTOR:				LOG SUMMARY:							
								PERSONNEL:			
								OPERATOR: W. WDETH			
								WA LICENSE NUMBER: 2273			
								OTHER:			
								M. GOMEZ (RSI)			
M. STILLWELL (RSI)				K. FLOWER (RSI PRO. MGR)							
M. HASSEY (RSI SAFETY)				R. DOBUSH (RSI)							
D. SKOGLIE (WMTS REP)				S. GORIN (SEISMIC)							
B. REDPATH (SEISMIC)											
WEATHER CONDITIONS (32716)											
AM - OVERCAST - MIN. RAIN (45°F)											
PM - OVERCAST - NO RAIN (45°F)											

TIME		DESCRIPTION OF OPERATIONS/REMARKS	BLOW COUNTS
FROM	TO		
07:00	07:35	RSI Pickup badgers AND ARRIVE ON LOCATION.	
07:35	08:35	ORGANIZE SET-UP.	
08:35	08:50	DAILY SAFETY BRIEFING	
08:50	09:40	Complete Drive Rod SET-UP. TORQUE REQUIREMENTS (PER MANUFACTURER RECOMMENDATIONS) ARE SET @ 5,000 FT/LBS FOR 7 INCH AND 4.5 (DRIVE PIPE). TO MEET 5K FT/LBS GAUGE PRESSURE WILL READ 150 PSI (RIGHT HAND GAUGE) AND 350 PSI (LEFT HAND GAUGE).	
09:40	09:50	Machined Drive Head (4.5 inch) arrives AND IS STAGED ON LOCATION. THE DRIVE HEAD WAS PLACED INTO 7-INCH DRIVE PIPE. TOLERANCE IS VERY CLOSE - THE DRIVE HEAD WILL NEED MILLED. ARRANGEMENTS WERE MADE TO HAVE THE DRIVE HEAD MILLED @ THE HANFORD MACHINE SHOP.	

REPORT BY: D.E. SKOGLIE
 TITLE: SR. DRILG ENGINEER
 SIGNATURE: Daniel E Skoglie

REVIEWED BY: MB GARDNER
 TITLE: Manager S&WS DATE: 3/26/00
 SIGNATURE: MB Gardner

WASTE MANAGEMENT TECHNICAL SERVICES

DRILLING AND SAMPLING (SLANT BORING) DAILY WORK RECORD

Page 2 of 3

DATE: 03 08 00

WELL NUMBER: 204

CONTINUATION OF REPORT NUMBER:

[illegible]

REPORT BY: D.E. SKOGLIE

REVIEWED BY: MB GARDNER

TITLE: SR. DRUG ENGINEER

TITLE: *Monero SAs*

DATE: 3/26/00

SIGNATURE: David E. Shoghe

SIGNATURE: *H. Barden*

RPP ADMINISTRATION

Manual

ref. - HNF-IP-0842

PRE-JOB BRIEFING

Volume

V, Maintenance/Production Control

Section

4.1, REV 4g

Page

10 of 10

Effective Date

January 14, 2000

ATTACHMENT A

PRE-JOB SAFETY MEETING (cont.)

Job Description/Title SX SLANT DEMO.

Date

030800Work Package No. 4850-8

Person in Charge (PIC)

D.E. SKOGLIE

ATTENDANCE ROSTER

Name	Org. Code	Payroll No.
<u>Ken Plunk</u>	<u>RSI</u>	<u>9D476</u>
<u>MARC HASEY</u>	<u>RSI</u>	<u>00448-4340</u>
<u>mac stinwell</u>	<u>RSI</u>	<u>0046596</u>
<u>MIKE GOMEZ</u>	<u>RSI</u>	<u>546-63-3443</u>
<u>Joseph m Jones</u>	<u>LATA</u>	<u>4D142</u>
<u>Harold S. Snor</u>	<u>CHG</u>	<u>8B509</u>
<u>BRUCE REDPATH</u>	<u>LATA +1</u>	<u>N/A</u>
<u>Steve Gorin</u>	<u>LATA</u>	<u>NA</u>
<u>Dave Skoglie</u>	<u>UMTS</u>	<u>Y1299</u>
<u>Lloyd J. Patten</u>	<u>CH2MH</u>	<u>63767</u>
<u>LG Hartley</u>	<u>CH2MH</u>	<u>82461</u>
<u>WA WARTH</u>	<u>PG946</u>	<u>PG946</u>
<u>MARK HARTNET</u>	<u>4605 ^{UMTS}</u>	<u>46053</u>
<u>Robert T Dobush</u>	<u>RSI</u>	<u>HF00595</u>
<u>N/A</u>		

Discussed - Preliminary operations, i.e., drill pipe/sub set-up, drilling operations, seismic operations, Emergency protocol (3733800 or 911) and card location. Equipment inspection will be completed prior to handling operations.

A-6

WASTE MANAGEMENT TECHNICAL SERVICES

DRILLING AND SAMPLING (SLANT BORING) DAILY WORK RECORD

Page 1 of 2

WELL ID: C3070		WELL NUMBER: N/A		REPORT NUMBER: 04		DATE: 3/09/00	
CONTRACT NUMBER: 4850-8		START CARD NO.: 500610		RIG MODEL/NO: RSI #106			
PURPOSE: SLANT WELL DEMONSTRATION				REFERENCE: WMTS- DOW-001		LOCATION: 200W (S of SX Farm)	
REFERENCE MEASURING POINT: GROUND LEVEL (4.35 FT)				TOTAL SHIFT FOOTAGE: - 0 -			
CONSTRUCTION DESCRIPTION:				BORING DEPTH:		START TIME: 0700	
CASING SIZE	SET-AT DEPTH	TYPE CASING	DRIVE POINT DIMENSION	START DEPTH	END DEPTH	END TIME: 15:30	
7 4.5	✓	1.580	✓	✓	✓	CONTRACTOR TIME 8.5	
ODC FOR SUBCONTRACTOR:				LOG SUMMARY:		TOTAL TIME: 8.5	
						PERSONNEL:	
						OPERATOR: W. WORTH	
						WA LICENSE NUMBER: 2273	
						OTHER:	
						M. GOMEZ M. Stilwell K. Flower M. HALSEY R. Dobush D. Skoglie	
WEATHER CONDITIONS (32716)						Also see Daily tailgate sheet.	
AM - OVERCAST - (~40°F)							
PM - CLEAR - (~45°F)							
TIME		DESCRIPTION OF OPERATIONS/REMARKS				BLOW COUNTS	
FROM	TO						
0700	0715	Initial discussion and warm up Rig.					
0715	0730	Daily Safety Briefing					
0730	0915	Change out 7-inch pipe. Align head and adjust 4.5 inch Drive head. Machined drive head works fine.					
0915	15:30	The Hammer was going to be raised for pipe advancement. However, due to a problem with the hydraulic ram / Latching mechanism the hammer will not move. A MANLIFT was moved to the work location. A COVER WAS REMOVED TO access the hydraulic ram and Latching device. The hydraulic ram is bent. The hydraulic ram was removed and straightened. Re-install the hydraulic RAM. Operation still failed. The ram and latch were removed. A ram will be in tonight for tomorrow.					
REPORT BY: D. E. Skoglie		REVIEWED BY: M. G. GARDNER					
TITLE: SR. Drilling Engineer		TITLE: Manager SWS				DATE: 3/26/00	
SIGNATURE: David E Skoglie		SIGNATURE: M. Gardner					

WMA

FIELD MEMORANDUM

Page 2 of 2

DATE: 030900

WELL NUMBER: C3070

CONTRACT/WORK ORDER NUMBER: 4850-8

TO:

FROM:

PROJECT NUMBER: SLANT DEMO - Daily Safety Briefing

DESCRIPTION:

NAME		
Mac Stillwell	RST	3-9-00
MIKE GOMEZ	RSI	3-9-00
Ken Flower	RSI	3-9-00
Lloyd Petty	CH2MH	3-9-00
Wes North	RSI	3-9-00 7:00
Marc Hasey	RSI	3/9/00
BRUCE REDPATH	LATA +	9 MAR 00
Steve Gorman	LATA	9 March 00
Harold S. Dyer	CHG	9 March 00
DAVE SKOGLIE	WMTS	
SUSAN HARRINGTON	CHG	3/9/00
Greg Sullivan	CHG	3-9-00
W. W. Smith	COGEMA	3-9-00

ESTIMATE COST IMPACT: YES NO AMOUNT \$ -0-

SCHEDULE IMPACT: YES NO ESTIMATE -0-

Discuss pre job check - daily operations - Emergency protocol

WMTS SUPERINTENDENT:

DE SKOGLIE

CUSTOMER:

CONTRACTOR:

OTHER:

WASTE MANAGEMENT TECHNICAL SERVICES

DRILLING AND SAMPLING (SLANT BORING) DAILY WORK RECORD

Page 1 of 2

WELL I.D.: C3070	WELL NUMBER: N/A	REPORT NUMBER: 05	DATE: 03 10 00
CONTRACT NUMBER: 4850-8	START CARD NO.: 500610	RIG MODEL/NO: RSI #106	
PURPOSE: SLANT WELL DEMONSTRATION	REFERENCE: WMTS DOW-001	LOCATION: 200 W (S OF SX FARM)	
REFERENCE MEASURING POINT: GROUND LEVEL	TOTAL SHIFT FOOTAGE: 38.36		
CONSTRUCTION DESCRIPTION:		BORING DEPTH:	START TIME 0700
CASING SIZE	SET-AT DEPTH	TYPE CASING	DRIVE POINT DIMENSION
7"	4.5"	1.580	0
		START DEPTH	END DEPTH
		START: 8.85 (start casing)	END TIME 1700
		END: 47.21 ft.	CONTRACTOR TIME .5
ODC FOR SUBCONTRACTOR:		LOG SUMMARY:	
		PERSONNEL:	
		OPERATOR: W. WORTH	
		WA LICENSE NUMBER: 2273	
		OTHER:	
		M. GOMEZ	
		M. ST. Iwell	
		K. Flower	
		M. HARSEY	
		K. Reynolds	
		D. Skoglie	
		Also see Daily Safety	
		Tailgate Rooster	
WEATHER CONDITIONS (32716)			
AM - CLEAR (~45°F)			
PM - OVERCAST (~43°F)			

TIME		DESCRIPTION OF OPERATIONS/REMARKS	BLOW COUNTS
FROM	TO		
07:00	07:25	Setup hydraulic ram with fittings, warm equipment.	
07:25	07:45	Pre-job Safety Briefing conducted and signed off.	
07:45	07:50	Manlift on way to site.	
07:50	09:15	Reinstall hydraulic ram and latching mechanism. Test system - with no luck. Further evaluation is being conducted by RSI.	
09:15	11:00	COVER REINSTALL - Hammer is functioning periodically.	
11:00	11:18	Drive to a depth of 12.25 FT BGS.	
11:18	11:53	Add pipe. 7 and 4.5 inch	
11:53	12:20	Set-up Hammer, Drive 4.89 FT (11:58-12:01) and remove Drive Head.	
12:20	12:50	Lunch	
12:50	13:23	Add pipe 7 and 4.5 inch. TOTAL pipe length (7") 26.47 FT.	
13:23	13:28	Drive CASING to a depth of 22.22 FT BGS.	
13:28	13:35	Pull casing BACK .4' due to high blow counts. TIP BOTTOM @ 21.88'	
13:35	13:56	Add pipe (7 and 4.5 inch). TOTAL pipe length (7") 31.47 FT.	

REPORT BY: D.E. Skoglie
 TITLE: SR. Drilling Engineer
 SIGNATURE: David E. Skoglie

REVIEWED BY: MB GARNER
 TITLE: Manager SAWS
 DATE: 3/20/00
 SIGNATURE: MB Garner

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CONTINUATION OF REPORT NUMBER:

МВБ

WASTE MANAGEMENT TECHNICAL SERVICES

DRILLING AND SAMPLING (SLANT BORING) DAILY WORK RECORD

Page 1 of 2

WELL ID.: <u>C3070</u>	WELL NUMBER: <u> </u>	REPORT NUMBER: <u>7</u>	DATE: <u>3/13/00</u>
CONTRACT NUMBER: <u>4850-8</u>	START CARD NO.: <u>500610</u>	RIG MODEL/NO: <u>#106</u>	
PURPOSE: <u>Slant Borehole Demo</u>	REFERENCE: <u>WMTS</u> <u>Pow-001</u>	LOCATION: <u>S of St</u>	
REFERENCE MEASURING POINT: <u>Ground Level</u>	TOTAL SHIFT FOOTAGE: <u>-0-</u>		
CONSTRUCTION DESCRIPTION:			
CASING SIZE: <u>7"</u>	SET-AT DEPTH: <u>NA</u>	TYPE CASING: <u>CS</u>	DRIVE POINT DIMENSION: <u>See Spec drawing</u>
START DEPTH: <u>81.35'</u>	END DEPTH: <u> </u>	BORING DEPTH: <u>81.35'</u>	START TIME: <u>0700</u>
END: <u> </u>			END TIME: <u>1630</u>
ODC FOR SUBCONTRACTOR: <u>NA</u>			CONTRACTOR TIME: <u>1/2</u>
LOG SUMMARY:			TOTAL TIME: <u>9</u>
<ul style="list-style-type: none"> • Need different compressor checked out LeROI - • Wrong threads on spline & over from XL6 to spoon 			PERSONNEL:
			OPERATOR: <u>W Worth</u>
			WA LICENSE NUMBER: <u>2273</u>
			OTHER: <u>M. Stowell</u>
			<u>M. Massey</u>
			<u>M. Gomez</u>
			<u>K. Flower</u>
			<u>L. Petty</u>
			<u>R. Steffler</u>
			<u>K. Reynolds</u>
WEATHER CONDITIONS (32716)			
AM - Cool - clear			
PM - Cool			

TIME		DESCRIPTION OF OPERATIONS/REMARKS	BLOW COUNTS
FROM	TO		
0700	0710	POD	
0710	0820	Complete pulling 4 1/2' dip - trip in good shape has compacted soils around ~ 50% of shank & up to shoulder	
0820	1000	Set up gyroscope & run in well	
1000	1110	Rerun gyro - complete gyro run - 4 hydro lines on	
1110	1130	Arm, break off top from dip -	
1130	1200	Lunch	
1200	4:30	Work on rig, cut off wrenches, & out leaking lines prepare to add centralizers to pipe check out threads & match ups on A1/ Hammer (wrong threading on spline X-over for XL-6)	

REPORT BY: <u>Kent Reynolds</u>	REVIEWED BY: <u>MG GARDNER</u>
TITLE: <u>Scientist II</u>	TITLE: <u>Mgr Saws</u>
SIGNATURE: <u>Kent Reynolds</u>	SIGNATURE: <u>MG Gardner</u>
	DATE: <u>3/20/00</u>

WASTE MANAGEMENT TECHNICAL SERVICES

DRILLING AND SAMPLING (SLANT BORING) DAILY WORK RECORD

Page 1 of 1

WELL I.D.: 03070 WELL NUMBER: REPORT NUMBER: 8 DATE: 3/14/00

CONTRACT NUMBER: 4850-8 START CARD NO.: 500610 RIG MODEL NO.: #106 PSI

PURPOSE: Slant Demo REFERENCE: MTS Dow-001 LOCATION: S. PSX

REFERENCE MEASURING POINT: Q.L. TOTAL SHIFT FOOTAGE: NA

CONSTRUCTION DESCRIPTION:

CASING SIZE	SET-AT DEPTH	TYPE CASING	DRIVE POINT DIMENSION	START DEPTH	END DEPTH
7"	NA	CS	See Spec	81.35	81.35

BORING DEPTH:

 START: 81.35
 END: -NA-
 Total: 0

START TIME: 0700

END TIME: 1630

CONTRACTOR TIME: 0-

TOTAL TIME: 9

QDC FOR SUBCONTRACTOR:

1- target level - laser

NA

LOG SUMMARY:

 PERSONNEL:
 OPERATOR: W. W. W. W.
 WA LICENSE NUMBER: 2273
 OTHER:

 M. St. Hill
 M. Massey
 M. Gomez
 K. Flower
 K. Reynolds

WEATHER CONDITIONS (32716)

AM - cloudy / cool

PM - clear / cool windy

TIME

FROM TO

DESCRIPTION OF OPERATIONS/REMARKS

BLOW COUNTS

0700 1130 Weld controllers on dp

1130 1200 Lunch

 1200 Run camera, continue to weld dp, move in
 Le Roi, work on med. size wrenches for
 4:30 break pulling 4 1/2" dp.

REPORT BY: K Reynolds

REVIEWED BY: M G GARDNER

TITLE: Scumbst II

TITLE: Map Saws

DATE: 3/20/00

SIGNATURE: K Reynolds

SIGNATURE: M G Gardner

WMA

FIELD MEMORANDUM

Page 2 of 2

DATE: 3/13/00

WELL NUMBER: C3070

CONTRACT/WORK ORDER NUMBER: 4850-8

TO:

FROM:

PROJECT NUMBER: POD

DESCRIPTION: Complete pulling 4 1/2", review PPE requirements
Set up gyro, plan rig modifications, cut & move
csg. wrenches, (Burr Permit - Fine watch) Add centralizers
to drill pipe.

Attendees: see daily sheet #1 Report #7

ESTIMATE COST IMPACT: YES NO AMOUNT \$
SCHEDULE IMPACT: YES NO ESTIMATE

WMTS SUPERINTENDENT:

Kent Reynolds

CUSTOMER:

CONTRACTOR:

OTHER:

WASTE MANAGEMENT TECHNICAL SERVICES

DAILY FIELD SAFETY PROJECT REVIEW

Page 2 of 2

DATE: 3/15/00

PROJECT: 4850-8/slant hole

CONTINUATION OF
REPORT NUMBER: 8DESCRIPTION OF WORK ACTIVITY: First run of compressor - blow dirt
out of shoe

TOPICS TO BE ADDRESSED:

YES/NO

1)	DESCRIPTION OF TASK TO BE PERFORMED.	✓
2)	PERSONNEL ARE TRAINED AND QUALIFIED.	✓
3)	PERSONAL PROTECTIVE EQUIPMENT REQUIRED FOR JOB - heavy protection	✓
4)	KEY PERSONNEL IDENTIFIED WITH A CLEAR CHAIN OF COMMAND. Personnel comp.	✓
5)	CONTINGENCY PLAN DISCUSSED.	✓
6)	LESSONS LEARNED FROM PREVIOUS WORK DISCUSSED.	NA
7)	HOLD POINTS ADDRESSED OR REQUIRED APPROVALS IN WORK PACKAGE.	NA
8)	EQUIPMENT AND TOOLS IN GOOD CONDITION/INSPECTION CONDUCTED.	✓
9)	AREA CONDITIONS REVIEWED FOR OTHER ACTIVITIES, WEATHER, CONGESTION, ETC.	NA
10)	LOCK AND TAG IN PLACE.	NA
11)	PERSONNEL PROVIDE SAFETY, QUALITY, RADIOLOGICAL, OR OTHER CONCERNS.
(IF YES, ADDRESS IN COMMENTS SECTION).	NO
12)	SAFETY PLAN AND MSDS'S AVAILABLE ON-SITE.	✓
13)	EMERGENCY CONTACT LIST AND PHONE NUMBERS POSTED.	✓

CHECK BLOCKS THAT APPLY: ☐ CUTTING/ WELDING PERMIT; ☐ RADIOLOGICAL WORK PERMIT;

☐ CONFINED SPACE ENTRY PERMIT; ☐ TANK FARMS OPERATIONS; ☐ FALL PROTECTION WORK PLAN;

☐ OTHER RADIOLOGICAL/HAZARDOUS OPERATIONS; ☐ FORK LIFT OPERATION; ☐ SITE SECURED;

☐ FIRE EXTINGUISHER OPERATIONAL; ☒ GOOD HOUSE-KEEPING PRACTICES.

PERSONNEL NAMES (SIGN):

PIC K Reynolds

K Flower

M Hassey

M Stulwell

W Worth

COMMENTS:

WASTE MANAGEMENT TECHNICAL SERVICES

DRILLING AND SAMPLING (SLANT BORING) DAILY WORK RECORD

Page 1 of 2

WELL I.D. <u>C3070</u>	WELL NUMBER: <u>/</u>	REPORT NUMBER: <u>89th</u>	DATE: <u>3/15/00</u>
CONTRACT NUMBER: <u>4850-8</u>	START CARD NO.: <u>S00610</u>	RIG MODEL/NO: <u>#106 RSI</u>	
PURPOSE: <u>Slant Demo</u>	REFERENCE: <u>WMTS DOW-001</u>	LOCATION: <u>South of St</u>	
REFERENCE MEASURING POINT: <u>Ground level</u>	TOTAL SHIFT FOOTAGE: <u>NA</u>		
CONSTRUCTION DESCRIPTION:		BORING DEPTH:	START TIME <u>0700</u>
CASING SIZE	SET-AT DEPTH	TYPE CASING	DRIVE POINT DIMENSION
START DEPTH	END DEPTH	START: <u>72.05</u>	END TIME <u>1630</u>
7"	NA	CS	Spec
81.35	72.05	NA	CONTRACTOR TIME <u>NA</u>
ODC FOR SUBCONTRACTOR:		LOG SUMMARY:	TOTAL TIME: <u>9</u>
2- 12 volt batteries for Le Roi		<div style="text-align: center;">NA</div>	PERSONNEL: OPERATOR: <u>W. Worth</u> WA LICENSE NUMBER: <u>2273</u> OTHER: <u>M. St. Iwell</u> <u>M. Hassey</u> <u>K. Flower</u> <u>K. Reynolds</u> <u>L. Petty</u>
WEATHER CONDITIONS (32716)			
AM - <u>Clear warm</u>			
PM - <u>clear warm</u>			

TIME		DESCRIPTION OF OPERATIONS/REMARKS	BLOW COUNTS
FROM	TO		
0700		Continue Fall of 4 1/2" back pull setup	
		Check Le Roi (batteries will not charge, order new batteries from town - RSI ODC)	
11:30	12:00	Lunch	
12:00	14:00	Complete Fall	
14:00	14:45	Trip on w 4 1/2" to blow out dirt in shoe - 18 sticks	
14:45	15:00	Fix hydraul. leak, put batteries on Le Roi, prime & start - warmed Le Roi	
15:00	15:10	Safety discussion & F rules of operation for large	
15:10	15:25	compressor - build pressure, prepare to blow hole	
15:25	15:30	Blow hole	
15:30	16:10	Trip out 4 1/2"	
16:10	16:30	Clean up tools - secure rig - enclsh. At	

REPORT BY: <u>K Reynolds</u>	REVIEWED BY: <u>MG GARNER</u>
TITLE: <u>Scientist II</u>	TITLE: <u>Mar Saws</u> DATE: <u>3/20/00</u>
SIGNATURE: <u>K Reynolds</u>	SIGNATURE: <u>M. Garner</u>

WASTE MANAGEMENT TECHNICAL SERVICES

DRILLING AND SAMPLING (SLANT BORING) DAILY WORK RECORD

Page 1 of 3

WELL I.D.: C3070 WELL NUMBER: / REPORT NUMBER: KR 10910 DATE: 3/16/00

CONTRACT NUMBER: 4850-8 START CARD NO.: S 00610 RIG MODEL NO: RSI # 106

PURPOSE: Slant Demo REFERENCE: Wmws Dow-001 LOCATION: S of PSI

REFERENCE MEASURING POINT: G.L. TOTAL SHIFT FOOTAGE: NA

CONSTRUCTION DESCRIPTION:

CASING SIZE	SET-AT DEPTH	TYPE CASING	DRIVE POINT DIMENSION	START DEPTH	END DEPTH
7"	NA	CS	See Spec	77.05	NA

BORING DEPTH:

8135
START: 77.05
END: /

START TIME 0700

END TIME 1530

CONTRACTOR TIME

TOTAL TIME: 8 hrs

ODC FOR SUBCONTRACTOR:

LOG SUMMARY:

PERSONNEL:
OPERATOR: W WORTH
WA LICENSE NUMBER: 2273
OTHER:

M. St. Iwell
M. Hassey
K. Flower
M. Gomez
K. Reynolds
R. Dobbish

WEATHER CONDITIONS (32716)

AM - Rain

PM - Cloudy - Windy

TIME

DESCRIPTION OF OPERATIONS/REMARKS

BLOW COUNTS

FROM	TO	DESCRIPTION OF OPERATIONS/REMARKS	BLOW COUNTS
0700	0800	Safety topic - see sheet #2	
0800		Trip on hole - look for x-over for 8" hammer	
		No 4 1/2 reg to 3 1/2 reg box - box or box-pin	
		Available - check Wmws yard	
		Pipe tally - see sheet #3 - pick up x-over to	
	10:00	drive with CS3 hammer BG. 89 to tally emergency	
10:00		Stop to work on rig hammer - rig kill switch	
		not operational - Mr. Hartney agrees required element	
	11:00	to run	
11:00	11:30	Lunch	
11:30		move compressor, get line filter, modify - drill rebar	
		on XL-6 x-over, assemble XL-6 sampling x-over hammer	
	1530	END OF Wmws directed activities	

REPORT BY: K Reynolds

REVIEWED BY: M G GARDNER

TITLE: Slant #1

TITLE: Mgr Saws

DATE: 3/24/00

SIGNATURE: Kurt Rye

SIGNATURE: M G Gardner

WASTE MANAGEMENT TECHNICAL SERVICES

DAILY FIELD SAFETY PROJECT REVIEW

Page ^{KR} 3 of 3

DATE: 3/16/00

PROJECT: Slant Demo

CONTINUATION OF
REPORT NUMBER: ^{KR} 104

DESCRIPTION OF WORK ACTIVITY: First iteration of driving sampler
discuss string assembly, air driven safety req, fall protection
req for climbing on mast, netting protection, proper
lifting requirements

TOPICS TO BE ADDRESSED:

YES/NO

1) DESCRIPTION OF TASK TO BE PERFORMED.	✓
2) PERSONNEL ARE TRAINED AND QUALIFIED.	✓
3) PERSONAL PROTECTIVE EQUIPMENT REQUIRED FOR JOB.	✓
4) KEY PERSONNEL IDENTIFIED WITH A CLEAR CHAIN OF COMMAND.	✓
5) CONTINGENCY PLAN DISCUSSED.	NA
6) LESSONS LEARNED FROM PREVIOUS WORK DISCUSSED.	NA
7) HOLD POINTS ADDRESSED OR REQUIRED APPROVALS IN WORK PACKAGE.	NA
8) EQUIPMENT AND TOOLS IN GOOD CONDITION/INSPECTION CONDUCTED. - missing item	✓
9) AREA CONDITIONS REVIEWED FOR OTHER ACTIVITIES, WEATHER, CONGESTION, ETC.	✓
10) LOCK AND TAG IN PLACE.	NA
11) PERSONNEL PROVIDE SAFETY, QUALITY, RADIOLOGICAL, OR OTHER CONCERNS.
(IF YES, ADDRESS IN COMMENTS SECTION).	✓ NO issues
12) SAFETY PLAN AND MSDS'S AVAILABLE ON-SITE.	✓
13) EMERGENCY CONTACT LIST AND PHONE NUMBERS POSTED.	✓

CHECK BLOCKS THAT APPLY: ☐ CUTTING/ WELDING PERMIT; ☐ RADIOLOGICAL WORK PERMIT;

- ☐ CONFINED SPACE ENTRY PERMIT; ☐ TANK FARMS OPERATIONS; ☒ FALL PROTECTION WORK PLAN;
For checking mast & hammer
- ☐ OTHER RADIOLOGICAL/HAZARDOUS OPERATIONS; ☐ FORK LIFT OPERATION; ☐ SITE SECURED;
- ☐ FIRE EXTINGUISHER OPERATIONAL; ☐ GOOD HOUSE-KEEPING PRACTICES.

PERSONNEL NAMES (SIGN):

PIC Kent Reynolds

W. Worth

M Stilwell

M Gomez

M Hasey

K Flower

COMMENTS:

WASTE MANAGEMENT TECHNICAL SERVICES

TUBULAR GOODS TALLY SHEET

Page 2 of 3

DATE: 3/16/00

WELL NUMBER: C3070

CONTINUATION OF REPORT NUMBER: 102117

DRILL STRING TALLY				SAMPLE STRING TALLY			
JT. NO.	LENGTH (in feet)	JT. NO.	LENGTH (in feet)	JT. NO.	LENGTH (in feet)	JT. NO.	LENGTH (in feet)
1	Sampler 1.69	19	1.21	1		19	
2	2.00	20	86.89	2		20	
3	4 1/2"	21	total	3		21	
4	5.00	22		4		22	
5	5.00	23		5		23	
6	4.99	24		6		24	
7	4.99	25		7		25	
8	5.00	26		8		26	
9	5.00	27		9		27	
10	5.00	28		10		28	
11	5.01	29		11		29	
12	5.00	30		12		30	
13	5.00	31		13		31	
14	5.00	32		14		32	
15	5.00	33		15		33	
16	5.00	34		16		34	
17	5.00	35		17		35	
18	5.00	36		18		36	

TOTAL for Page:

86.89 FT

TOTAL for Page:

FT

TOTAL for Page:

FT

TOTAL for Page:

FT

TOTAL (ALL):

FT

TOTAL (ALL):

86.89 FT

REPORT BY:

K Reynolds

REVIEWED BY:

MB GARDNER

TITLE:

Seminar II

TITLE:

Mgt SAs

DATE:

3/20/00

SIGNATURE:

1 Cut Rd

SIGNATURE:

MB Gardner

WASTE MANAGEMENT TECHNICAL SERVICES

DRILLING AND SAMPLING (SLANT BORING) DAILY WORK RECORD

Page 1 of 3

WELL I.D. <u>C3070</u>		WELL NUMBER: <u> </u>		REPORT NUMBER: <u>11</u>		DATE: <u>3/20/00</u>	
CONTRACT NUMBER: <u>4850-8</u>		START CARD NO.: <u>500610</u>		RIG MODEL NO: <u>RST #106</u>			
PURPOSE: <u>Slant Demo</u>				REFERENCE: <u>WMTS Dow-001</u>		LOCATION: <u>S of FST</u>	
REFERENCE MEASURING POINT: <u>C.L.</u>				TOTAL SHIFT FOOTAGE: <u>5.3</u>			
CONSTRUCTION DESCRIPTION:						BORING DEPTH:	
CASING SIZE	SET-AT DEPTH	TYPE CASING	DRIVE POINT DIMENSION	START DEPTH	END DEPTH	START: <u>76.80</u>	
<u>7"</u>	<u>76.80</u>	<u>CS</u>	<u>SSD Spec</u>	<u>76.80</u>	<u>82.10</u>	END: <u>82.10</u>	
ODC FOR SUBCONTRACTOR:				LOG SUMMARY:		START TIME: <u>0700</u>	
				<u>• Operate for 4 hrs</u> <u>remainder of Day</u> <u>on RST</u>		END TIME: <u>1630</u>	
						CONTRACTOR TIME: <u>5.0</u>	
						TOTAL TIME: <u>9.0</u>	
						PERSONNEL:	
						OPERATOR: <u>W Worth</u> WA LICENSE NUMBER: <u>2223</u> OTHER: <u>M St. Iwell</u> <u>M Gomez</u> <u>M Massey</u> <u>K Reynolds</u>	
WEATHER CONDITIONS (32716)				PERSONNEL:			
AM - <u>Clear, cool</u>				OPERATOR: <u>W Worth</u> WA LICENSE NUMBER: <u>2223</u> OTHER: <u>M St. Iwell</u> <u>M Gomez</u> <u>M Massey</u> <u>K Reynolds</u>			
PM - <u>Same</u>							

TIME		DESCRIPTION OF OPERATIONS/REMARKS	BLOW COUNTS
FROM	TO		
0700	0710	POD - Safety talk - See sheet #3	
0710	0750	Install Selenoid, warm rig up -	
0750		Equip running - weld plug in X over - spline for xlg	
	0800	hammer - shut off rig - Selenoid overheating - not	
0800	0830	operable - rig up again @ 0830 -	
0830	0844	Prep to drive sampler -	
0844	0845	Dry fine csg hammer - 1 hit - Acc. 1.6' total - transport	
0845		Tripout	
		Have 81.35 total csg - $[6.25 - 1.20] = 81.35 - 4.55 = 76.80$	
		bHm csg, sample string, 86.89 - $[4.00 + 6.25] = 86.89 - 7.25 = 79.64$	
0925		Drive 78.61 to 78.11 - on bank -	
		Break out - pick up tip - trip sampler -	
		A 1/4 Full - sand pack on catcher - cut every other	
		Finger 1/4" from top end - worked on centering/leveling	

REPORT BY: <u>Kent Reynolds</u>	REVIEWED BY: <u>MG GARDNER</u>
TITLE: <u>Seatest II</u>	TITLE: <u>Mar Saws</u>
SIGNATURE: <u>[Signature]</u>	SIGNATURE: <u>[Signature]</u>
	DATE: <u>3/21/00</u>

DRILLING AND SAMPLING (SLANT BORING) DAILY WORK RECORD

Page 2 of 3

DATE: 3/20

WELL NUMBER: C3070

CONTINUATION OF REPORT NUMBER: 11

TIME		DESCRIPTION OF OPERATIONS/REMARKS
FROM	TO	
		rrg-
1010	1040	Trip in - trip into shore
1040	N	Pickup csg
	1102	$81.35 + 5.00 = 86.35$ total csg
1102	1113	Drive csg $86.35 - [6.25 - 2.00] = 4.25 = 82.10$
1113	1127	Pull csg back .55'
1130	1215	Lunch
1215	1248	Start rig - resume trip out
1248	1252	Repair broken bolt on wrenches
1252	1256	Pull pipe
1256		Break held for wrench cylinder - stop to repair
	1630	work on Fabrication of new pipe

REPORT BY: Kent Reynolds

REVIEWED BY: MG GARDNER

TITLE: Scrubsttt

TITLE: Har Saws

DATE: 3/21/00

SIGNATURE: [Signature]

SIGNATURE:

WASTE MANAGEMENT TECHNICAL SERVICES

DAILY FIELD SAFETY PROJECT REVIEW

Page 3 of 3

DATE: 3/20/00

PROJECT: Slant Demo

CONTINUATION OF
REPORT NUMBER: 11

DESCRIPTION OF WORK ACTIVITY: A Seidmold, drive sampler w/ csg hammer, trip
 pipe, Add csg, advance csg, trip out trip, run sampler w/ x46
 hammer, Safety, Talk - watch speed on site, wear safety
 belts

TOPICS TO BE ADDRESSED:

YES/NO

1)	DESCRIPTION OF TASK TO BE PERFORMED.	Yes
2)	PERSONNEL ARE TRAINED AND QUALIFIED.	Yes
3)	PERSONAL PROTECTIVE EQUIPMENT REQUIRED FOR JOB.	Yes
4)	KEY PERSONNEL IDENTIFIED WITH A CLEAR CHAIN OF COMMAND.	Yes
5)	CONTINGENCY PLAN DISCUSSED.	Yes
6)	LESSONS LEARNED FROM PREVIOUS WORK DISCUSSED.	NA
7)	HOLD POINTS ADDRESSED OR REQUIRED APPROVALS IN WORK PACKAGE.	NA
8)	EQUIPMENT AND TOOLS IN GOOD CONDITION/INSPECTION CONDUCTED.	Yes
9)	AREA CONDITIONS REVIEWED FOR OTHER ACTIVITIES, WEATHER, CONGESTION, ETC.	Yes
10)	LOCK AND TAG IN PLACE.	NA
11)	PERSONNEL PROVIDE SAFETY, QUALITY, RADIOLOGICAL, OR OTHER CONCERNS.
(IF YES, ADDRESS IN COMMENTS SECTION).	NO
12)	SAFETY PLAN AND MSDS'S AVAILABLE ON-SITE.	Yes
13)	EMERGENCY CONTACT LIST AND PHONE NUMBERS POSTED.	Yes

CHECK BLOCKS THAT APPLY: ☐ CUTTING/ WELDING PERMIT; ☐ RADIOLOGICAL WORK PERMIT;

☐ CONFINED SPACE ENTRY PERMIT; ☐ TANK FARMS OPERATIONS; ☐ FALL PROTECTION WORK PLAN;

☐ OTHER RADIOLOGICAL/HAZARDOUS OPERATIONS; ☐ FORK LIFT OPERATION; ☐ SITE SECURED;

☐ FIRE EXTINGUISHER OPERATIONAL; ☐ GOOD HOUSE-KEEPING PRACTICES.

PERSONNEL NAMES (SIGN):

PIC K Reynolds

W Worth

M St. Iwell

M Gomez

M Massey

COMMENTS:

WASTE MANAGEMENT TECHNICAL SERVICES

DRILLING AND SAMPLING (SLANT BORING) DAILY WORK RECORD

Page 1 of 2

WELL I.D.: C3070		WELL NUMBER: _____		REPORT NUMBER: 12		DATE: 3/21/00	
CONTRACT NUMBER: 4850-8		START CARD NO.: 500610		RIG MODEL/NO: RSI#106			
PURPOSE: Slant Domo				REFERENCE: WMS Dow-co1		LOCATION: S of SX	
REFERENCE MEASURING POINT: Q.L.				TOTAL SHIFT FOOTAGE: 4.25			
CONSTRUCTION DESCRIPTION:						BORING DEPTH:	
CASING SIZE	SET-AT DEPTH	TYPE CASING	DRIVE POINT DIMENSION	START DEPTH	END DEPTH	START: 82.10	END TIME: 1630
7"	NA	CS	Self Spec	82.10	86.35	END: 86.35	CONTRACTOR TIME: 0-
ODC FOR SUBCONTRACTOR:				LOG SUMMARY:		TOTAL TIME: 9	
WEATHER CONDITIONS (32716) AM - clear warm PM - clear warm						PERSONNEL:	
						OPERATOR: W Worth	
						WA LICENSE NUMBER:	
						OTHER: M Stilwell	
						M Gomez	
		M Hassey					
		K Reynolds					
		K Flower					

TIME		DESCRIPTION OF OPERATIONS/REMARKS	BLOW COUNTS
FROM	TO		
0700		POD - trip out - pickup sampler - test drive -	
	0720	run 5' csg - drive - trip out	
0720	0740	Warm up - relevel	
0740		Trip out - measure to re wrenches - 6.5' From EL to wrench top - (csg 1.8')	
	0820	86.35 - [6.5 - 1.8] = 4.7 = 84.65 csg BLS	
0820		Pickup hammer, test fire - walk down compressor	
	0920	prior to operation - pickup sampler	
0920	0945	trip on hole - 80' elv + 12.24 = 92.24 - 10.4 su = 81.84	
0945	0948	Drive sampler - does not appear to be through shoe	
0948	1000	work pipe - attempt to drive selv ~ 3'	
1000	1115	trip out - trouble laying down sampler - head	
		additional hours	
1115	1200	Ran camera - significant dent on shoulder & on throat	

REPORT BY: K Reynolds	REVIEWED BY: MG GARDNER
TITLE: Screenshot II	TITLE: Mgs Saws
SIGNATURE: K Reynolds	SIGNATURE: M Gardner
	DATE: 3/22/00

WASTE MANAGEMENT TECHNICAL SERVICES

DRILLING AND SAMPLING (SLANT BORING) DAILY WORK RECORD

Page 2 of 2

DATE: 3/21/00

WELL NUMBER: C3070

CONTINUATION OF REPORT NUMBER: 12

[illegible]

REPORT BY: K Reynolds

REVIEWED BY: MG GARNER

TITLE: Scientist II

TITLE: Mar Saws

DATE: 3/22/00

SIGNATURE: Kurt K...

SIGNATURE:

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H. Gardner

WASTE MANAGEMENT TECHNICAL SERVICES

DRILLING AND SAMPLING (SLANT BORING) DAILY WORK RECORD

Page 1 of 2

WELL I.D.: C3070	WELL NUMBER: /	REPORT NUMBER: 14	DATE: 3/23/00
CONTRACT NUMBER: 4850-8	START CARD NO.: S00610	RIG MODEL NO: RSI #106	
PURPOSE: Slant Demo	REFERENCE: WMTS Down-001	LOCATION: S of St	
REFERENCE MEASURING POINT: C.L.	TOTAL SHIFT FOOTAGE: 5.06		
CONSTRUCTION DESCRIPTION:			
CASING SIZE	SET-AT DEPTH	TYPE CASING	DRIVE POINT DIMENSION
7"	NA	CS 5.50	see spec
START DEPTH	END DEPTH	BORING DEPTH:	START TIME
91.84	96.90	START: 91.84	0700
		END: 96.90	END TIME: 1700
QDC FOR SUBCONTRACTOR:		LOG SUMMARY:	CONTRACTOR TIME
			TOTAL TIME: 9 1/2
WEATHER CONDITIONS (32716)		PERSONNEL:	
AM - Clear, cool		OPERATOR: M. Stulwell	
PM -		WA LICENSE NUMBER:	
		OTHER: M. Gomez	
		K. F. Brown	
		K. Reynolds	
		L. Petty	
		H. Snyder	

TIME		DESCRIPTION OF OPERATIONS/REMARKS	BLOW COUNTS
FROM	TO		
0700	0750	Reg Service - discuss Day Plan - trip csq drive	
0750		Makeup trip - trip in hole, pickup csq	
	0900	96.34 total csq + 5.01 = 101.35 total csq	
0900	0913	Makeup drive head - drive csq	
0913		Trip point 96.4 - 1.95 = 96.90 trip location BLS	
	1030	Run 110.05 total 115.54 dp + sampler + hammer	
1030	1130	Work on collecting / correct x-overs	
1130	1200	Attempt to drive sampler - surface SD-8	
		won't drive - 5.2 - 1.4'	
1200	1230	Lunch	
1230	1340	Trip out -	
1340		Pickup XL-6 hammer + sampler - trip in hole	
		12.24 + 19 fts (95') + 2.51 = 109.25	
	1505	Add csq + drive	

REPORT BY: K Reynolds	REVIEWED BY: MCGARNER
TITLE: Scientist II	TITLE: Mgr SWS
SIGNATURE: K Reynolds	SIGNATURE: MCGARNER
	DATE: 3/24/00

Page 2 of 2

CONTINUATION OF REPORT NUMBER: 14

M. Gardner

WASTE MANAGEMENT TECHNICAL SERVICES

DRILLING AND SAMPLING (SLANT BORING) DAILY WORK RECORD

Page 1 of 1

WELL ID: C3070		WELL NUMBER: /		REPORT NUMBER: 15		DATE: 3/24/00	
CONTRACT NUMBER: 4950-8		START CARD NO: 300610		RIG MODEL NO: RST # 106			
PURPOSE: Slant Demo				REFERENCE: WMTS DOW-001		LOCATION: S of SX	
REFERENCE MEASURING POINT: G.L.				TOTAL SHIFT FOOTAGE: NA			
CONSTRUCTION DESCRIPTION:						BORING DEPTH:	
CASING SIZE	SET-AT DEPTH	TYPE CASING	DRIVE POINT DIMENSION	START DEPTH	END DEPTH	START TIME: 0630	
7"	NA	CS	Sep spec	96.90	96.91	END TIME: 1530	
						CONTRACTOR TIME: /	
ODC FOR SUBCONTRACTOR: NA						TOTAL TIME: 8 1/2	
LOG SUMMARY:						PERSONNEL:	
						OPERATOR: W Worth	
						WA LICENSE NUMBER: 2273	
						OTHER: M St. Iwell	
						M Gomez	
						K Reynolds	
WEATHER CONDITIONS (32716)						K Power	
AM - clear - cool							
PM - clear - warm							

TIME		DESCRIPTION OF OPERATIONS/REMARKS	BLOW COUNTS
FROM	TO		
0630		POD - camera run, rig service, wait on sampler.	
	0700	Adj. chain drive sprockets,	
0700		work on rig	
	0745	Run camera - shoe clean - abrasion marks in throat match S.S. sampler - appears to be alignment issue - hammer CD - pipe ID, sampler CD - shoe ID - no disassemble XL-6 hammer to get centralizers on hammer - tubing hammer up to CSG center line -	
	1530	Work on rig adjustments - replace sensor	

REPORT BY: K Reynolds	REVIEWED BY: MG GARDNER
TITLE: Screenst II	TITLE: My Saws
SIGNATURE: [Signature]	SIGNATURE: [Signature]
	DATE: 3/24/00

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WASTE MANAGEMENT TECHNICAL SERVICES

DRILLING AND SAMPLING (SLANT BORING) DAILY WORK RECORD

Page 1 of 1

WELL ID.: C3070		WELL NUMBER: /		REPORT NUMBER: 16		DATE: 3/27/00	
CONTRACT NUMBER: 4850-8		START CARD NO.: S00610		RIG MODEL NO: RSI #106			
PURPOSE: Slant Demo				REFERENCE: WMTS Dow-001		LOCATION: S of SX	
REFERENCE MEASURING POINT: G.L.				TOTAL SHIFT FOOTAGE: NA			
CONSTRUCTION DESCRIPTION:						BORING DEPTH:	
CASING SIZE	SET-AT DEPTH	TYPE CASING	DRIVE POINT DIMENSION	START DEPTH	END DEPTH	START:	END:
7"	NA	CS	See Spec	96.90	96.9	96.90	96.9
ODC FOR SUBCONTRACTOR:				LOG SUMMARY:		START TIME: 0700	
						END TIME: 1630	
						CONTRACTOR TIME:	
						TOTAL TIME: 9	
						PERSONNEL:	
						OPERATOR: W Worth	
WEATHER CONDITIONS (32716)						WA LICENSE NUMBER: 2273	
AM - Cool-cloudy						OTHER: M St. L. well	
PM - warm cloudy						M Gomer	
						M Hassey	
						K Reynolds	
						H S. dno /	
						L Petty	
TIME		DESCRIPTION OF OPERATIONS/REMARKS					
FROM	TO	BLOW COUNTS					
0700	0800	Rig warmup - put centralizer on hammer - remove lead from tip of sampler - centralizers won't fit in egg - break out of string - send to get turned down 1/32" on A gauge - slots cut in for air -					
		cleanup location - wait on parts					
1000	1015	No WMTS personnel onsite - remainder of day - wait on part modification					
REPORT BY: K Reynolds		REVIEWED BY: MCGARDNER					
TITLE: Scientist II		TITLE: May SAMS					
SIGNATURE: [Signature]		DATE: 3/31/00					
		SIGNATURE: [Signature]					

WASTE MANAGEMENT TECHNICAL SERVICES

DRILLING AND SAMPLING (SLANT BORING) DAILY WORK RECORD

Page 1 of 2

WELL I.D.: C3070		WELL NUMBER: _____		REPORT NUMBER: 17		DATE: 3/28/00	
CONTRACT NUMBER: 4850-B		START CARD NO.: S00610		RIG MODEL/NO: RSI #106			
PURPOSE: Slant Demo				REFERENCE: WMTS DOW-001		LOCATION: S of St	
REFERENCE MEASURING POINT: Ground level				TOTAL SHIFT FOOTAGE: 9.45'			
CONSTRUCTION DESCRIPTION:						BORING DEPTH:	
CASING SIZE	SET-AT DEPTH	TYPE CASING	DRIVE POINT DIMENSION	START DEPTH	END DEPTH	START TIME	END TIME
7"	NA	CS	sep spec	96.9	106.35	0700	KRS 415 430
ODC FOR SUBCONTRACTOR:						CONTRACTOR TIME	
LOG SUMMARY:						TOTAL TIME: 9	
WEATHER CONDITIONS (32716) AM - cool - clear PM -						PERSONNEL:	
						OPERATOR: W.W.O. Jr	
						WA LICENSE NUMBER: 2273	
						OTHER: M. Gomez	
						M. Hassey	
						K. Reynolds	
						L. Petty	
						M. Snelmer	
						D. Curry	
						Z. Simpson	
						L. Petty	
						J. Jones	
						Kevin (#PT)	

TIME		DESCRIPTION OF OPERATIONS/REMARKS	BLOW COUNTS
FROM	TO		
0700	0715	Warm rig	
0715	0730	POD - discuss sample - trip in - csg iteration	
0730		Trip in hole w/sampler	
		Sampler - xover - hammer - xover = 12.24 +	
	0804	19 fts 4 1/2" x 5.00" dp = 95.00 = 107.24	
0804	0810	Drivesampler -	
		total csg 101.35 - csg to hammer + 1.85 to top of dp + 3.5 =	
		106.7	
		107.24 - 6.5 - 3.5 = 97.24 (Apparent Fm) + 12" = 98.24	
0820	0910	Trip out - on bank - handle pipe exclusively w/ Arm	
0910		Handle sampler - 100% recovery - Fresh - some	
	0950	slt/clay -	
0950	1025	Pickup top - trip in hole 20 fts + 2' = 102' + top 21.48	
1025	1059	Pickup 500 csg + 101.35 = 106.35 total csg	

REPORT BY: Kent Reynolds	REVIEWED BY: M.C. Gardner
TITLE: Screwst II	TITLE: Myr Saws
SIGNATURE: <i>Kent Reynolds</i>	SIGNATURE: <i>M.C. Gardner</i>
	DATE: 3/29/00

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CONTINUATION OF REPORT NUMBER: 17

SIGNATURE: *[Signature]*

WASTE MANAGEMENT TECHNICAL SERVICES

DRILLING AND SAMPLING (SLANT BORING) DAILY WORK RECORD

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WELL I.D.: C3070		WELL NUMBER: —		REPORT NUMBER: 18		DATE: 3/29/00			
CONTRACT NUMBER: 4850-8		START CARD NO.: S00610		RIG MODEL/NO.: RST #106					
PURPOSE: Slant demo				REFERENCE: WMS DOW-001		LOCATION: South Fork			
REFERENCE MEASURING POINT: Ground level				TOTAL SHIFT FOOTAGE: 5,36'					
CONSTRUCTION DESCRIPTION:						BORING DEPTH:			
CASING SIZE	SET-AT DEPTH	TYPE CASING	DRIVE POINT DIMENSION	START DEPTH	END DEPTH	START TIME 0700			
7"	106.35	CS	Self spec	106.35	106.71	END TIME 1630			
						CONTRACTOR TIME .5			
ODC FOR SUBCONTRACTOR:				LOG SUMMARY:		TOTAL TIME: 9.5			
						PERSONNEL: OPERATOR: W. Worth WA LICENSE NUMBER: 2273 OTHER: M. Gomez M. Stollwell M. Massey M. Seelhor K. Reynolds L. Petty			
WEATHER CONDITIONS (32716)									
AM - clear cool									
PM - cool-windy									

TIME		DESCRIPTION OF OPERATIONS/REMARKS	BLOW COUNTS
FROM	TO		
0700		Discuss POD - camera run, cleanup sampler & centralizers, print, run in & rotate - trip out, assess	
	0745	results - w/ in rig	
0745		Trip on w/ hammer - sampler - 107.24 total length	
	0830	(0800) sampler for noise on drill - land on & Hm	
0830		102.1 ft - on bit - rotate - trip out - inspect w/ camera	
	10100	inspect sampler - break pull csg & 3"	
1000	1023	Trip on w/ sampler	
1023	1027	Drive sampler 11"	
1027	1115	Trip out - sampler on bank	
1115	1130	100% recovery @ 10.5 - 11" of fresh mud on bank	
1130	1200	Lunch - Dept of Ecology rep on location	
1200	1250	Trip on - pickup 5' csg @ 106.35 = 111.36 total csg	
1252	1256	Drive csg 111.36 - 4.65 = 106.71 csg in ground	

REPORT BY: K. Reynolds	REVIEWED BY: M. Gardner
TITLE: Scientist II	TITLE: Mgr S&WS
SIGNATURE: [Signature]	SIGNATURE: [Signature]
	DATE: 4/3/00

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CONTINUATION OF REPORT NUMBER: 19

SIGNATURE: M. G. Barker

WASTE MANAGEMENT TECHNICAL SERVICES

DRILLING AND SAMPLING (SLANT BORING) DAILY WORK RECORD

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WELL I.D.: <u>C3070</u>		WELL NUMBER: <u>/</u>		REPORT NUMBER: <u>19</u>		DATE: <u>3/30/00</u>	
CONTRACT NUMBER: <u>4850-8</u>		START CARD NO.: <u>500610</u>		RIG MODEL/NO: <u>RSI #106</u>			
PURPOSE: <u>Slant demo</u>				REFERENCE: <u>MMS Dow-001</u>		LOCATION: <u>SOFSY</u>	
REFERENCE MEASURING POINT: <u>Ground level</u>				TOTAL SHIFT FOOTAGE: <u>10.6'</u>			
CONSTRUCTION DESCRIPTION:						BORING DEPTH:	
CASING SIZE	SET-AT DEPTH	TYPE CASING	DRIVE POINT DIMENSION	START DEPTH	END DEPTH	START: <u>106.71'</u>	
<u>7"</u>	<u>106.71</u>	<u>CS</u>	<u>See Spec</u>	<u>106.71'</u>	<u>117.81</u>	END: <u>117.31'</u>	
ODC FOR SUBCONTRACTOR:				LOG SUMMARY:		START TIME: <u>0700</u>	
						END TIME: <u>1530</u>	
						CONTRACTOR TIME: <u>.5</u>	
						TOTAL TIME: <u>8</u>	
						PERSONNEL:	
						OPERATOR: <u>W.W.M.</u>	
WEATHER CONDITIONS (32716)						WA LICENSE NUMBER: <u>2273</u>	
AM - <u>Clear-cold/cwl</u>						OTHER: <u>M. Gomez</u>	
PM - <u>clear warm</u>						<u>M. Massey</u>	
						<u>K. Reynolds</u>	
						<u>M. Stillwell</u>	
						<u>L. Petty</u>	
						<u>D. Curry</u>	

TIME		DESCRIPTION OF OPERATIONS/REMARKS	BLOW COUNTS
FROM	TO		
0700		Warm rig - complete rig repairs - POD - drive cs -	
	0730	Attempt to sample w/ cs, hammer, drive cs	
0730		Trip in - pick up cs	
	0830	111.86 to 116.36 + 5.00 = 116.36	
0830		Drive cs w/ 6.5 - 1.95 pickup = 4.55 S.U.	
	0840	116.36 - 4.55 = 111.81 pipe in ground	
0840	0910	Trip out tip - 122.68 -	
0910	0955	Pick up sampler - trip in 117.88 - 10.8 = 106.88 ground	
0955	1015	Drive sampler - would not drive dry Fire - Fire hammer	
		6 blows - in sets of 2 - drive sampler 2.11"	
1015	1118	Trip out - lay down sampler - recover 11" of Fire hammer	
1118	1130	Handle pipe - to change drive head	
1130	1200	Lunch	
1200	1230	Mill Aram - screws off	

REPORT BY: <u>K Reynolds</u>	REVIEWED BY: <u>MG GARDNER</u>
TITLE: <u>Scientist II</u>	TITLE: <u>Mgr Saws</u> DATE: <u>4/3/00</u>
SIGNATURE: <u>K Reynolds</u>	SIGNATURE: <u>M Gardner</u>

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CONTINUATION OF REPORT NUMBER: 19

SIGNATURE: H. H. H. H.

WASTE MANAGEMENT TECHNICAL SERVICES

DRILLING AND SAMPLING (SLANT BORING) DAILY WORK RECORD

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WELL I.D.: C3070	WELL NUMBER: _____	REPORT NUMBER: 20	DATE: 4/3/00
CONTRACT NUMBER: 4850-8	START CARD NO.: 500610	RIG MODEL/NO: RST # 106	
PURPOSE: Slant Demo	REFERENCE: WMTS Dow-001	LOCATION: South of RST	
REFERENCE MEASURING POINT: Ground level	TOTAL SHIFT FOOTAGE: 44.96'		
CONSTRUCTION DESCRIPTION:			
CASING SIZE	SET-AT DEPTH	TYPE CASING	DRIVE POINT DIMENSION
7"	NA	CS	See Spec
START DEPTH	END DEPTH	BORING DEPTH:	START TIME
117.31	162.27	START: 117.31	0700
		END: 162.27	END TIME
			1630
ODC FOR SUBCONTRACTOR:		LOG SUMMARY:	CONTRACTOR TIME .5
			TOTAL TIME: 9
WEATHER CONDITIONS (32716)		PERSONNEL:	
AM - Clear cool		OPERATOR: W Worth	
PM - Semi cloudy warm		WA LICENSE NUMBER: 2273	
		OTHER: M Gomez	
		M Stowell	
		M Hesser	
		D Curry	
		K Reynolds	
		K. Mortensen	
		L Hartley	

TIME		DESCRIPTION OF OPERATIONS/REMARKS	BLOW COUNTS
FROM	TO		
0700	0730	Warm & check equip - rig up diverter	
0730	0810	POD - go over clay plan - ① drive ② dress out ③ trip for sample ④ sample ⑤ trip out	
0819	0819	Drive sampler - 280 psi / 300 cfm - 15 psi at wellhead	
0819	0900	Trip out	
0900	0915	Break down sampler - 100% recovery - sand - sl slty - tr clay 10 1/2 - 11" cfs sample -	
0915	0945	Dress out in "training" whites	
0945	1030	Trip in top	
1030	1045	Pick up csg 121.36 + 5.00 = 126.36 tubal csg	
1045	1050	Drive csg in 6.5 - 2.4 = 4.1 stickup 126.36 - 4.1 = 122.26 p.p.c. in ground	
1050	1200	Pull top - survey simulation	
1200	1230	Lunch -	

REPORT BY: K Reynolds	REVIEWED BY: M GARDNER
TITLE: Scientist II	TITLE: Mgr SWS
SIGNATURE: [Signature]	DATE: 4/4/00
	SIGNATURE: [Signature]

WASTE MANAGEMENT TECHNICAL SERVICES

DRILLING AND SAMPLING (SLANT BORING) DAILY WORK RECORD

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DATE: 4/3/00

WELL NUMBER: C3070

CONTINUATION OF REPORT NUMBER: 20

TIME		DESCRIPTION OF OPERATIONS/REMARKS
FROM	TO	
1230	1245	Discuss MPT - Op observations • need hammer automatically • oil spray hose • tip on hot steel
1245	1320	Trip mix/tup 131.37 KR
1320	1328	Pickup csg $128.36 + 5.01 = 127.37$
1328	1332	Drive csg lv (2.4) $6.5 - 2.4 = 4.1$ $131.37 - 4.1 = 127.27$
1332	1340	Pickup csg $5.00 + 131.37 = 136.37$ total csg
1340	1353	Drive csg $136.37 (6.5 - 2.4) 4.1 = 132.27$ csg in ground
1353	1415	Pickup csg $5.00 + 136.37 = 141.37$
1415	1420	Drive csg $(6.2 - 2.5) - 3.7 + 141.37 = 137.67$ csg in ground
1420	1445	Pickup csg $5.00 + 141.37 = 146.37$
1445	1450	Drive csg lv $6.2 - 2.4 = 3.7$ stickup $146.37 - 3.7 = 142.67$
1451	1455	Pickup csg $146.37 + 5.00 = 151.37$
1455	1518	Break
1518	1525	Drive pipe lv $6.2 - 2.45 = 3.75$ $151.37 - 3.75 = 147.62$
1525	1542	Pickup csg $151.37 + 5.00 = 156.37$
1542	1547	Drive csg $156.37 - [6.2 - (2.45)] = 152.62$ csg in ground
1547	1602	Pickup csg $156.37 + 5.00 = 161.37$
1602	1605	Drive csg lv $6.2 - 2.42 =$ stickup $= 157.59$
1605	1620	Pickup csg $5.00 + 161.37 = 166.37$
1620	1624	Drive csg lv $6.2 - 2.4 = 3.8$ $166.37 - 3.8 = 162.27$
1624	1630	Secure rig

REPORT BY: K Reynolds

REVIEWED BY: M GARDNER

TITLE: Serengeti II

TITLE: Mgr SWS

DATE: 4/4/00

SIGNATURE: K Reynolds

SIGNATURE: M Gardner

WASTE MANAGEMENT TECHNICAL SERVICES

DRILLING AND SAMPLING (SLANT BORING) DAILY WORK RECORD

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WELL I.D.: C3070		WELL NUMBER: /		REPORT NUMBER: 21		DATE: 4/4/00			
CONTRACT NUMBER: 4850-8		START CARD NO.: S00610		RIG MODEL/NO: RSI #106					
PURPOSE: Slant Demo				REFERENCE: WMTS Dow-001		LOCATION: South FSX			
REFERENCE MEASURING POINT: Ground level				TOTAL SHIFT FOOTAGE: 21.29'					
CONSTRUCTION DESCRIPTION:						BORING DEPTH:			
CASING SIZE	SET-AT DEPTH	TYPE CASING	DRIVE POINT DIMENSION	START DEPTH	END DEPTH	START TIME 0700			
7"	NA	CS	Std Spec	162.27	183.56	END TIME 1630			
						START: 162.27			
						END: 183.56			
ODC FOR SUBCONTRACTOR:				LOG SUMMARY:					
								PERSONNEL:	
								OPERATOR: W. Worth	
								WA LICENSE NUMBER: 2273	
								OTHER: M. St. Louis	
								M. Gomez	
WEATHER CONDITIONS (32716)									
AM - cool - overcast									
PM -									

TIME		DESCRIPTION OF OPERATIONS/REMARKS	BLOW COUNTS
FROM	TO		
0700	0715	POD - drive csg, gyro, sample, geophones	
		discuss pick up results	
0715	0800	Warming pick up csg 166.37 + 5.00 = 171.37	
0801	0805	Drive csg 171.37 - (6.2 - 2.45) = 168.62	
0805	0828	Pick up csg 171.37 + 4.99 = 176.36 total csg	
0829	0834	Drive csg 176.36 - (6.2 - (2.4)) = 172.56	
0834	0852	Pick up csg 176.36 + 5.00 = 181.36 total csg	
0852	0856	Drive csg 181.36 - (6.2 - 2.4) = 177.56	
0856	0913	Pick up csg 181.36 + 5.00 = 186.36 total csg	
0913	0921	Drive csg - Adv 1.5' - 52 blows 1/2 ft - stop - back pull	
		1.2' -	
0921	0929	Drive csg 186.36 - (6.2 - 2.4) = 183.56 total csg in ground	
0929		Pull csg back 1.2' - pull up - back up sampler	
	0935	down hole hammer - trip in hole	

REPORT BY: K Reynolds
 TITLE: Scientist II
 SIGNATURE: K Reynolds

REVIEWED BY: M G Gardner
 TITLE: Mgr Saws
 SIGNATURE: M G Gardner
 DATE: 4/5/00

DRILLING AND SAMPLING (SLANT BORING) DAILY WORK RECORD

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DATE: 4/4/00

WELL NUMBER: C3070

CONTINUATION OF REPORT NUMBER: 21

[illegible]

REPORT BY: R Reynolds

REVIEWED BY: MCGARNER

TITLE: Screenlist II

TITLE: Mar Saws

DATE: 4/5/00

SIGNATURE: K. J. [Signature]

SIGNATURE:

WASTE MANAGEMENT TECHNICAL SERVICES

DRILLING AND SAMPLING (SLANT BORING) DAILY WORK RECORD

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WELL ID.: C3070	WELL NUMBER: C3070	REPORT NUMBER: 22	DATE: 4/5/00
CONTRACT NUMBER: 4850-8	START CARD NO.: S00610	RIG MODEL NO: RST #106	
PURPOSE: Slant Demo	REFERENCE: WMTS DOW-604	LOCATION: Southern PSX	
REFERENCE MEASURING POINT: Ground Level	TOTAL SHIFT FOOTAGE: NA		
CONSTRUCTION DESCRIPTION:		BORING DEPTH:	START TIME: 0700
CASING SIZE: 7"	SET-AT DEPTH: 183.56	TYPE CASING: CS	END TIME: 1630
DRIVE POINT DIMENSION: 8" Spec	START DEPTH: 183.56	END DEPTH: —	CONTRACTOR TIME: 15
ODC FOR SUBCONTRACTOR:		LOG SUMMARY:	TOTAL TIME: 9
		PERSONNEL:	
		OPERATOR: W. Worth	
		WA LICENSE NUMBER: 2273	
		OTHER: M. Stillwell	
		M. Gomez	
M. Hlasny		J. Reynolds	
J. Mersner			
WEATHER CONDITIONS (32716)			
AM - Cool, cloudy			
PM - Overcast, warm			

TIME		DESCRIPTION OF OPERATIONS/REMARKS	BLOW COUNTS
FROM	TO		
0700	0720	Warm up equip, check HF	
0720	0730	POD w/crew - sample, trip, run cutter, run geophones when Arrives	
0737	0742	Drivesampler - adv ~ 4-5"	
0742	0840	Trip out	
0840		Prep to run geophones test to bottom	
	1115	Complete Run - 183.1' total depth BLS - minor cable alignment issues	
1130	1200	Lunch	
1200	1220	Discuss cutter operations w/crew	
1220		Pickup csg cutter, trip in hole	
		Cutter 4.00 + x-over 2.00 + 30" dp + 35(5') Jts dp =	
	1400	187 1/2' of pipe - went to bottom easily	
1400	1630	Fix pipe racks, modify rig deck	

REPORT BY: K Reynolds	REVIEWED BY: MG BARNER
TITLE: Scribbler II	TITLE: Mgr Saws
SIGNATURE: Kent Ryba	DATE: 4/10/00
	SIGNATURE: M. BARNER

WASTE MANAGEMENT TECHNICAL SERVICES

DRILLING AND SAMPLING (SLANT BORING) DAILY WORK RECORD

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WELL I.D.: C3070 WELL NUMBER: C3070 REPORT NUMBER: 23 DATE: 4/6/00

CONTRACT NUMBER: 4850-8 START CARD NO.: 500610 RIG MODEL NO.: RSI #106

PURPOSE: Slant Demo REFERENCE: WMTS DOW-001 LOCATION: South PSX

REFERENCE MEASURING POINT: Ground Level TOTAL SHIFT FOOTAGE: NA

CONSTRUCTION DESCRIPTION:						BORING DEPTH:	START TIME
CASING SIZE	SET-AT DEPTH	TYPE CASING	DRIVE POINT DIMENSION	START DEPTH	END DEPTH	START: 183.56 Total csg 186.36 END:	0700
7"	183.56	CS	Sep Spec	183.56			END TIME 1430

ODC FOR SUBCONTRACTOR: LOG SUMMARY:

TIME	DESCRIPTION OF OPERATIONS/REMARKS	BLOW COUNTS
0700	0730 Inspect equip, warm rig	
0730	0745 POD, cut csg, inspect, cut, etc	
0745	Work on Hcr, 186.36 csg on string, 40 St. deep = 182.36 BLS	
	csg btm @ 182.36'	
	182.5' F 4 1/2" + cutter on hole on btm w/ 6.4' stickup	
	181.1' BLS - pickup string 3.5' - cutter @ 174.9	
	in 2.1' ft above 1st-2nd jt. connection	
	Cut Hcr. could not release after 45 min. Friction	
	Pulled w/ irks, All 3 cutters broken when on bank	
1130	1200 Lunch	
1200	Camera inspection, replace cutters, - hole was "polished"	
	1240 not cut -	
	Replace cutters, pickup 5' csg - place on wrenches	
	insert cutter & attempt to cut at surface	

PERSONNEL:
 OPERATOR: W Worth
 WA LICENSE NUMBER: 2273
 OTHER: M Stulwell
 M Gomez
 M Harshey
 D Skogline
 H. Snyder
 K Reynolds

REPORT BY: K Reynolds REVIEWED BY: MB GARDNER
 TITLE: Scientist II TITLE: Mgr Saws DATE: 4/10/00
 SIGNATURE: Kurt R. Reynolds SIGNATURE: MB Gardner

DRILLING AND SAMPLING (SLANT BORING) DAILY WORK RECORD

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DATE: 4/6/00

WELL NUMBER: C3070

CONTINUATION OF REPORT NUMBER: 23

[illegible]

REPORT BY: Kent Bernholz

REVIEWED BY:

TITLE: Saentst II

TITLE: Mar Saws

DATE: 4/10/00

SIGNATURE:

SIGNATURE:

WASTE MANAGEMENT TECHNICAL SERVICES

DRILLING AND SAMPLING (SLANT BORING) DAILY WORK RECORD

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WELL I.D.: C3020	WELL NUMBER: C3020	REPORT NUMBER: 24	DATE: 4/7/00
CONTRACT NUMBER: 4850-8	START CARD NO.: S00610	RIG MODEL/NO: RSI #106	
PURPOSE: Slant Demo	REFERENCE: WMS Dow-001	LOCATION: S of S4	
REFERENCE MEASURING POINT: Ground level	TOTAL SHIFT FOOTAGE: NA		
CONSTRUCTION DESCRIPTION:			
CASING SIZE	SET-AT DEPTH	TYPE CASING	DRIVE POINT DIMENSION
NA			
BORING DEPTH:		START TIME	END TIME
START: NA		0700	1530
END: NA		CONTRACTOR TIME	TOTAL TIME:
		.5	8
ODC FOR SUBCONTRACTOR:		LOG SUMMARY:	
		PERSONNEL:	
		OPERATOR: W Wentu	
		WA LICENSE NUMBER: 2223	
		OTHER: M Stowell	
		M Gomez	
		M Hasey	
K Reynolds			
WEATHER CONDITIONS (32716)			
AM - clear cool			
PM - clear warm			
TIME			
FROM	TO	DESCRIPTION OF OPERATIONS/REMARKS	
0700	0715	- PoD	
0715		Breakdown cutter, lube csg, clean chss - hammers	
		complete general prep & cleanup & parts - order	
		replacement parts for cutter -	
		Skogline &	
		Anten onsite to inspect cutter & determine	
		items for replacement	
11:30		RSI off location - hauling pipe to town	
		for cleaning - completing at RSI yard	
12:00		off location	
REPORT BY: Kent Reynolds			
TITLE: Scientist II			
SIGNATURE:
REVIEWED BY: MCGARNER			
TITLE: Mr. SAMS			
DATE: 4/10/00			
SIGNATURE:

WASTE MANAGEMENT TECHNICAL SERVICES

DRILLING AND SAMPLING (SLANT BORING) DAILY WORK RECORD

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WELL ID: <u>C3070</u>	WELL NUMBER: <u>C3070</u>	REPORT NUMBER: <u>23 25</u>	DATE: <u>4/1/00</u>
CONTRACT NUMBER: <u>4850-8</u>	START CARD NO: <u>500610</u>	RIG MODEL/NO: <u>RSI #106</u>	
PURPOSE: <u>Slant Demo</u>	REFERENCE: <u>WMTS Dow-001</u>	LOCATION: <u>S of St</u>	
REFERENCE MEASURING POINT: <u>Ground level</u>	TOTAL SHIFT FOOTAGE: <u>NA</u>		
CONSTRUCTION DESCRIPTION:			
CASING SIZE	SET-AT DEPTH	TYPE CASING	DRIVE POINT DIMENSION
7"	183.56	CS	See Spec
START DEPTH		END DEPTH	
183.56		—	
BORING DEPTH:		START TIME	
START: 183.56		0700	
Total csq END: 186.36		END TIME	
		1630	
ODC FOR SUBCONTRACTOR:		CONTRACTOR TIME	
NA		.5	
LOG SUMMARY:		TOTAL TIME: 9.5	
NA		PERSONNEL:	
NA		OPERATOR: <u>W Woot</u>	
NA		WA LICENSE NUMBER: <u>2273</u>	
NA		OTHER: <u>Mstruwell</u>	
NA		<u>M Gomez</u>	
NA		<u>M Hasey</u>	
WEATHER CONDITIONS (32716)			
AM -			
PM -			

TIME		DESCRIPTION OF OPERATIONS/REMARKS	BLOW COUNTS
FROM	TO		
		RSI working at RSI Yard	
		down - csq	
		- break down hammers	
		clean - reassemble	
		order parts change out to dress cutter to	
		larger size pipe	
		Standby - Time	
		Clean Equipment for farm	
		deployment	

REPORT BY: <u>K Reynolds</u>	REVIEWED BY: <u>M BARNER</u>
TITLE: <u>Geologist</u>	TITLE: <u>Mgr SWS</u> DATE: <u>4/27/00</u>
SIGNATURE: <u>K Reynolds</u>	SIGNATURE: <u>M BARNER</u>

WASTE MANAGEMENT TECHNICAL SERVICES

DRILLING AND SAMPLING (SLANT BORING) DAILY WORK RECORD

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WELL I.D.: /		WELL NUMBER: C3070		REPORT NUMBER: 26		DATE: 4/11/00	
CONTRACT NUMBER: 4850-8			START CARD NO.: S00610		RIG MODEL/NO: RSI #106		
PURPOSE: Slant Demo				REFERENCE: WMS Down		LOCATION: 30FSX	
REFERENCE MEASURING POINT: G.L.				TOTAL SHIFT FOOTAGE: NA			
CONSTRUCTION DESCRIPTION:						BORING DEPTH:	
CASING SIZE	SET-AT DEPTH	TYPE CASING	DRIVE POINT DIMENSION	START DEPTH	END DEPTH	START: NA	
See rpt	25					END:	
ODC FOR SUBCONTRACTOR:			LOG SUMMARY:				TOTAL TIME: 9.5
							PERSONNEL:
							OPERATOR: W Worth
							WA LICENSE NUMBER: 2273
							OTHER: M Gomez
							M Stilwell
							M Hasey
WEATHER CONDITIONS (32716)							
AM -							
PM -							

TIME		DESCRIPTION OF OPERATIONS/REMARKS	BLOW COUNTS
FROM	TO		
		<p><u>Clean & inspect casing & drill pipe for farm</u></p> <p>Clean - CSG <u>deployment</u></p> <ul style="list-style-type: none"> - drill pipe - reassemble hammers <p>build sub/crossover handling racks for rig</p> <p>Wait on cutter parts</p>	

REPORT BY: <u>K Reynolds</u>	REVIEWED BY: <u>MB GARDNER</u>
TITLE: <u>Geologist</u>	TITLE: <u>Mgt Saws</u> DATE: <u>4/27/00</u>
SIGNATURE: <u>MB Gardner</u>	SIGNATURE: <u>[Signature]</u>

A-48

WASTE MANAGEMENT TECHNICAL SERVICES

DRILLING AND SAMPLING (SLANT BORING) DAILY WORK RECORD

Page 1 of 1

WELL ID: C3070		WELL NUMBER: C3070		REPORT NUMBER: 27		DATE: 4/12/00			
CONTRACT NUMBER: 4850-8			START CARD NO.: 500610		RIG MODEL/NO: 412100 RSI				
PURPOSE: Slant Demo				REFERENCE: WMTS Dow-001		LOCATION: S of SX			
REFERENCE MEASURING POINT: Ground Level				TOTAL SHIFT FOOTAGE: NA					
CONSTRUCTION DESCRIPTION:				BORING DEPTH:		START TIME 0200			
CASING SIZE	SET-AT DEPTH	TYPE CASING	DRIVE POINT DIMENSION	START DEPTH	END DEPTH	END TIME 1630			
5"	183.56	CS	Seepac	NA	→	CONTRACTOR TIME 1.5			
ODC FOR SUBCONTRACTOR:				LOG SUMMARY:		TOTAL TIME: 9.5			
WEATHER CONDITIONS (32716) AM - cool PM - Cool-overcast						PERSONNEL: OPERATOR: W. Worth WA LICENSE NUMBER: OTHER: M. Huxey M. Gomez M. Stillwell D. Skogline K. Reynolds			
TIME		DESCRIPTION OF OPERATIONS/REMARKS					BLOW COUNTS		
FROM	TO								
0700	1200	Complete csg cleanup - Work on wrench tooling - pipe racks for drill pipe handling on deck,							
1200	1630	Set up to pressure grout trip packer to test for clearance - place to ~170' and pull - shug in several places Work on cutter parts - continue to work on pipe racks, wrench modifications							
REPORT BY: Kent Reynolds		REVIEWED BY: MCGARDNER							
TITLE: Geologist		TITLE: Mgr SWS							
SIGNATURE: Kent Reynolds		DATE: 4/27/00							
		SIGNATURE: MCGARDNER							

WASTE MANAGEMENT TECHNICAL SERVICES

DRILLING AND SAMPLING (SLANT BORING) DAILY WORK RECORD

Page 1 of 1

WELL ID.: C3070	WELL NUMBER: C3070	REPORT NUMBER: 28	DATE: 4/13/00
CONTRACT NUMBER: 4850-8	START CARD NO.: S00610	RIG MODEL/NO: RSI #106	
PURPOSE: Slant Demo	REFERENCE: WMTS Down 001	LOCATION: S of St	
REFERENCE MEASURING POINT: Q.L.	TOTAL SHIFT FOOTAGE: MA		
CONSTRUCTION DESCRIPTION:			
CASING SIZE	SET-AT DEPTH	TYPE CASING	DRIVE POINT DIMENSION
7"	183.56	C3	See Spec
START DEPTH		END DEPTH	
183.56		—	
BORING DEPTH:		START TIME	
START: 183.56		0700	
END:		END TIME	
		1630	
ODC FOR SUBCONTRACTOR:		CONTRACTOR TIME	
		.5	
LOG SUMMARY:		TOTAL TIME:	
		9.5	
WEATHER CONDITIONS (32716)		PERSONNEL:	
AM - could clear		OPERATOR: W. Worth	
PM - Warm		WA LICENSE NUMBER: 2273	
		OTHER: D Curry	
		M Stillwell	
		M Gomez	
		W Hargy	

TIME		DESCRIPTION OF OPERATIONS/REMARKS	BLOW COUNTS
FROM	TO		
0700	0715	Warm Reg	
0715	0730	POT	
0730	0900	Pull on csg, drive down attempt to pull back - NO movement	
0900	0930	Work pipe - check pressure settings	
0930	1000	Engage pressure on jacks @ 2000 - Need to improve pressure	
1000	1130	Work pipe - attempt to get power pipe	
1130	1200	Lunch	
1200	1630	Work pipe	

REPORT BY: Kent Reynolds	REVIEWED BY: MCGARDNER
TITLE: Geologist	TITLE: Mgr SAs
SIGNATURE: Kent Reynolds	SIGNATURE: MCGARDNER
	DATE: 4/29/00

WASTE MANAGEMENT TECHNICAL SERVICES

DRILLING AND SAMPLING (SLANT BORING) DAILY WORK RECORD

Page 1 of 1

WELL I.D.: C3070		WELL NUMBER: C3070		REPORT NUMBER: 28 29		DATE: 4/17/00	
CONTRACT NUMBER: 4850-8		START CARD NO: 30061		RIG MODEL/NO: RST #106			
PURPOSE: Slant Demo				REFERENCE: WMTS DCW-001		LOCATION: S of SX	
REFERENCE MEASURING POINT: Ground Level				TOTAL SHIFT FOOTAGE: NA			
CONSTRUCTION DESCRIPTION:						BORING DEPTH:	
CASING SIZE	SET-AT DEPTH	TYPE CASING	DRIVE POINT DIMENSION	START DEPTH	END DEPTH	START:	START TIME 0700
See prev record						END:	END TIME 1630
QDC FOR SUBCONTRACTOR:				LOG SUMMARY:		CONTRACTOR TIME 1.5	
WEATHER CONDITIONS (32716) AM - clear PM - muggy warm						TOTAL TIME: 9.5	
						PERSONNEL:	
						OPERATOR: W Worth	
						WA LICENSE NUMBER: 2273	
						OTHER: M Stalwell	
						D Curry	
						K Reynolds	
						K Flower (4 hr)	
TIME		DESCRIPTION OF OPERATIONS/REMARKS					BLOW COUNTS
FROM	TO						
0700	0930	wait on cutter parts					
0930	1030	Assemble cutter					
1030	1130	Assemble centralizers on string					
1130	1200	Lunch					
1200		Attempt to run csq cutter-centralizer problems change configurations - change btm nut re-run - stop at $\pm$ 25' BLS					
		Replace w/ smaller nut without centralizer					
		Attempt to run - stop @ 30' BLS					
	1630	Pull back - reevaluate					
REPORT BY: Kent Reynolds		REVIEWED BY: MB BARNER					
TITLE: Geologist		TITLE: Mgr Saws					
SIGNATURE:		SIGNATURE:					
		DATE: 4/27/00					

Page 1 of 1

DATE: 4/18/00

RIG MODEL/NO: RSI #106

LOCATION: S of SX

TOTAL SHIFT FOOTAGE: NA

START TIME 0700

END TIME 1630

CONTRACTOR TIME 5

TOTAL TIME: 9

PERSONNEL:
OPERATOR: W Worth
WA LICENSE NUMBER: 2273
OTHER: M Hasey
M Gomez
M Stowell
De Curry
K Reynolds
K Flower

BLOW COUNTS

1630

SIGNATURE: *[Signature]*

WASTE MANAGEMENT TECHNICAL SERVICES

DRILLING AND SAMPLING (SLANT BORING) DAILY WORK RECORD

Page 1 of 1

WELL I.D.: C3070		WELL NUMBER: C3070		REPORT NUMBER: 32		DATE: 4/20/00	
CONTRACT NUMBER: 4850-8		START CARD NO.: 300610		RIG MODEL/NO: RSI #106			
PURPOSE: Slant Demo				REFERENCE: NTS Dow-001		LOCATION: 30FS4	
REFERENCE MEASURING POINT: Ground level				TOTAL SHIFT FOOTAGE: Pul 50' of csg NA cement 50'			
CONSTRUCTION DESCRIPTION:						BORING DEPTH:	
CASING SIZE	SET-AT DEPTH	TYPE CASING	DRIVE POINT DIMENSION	START DEPTH	END DEPTH	START:	START TIME
7"	64.36	CS	see spec	64.36	150	64.36	0700
						END: 150	END TIME
							1630
ODC FOR SUBCONTRACTOR:						CONTRACTOR TIME	
						15	
						TOTAL TIME:	
						9.5	
LOG SUMMARY:						PERSONNEL:	
						OPERATOR: W Worth	
						WA LICENSE NUMBER:	
						OTHER: M Masey	
						M Striwell	
						M Gomez	
						D Curry	
						K Reynolds	
						K Flower	
WEATHER CONDITIONS (32716)							
AM - clear							
PM - warm - gusty							

TIME		DESCRIPTION OF OPERATIONS/REMARKS	BLOW COUNTS
FROM	TO		
0700	0730	Warm up, check off lists, POD	
0730		Pull remaining csg - to surface - remove	
	1030	Shoe - inspect csg, cut on 2nd joint	
1030	1130	Run 50' of casing back to hole - bore hole open to 125' - 6' stop = 119' BLS csg @ 1/4" BLS	
1130	1200	Lunch	
1200		Attempt to run rotational "scraper" to large	
	1300	to go to bttm - send to shop to turn down	
1300		Pick up diverter/rotational sampler, run in hole	
		unable to control guide tubing & diverter - slipage	
		during sampling damages sampler - retrieve	
	1530	3-4" of material in sampler	
1530	1630	Clean up location - make up air system for MEPA & air diverter/csg seal test	

REPORT BY: Kent Reynolds	REVIEWED BY: MB GARDNER
TITLE: Geologist	TITLE: Mgr Saws
SIGNATURE: Kent Reynolds	SIGNATURE: MB Gardner
	DATE: 4/27/00

WASTE MANAGEMENT TECHNICAL SERVICES

DRILLING AND SAMPLING (SLANT BORING) DAILY WORK RECORD

Page 1 of 1

WELL I.D.: C3070		WELL NUMBER: C3070		REPORT NUMBER: 33		DATE: 4/21/00			
CONTRACT NUMBER: 4850-8		START CARD NO.: 500610		RIG MODEL/NO: RST #106					
PURPOSE: Slant Demo				REFERENCE: WMS Dow-001		LOCATION: S of ST			
REFERENCE MEASURING POINT: Ground Level				TOTAL SHIFT FOOTAGE: 50					
CONSTRUCTION DESCRIPTION:						BORING DEPTH:			
CASING SIZE	SET-AT DEPTH	TYPE CASING	DRIVE POINT DIMENSION	START DEPTH	END DEPTH	START TIME 0700			
5"	-0-	CS	Scraper	264	-0-	END TIME 1630			
ODC FOR SUBCONTRACTOR:						CONTRACTOR TIME 15			
LOG SUMMARY:						TOTAL TIME: 9.5			
WEATHER CONDITIONS (32716) AM - Clear - cool PM - Warm - hot						PERSONNEL: OPERATOR: W. Worth WA LICENSE NUMBER: 2273 OTHER: M. Hoyer K. Flower M. Gomez M. St. Hill D. Curry K. Reynolds			
TIME		DESCRIPTION OF OPERATIONS/REMARKS						BLOW COUNTS	
FROM TO									
0700 0715		POD - warm equipment							
0715		Pickup diverter / scraper - run in							
		hole - no sample - run several times while adjusting cutter angle - number of rotations etc. - retrieve a 2-3 inches material in basket							
1030 1200		Run csg diverter air seal test - push 1150 cfm for 3 min @ 100-150 psi at compressor - no leaks in system - minor air leaks around csg at ground surface (only a 40' of csg in ground) - NO Annular Seal							
1200 1230		Lunch							
1230 1630		Rerun scraper sampler - Finish abandonment of borehole - bent. pellets to surface - all csg out							
REPORT BY: Kent Reynolds		REVIEWED BY: M. Gardner							
TITLE: Geologist		TITLE: Mgr SAWS						DATE: 4/27/00	
SIGNATURE: Kent Reynolds		SIGNATURE: M. Gardner							

WASTE MANAGEMENT TECHNICAL SERVICES

DRILLING AND SAMPLING (SLANT BORING) DAILY WORK RECORD

Page 1 of 1

WELL I.D.: C3070		WELL NUMBER: C3070		REPORT NUMBER: 34		DATE: 4/24/00	
CONTRACT NUMBER: 4850-8		START CARD NO.: 500610		RIG MODEL/NO: RST #106			
PURPOSE: Slant Demo				REFERENCE: W.M.T.S. Dow-coi		LOCATION: Soffsy	
REFERENCE MEASURING POINT: Ground Level				TOTAL SHIFT FOOTAGE: NA			
CONSTRUCTION DESCRIPTION:						BORING DEPTH:	
CASING SIZE	SET-AT DEPTH	TYPE CASING	DRIVE POINT DIMENSION	START DEPTH	END DEPTH	START: NA	START TIME: 0200
						END:	END TIME: 1630
ODC FOR SUBCONTRACTOR:				LOG SUMMARY:		CONTRACTOR TIME: .5	
						TOTAL TIME: 9.5	
WEATHER CONDITIONS (32716)						PERSONNEL:	
AM - Cloudy						OPERATOR: W Worth	
PM -						WA LICENSE NUMBER:	
						OTHER: M. Hasey	
						K Reynolds	
TIME		DESCRIPTION OF OPERATIONS/REMARKS					BLOW COUNTS
FROM	TO						
0700		RST. Clean and pallet WMTS equip. in prep					
	1630	for mobilization to farm					
		• Haul remaining csg to RST yard for cleaning					
		drill pipe cleaning and inspection					
		• Rig down compressor					
		• Clean up site					
		• Inventory and stage equip. in WM yard					
		Preparations for tank farm deployment					
REPORT BY: Kent Reynolds		REVIEWED BY: MG CARNER					
TITLE: Geologist		TITLE: Mgr Saws					
SIGNATURE: Kent Reynolds		DATE: 4/27/00					
		SIGNATURE: M. Carner					

WMTS-DOW-002, Rev. 0

ATTACHMENT B

Water Well Report

WATER WELL REPORT

STATE OF WASHINGTON

PPP-6435 REV 0
Start Card No. 3350850

UNIQUE WELL I.D. # C 3070

Water Right Permit No. N/A

(1) OWNER: Name U.S. DEPARTMENT OF ENERGY Address 825 JADWIN AVENUE, RICHLAND WA. 99352

(2) LOCATION OF WELL: County BENTON SW 1/4 SE 1/4 Sec 12 T. 12 N. R. 25 E.W.M.

(2a) STREET ADDRESS OF WELL (or nearest address) HANFORD SITE, 200 WEST AREA, SOUTH SX TANK FARM

(3) PROPOSED USE: ☐ Domestic ☐ Industrial ☐ Municipal ☐
☐ Irrigation ☐ Test Well ☐ Other ☒
☐ DeWater

(4) TYPE OF WORK: Owner's number of well (if more than one) N/A
Abandoned ☒ New well ☐ Method: Dug ☐ Bored ☐
Deepened ☐ Cable ☐ Driven ☐
Reconditioned ☐ Rotary ☐ Jetted ☐

(5) DIMENSIONS: Diameter of well 7.50 inches.
Drilled 183.56 feet. Depth of completed well N/A ft.

(6) CONSTRUCTION DETAILS:

Casing installed: _____ " Diam. from _____ ft. to _____ ft.
Welded ☐ _____ " Diam. from _____ ft. to _____ ft.
Liner installed ☐ 7.0 " Diam. from 8.85 ft. to 183.56 ft.
Threaded ☒

Perforations: Yes ☐ No ☒

Type of perforator used _____

SIZE of perforations _____ in. by _____ in.
_____ perforations from _____ ft. to _____ ft.
_____ perforations from _____ ft. to _____ ft.
_____ perforations from _____ ft. to _____ ft.

Screens: Yes ☐ No ☒

Manufacturer's Name _____

Type _____ Model No. _____
Diam. _____ Slot size _____ from _____ ft. to _____ ft.
Diam. _____ Slot size _____ from _____ ft. to _____ ft.

Gravel packed: Yes ☐ No ☒ Size of gravel _____
Gravel placed from _____ ft. to _____ ft.

Surface seal: Yes ☐ No ☒ To what depth? _____ ft.

Material used in seal _____

Did any strata contain unusable water? Yes ☐ No ☒

Type of water? _____ Depth of strata _____

Method of sealing strata off N/A

(7) PUMP: Manufacturer's Name _____
Type: _____ H.P. _____

(8) WATER LEVELS: Land-surface elevation above mean sea level _____ ft.

Static level _____ ft. below top of well Date _____

Artesian pressure _____ lbs. per square inch Date _____

Artesian water is controlled by _____ (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level

Was a pump test made? Yes ☐ No ☒ If yes, by whom? _____

Yield: _____ gal./min. with _____ ft. drawdown after _____ hrs.

" " " "

" " " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level
------	-------------	------	-------------	------	-------------

Date of test _____

Ball test _____ gal./min. with _____ ft. drawdown after _____ hrs.

Air test _____ gal./min. with stem set at _____ ft. for _____ hrs.

Artesian flow _____ g.p.m. Date _____

Temperature of water _____ Was a chemical analysis made? Yes ☐ No ☐

(10) WELL LOG or ABANDONMENT PROCEDURE DESCRIPTION

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information.

MATERIAL	FROM	TO
DRILLING (DRIVING) PROCESS:		
1) Install (Excavate) Diverter Box	0	8.85
2) DRIVE 7-inch O.D. CASING AND SHOE (17.5 inch) @ 30 degree angle to TOTAL DEPTH.	8.85	183.56
3) REMOVE TIP AND SAMPLE (SPLIT SPOON) SOIL AT PRE-DESIGNATED DEPTHS.		
4) CUT CASING SHOE @ ~175 FT.		

WELL COMPLETION PROCESS:

- 1) PULLING CASING (7-INCH)
- 2) ADD BENTONITE.
- 3) TEST SIDE-WALL SCRAPER @ ~50 FT BGS.
- 4) PULL CASING.
- 5) ADD BENTONITE TO A DEPTH OF 8.85 FT BGS (BOTTOM DIVERTER BOX).
- 6) BACK FILL EXCAVATION WITH NATURAL MATERIAL.

Work Started MARCH 10, 00 Completed APRIL 21, 19 00

WELL CONSTRUCTOR CERTIFICATION:

I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

NAME WASTE MANAGEMENT TECHNICAL SERVICES
(PERSON, FIRM, OR CORPORATION) (TYPE OR PRINT)

Address P.O. Box 650, Richland, WA. 99352

(Signed) David McGoogie License No. 1580
(WELL DRILLER)

Contractor's Registration No. N/A Date _____, 19 ____

(USE ADDITIONAL SHEETS IF NECESSARY)

ref. — WMTS-DOW-002, Rev. 0

ATTACHMENT C

Obstructions and Tank Locations Relative to the Rig Positioning

REFERENCE DRAWINGS

H-2-3402, copper tub, galv. pipe, vent.
H-2-3412, transfer/vent./cond. piping
H-2-3413, conduit
H-2-3602, cathodic prot. sys. depths
H-2-31881, caisson and laterals
H-2-36942, well depths
H-2-36944, tank/well locations
H-2-37855, tank/riser elevations
H-2-39511, tank radius/height
H-2-39575, vent./overflow piping
H-2-39922, cathodic protection
H-2-46240, vent./drain/trans./conduit
WHC-SD-WM-TI-665, grade elevations

CAD LAYOUT RESULTS

Borehole Coordinates at Grade:
-48,66.0 (origin at 108 center and
grade), E140 N145 (GPR scan map),
N35414 W75815 (Chanford)
Borehole Coordinates at Bottom:
0-10-155
Drill Angle: 30.1 deg.
Casing Length: 179.2 ft
Lateral clearance: 6 ft
Tank clearance: 9.7 ft
Tolerance effect: 1 deg equals
approx. 1.4 ft change to lateral
clearance and 1.0 ft change to
tank clearance.

PROPOSED SLANT BOREHOLE
LOCATION NEAR TANK
241-SX-108

3D Layout by D.J. Minter 02-22-2000

ref. — WMTS-DOW-002, Rev. 0

ATTACHMENT D

Anchoring Point (Box) That Will be Placed Over the Drive Point Location Adjacent to
SX-108

ONE * STEEL BOX W/10 3/4"O.D. DRILL CASING * (9 13/16" I.D.)

STEEL BOX WEIGHT = 4301 LBS.
STEEL BOX WEIGHT W/ CONCRETE FILL = 29,261 LBS
CEMENT WEIGHT 4000 LBS CUBIC FT.
LIFTING EYES A36 RATED @ 36,000 LBS EA.

NOTES	REVISION
DATE	BY
DESCRIPTION	DATE
FOR APPROVAL:	TO FIELD:
BY: [Signature]	BY: [Signature]
DATE: [Date]	DATE: [Date]
METALFAB INC. 6302 WEST VAN GIESSEN, WEST RICHLAND, WA. 99363 TELEPHONE (509) 947-2946	
JOB NAME:	JOB NUMBER:
STEEL BOX #2 W/ 11"O.D. DRILL CASING	WASHINGTON
LOCATION:	DESCRIPTION:
SCALE: NONE	CHECKED BY: [Signature]
DATE: 4/14/00	DATE: [Date]
SHEET: [Number]	SHEET: [Number]
D01	Δ

ref. -- WMTS-DOW-002, Rev. 0

ATTACHMENT E

Letter from the WMTS Safety Officer for Noise Considerations

WASTE MANAGEMENT
TECHNICAL SERVICES

TO: Marty Gardner/WMTS Manager S&WS

DATE: May 1, 2000

FROM: Mark Hartney/WMTS Safety
Telephone: (509) 372-3288

cc: Kent Reynolds/WMTS
file

SUBJECT: RESULTS OF NOISE MONITORING DURING RSI ANGLE BORING

Marty, the following is a brief of the noise monitoring we conducted at the RSI angle borehole in 200W. Please let me know if you need more data.

Personal noise monitoring was conducted on Resonant Sonic International (RSI) employees during the angle borehole demonstration conducted south of the SX Tank Farm in 200W. The Multiple Angle Percussion Rig (MAPR) operator and the MAPR Grapple operator were selected for monitoring due to their proximity to the noise sources. In both cases, there was an excellent cross section of work activities, of sufficient duration, performed during monitoring to ensure representative noise levels for the task. An 85-dBA dose criterion was selected with a 3dBA exchange rate. The highest measured Time Weighted Average was 94.9 dBA for the driller.

At the time of monitoring, both employees were wearing either single or double hearing protection based on the work task and in accordance with the RSI Activity Hazard Analysis (AHA; RSI-AHA-00-001). At a minimum, an NRR protection of 20 was maintained. Therefore a maximum dose of 74-dBA was received during the monitoring periods well below the 85-dBA dose criterion.

Based on the results of the noise monitoring, the current levels of protection are quite sufficient to protect the workers from the "typical" noise sources encountered during this type of drilling. In fact, consideration could be given into lowering the requirement for double protection during percussion hammering operations.

SX Inclined Borehole Demonstration

PPP-6475 REV0

Drilling blow counts versus depth and gyro-derived actual depths

Waste Management Technical Services

FTG	Blows	FTG	Blows	FTG	Blows	FTG	Blows
0 to 9	0	52	19	95	31	138	25
9 to 10	5	53	21	96	35	139	28
11	6	54	19	97	34	140	27
12	10	55	23	98	22	141	29
13	15	56	24	99	27	142	26
14	15	57	24	100	28	143	33
15	18	58	28	101	28	144	32
16	20	59	24	102	32	145	25
17	29	60	22	103	26	146	30
18	25	61	19	104	31	147	26
19	24	62	18	105	30	148	25
20	31	63	21	106	27	149	29
21	47	64	22	107	28	150	27
22	46	65	20	108	24	151	23
23	29	66	20	109	32	152	21
24	22	67	25	110	34	153	22
25	20	68	26	111	34	154	24
26	14	69	31	112	35	155	26
27	18	70	24	113	34	156	21
28	25	71	22	114	24	157	25
29	23	72	26	115	26	158	25
30	27	73	28	116	40	159	26
31	40	74	29	117	35	160	28
32	54	75	41	118	25	161	30
33	39	76	49	119	32	162	32
34	22	77	60	120	34	163	26
35	24	78	5	121	30	164	28
36	19	79	45	122	31	165	34
37	16	80	75	123	28	166	32
38	15	81	70	124	32	167	28
39	16	82	71	125	36	168	26
40	17	83	142	126	31	169	30
41	22	84	86	127	33	170	34
42	23	85	64	128	36	171	31
43	23	86	80	129	37	172	25
44	22	87	85	130	47	173	30
45	24	88	86	131	35	174	18
46	29	89	74	132	34	175	20
47	32	90	72	133	34	176	28
48	34	91	48	134	38	177	30
49	34	92	42	135	31	178	36
50	29	93	24	136	32	179	72
51	26	94	29	137	27	180	82
						181	84
						182	88
						183	106

ATTACHMENT G

| The Gyroscopic Survey for the First Run at 76 ft and the Second Run at Total Depth

Survey File: C:\GYRO\C3070#2.RAW

Date: Mar 13, 2000

Time: 10:24

Description: C3070 Slant hole

LOCATION: 200 West area. South of SX tank farm.

CUSTOMER: CH2MHILL

OPERATOR: RZ Steffler

Comments:

RPP-6475 REVO

HUMPHREY TOOL IDENTIFICATION

Gyroscope Model: DG69-0901-4 #4654

TX Series #4656

EI Series #4658

AC Series #4657

Accel.Voltage Limits: Xmax= 9.921 ; Xmin=-9.907 ; Ymax= 9.905 ; Ymin=-9.899

Comments:

Slant hole demo. Run #2. 1st run OK, but there was a question on the distance that the bottom of the hole was at.

Warm-Up Duration: 0.14 min

-----SURVEY REFERENCE DATA-----

Sight Reference Description: Corresponding Magnetic Compass Reading

Same green and white stack as the first run.

Local Magnetic Declination: 19 deg.

REFERENCE SUMMARY

Survey Reference Point: 165 deg.

Local Grid Offset:-19 deg.

Drift Correction Method: Least Squares Drift Linearization

Computation Method: Minimum Curvature

Target Direction (deg): 0

INRUN record set

Measured Depth (feet)	Course Inclin. from Vert.	Course Direction (deg)	True Vert. Depth (feet)	Rectangular Coordinates +N/-S +E/-W	Dogleg Severity "/100 f	Vertical Section (feet)
0.00	29.23	95.0	0.00	0.00 0.00	0.00	0.0
10.00	29.79	96.6	8.70	-0.50 4.90	9.40	-0.5
20.00	30.26	95.9	17.36	-1.04 9.87	5.70	-1.0
30.00	30.74	96.8	25.98	-1.60 14.92	6.60	-1.6
40.00	31.53	96.6	34.54	-2.20 20.05	8.00	-2.2
50.00	32.10	96.7	43.03	-2.81 25.29	5.70	-2.8
60.00	32.98	96.9	51.47	-3.45 30.63	8.80	-3.4
70.00	33.87	96.6	59.81	-4.10 36.10	9.10	-4.1
76.00	34.42	96.2	64.78	-4.47 39.45	10.20	-4.5

Bottom:

True Vertical Depth 64.78 feet

Closure Distance 39.7 feet

Closure Direction 96.5 deg.

Course Direction 96.2 deg.

DEFINITIONS:

Closure Direction: An angle between Main Reference direction (for example True North) and a line from coordinate origin to horizontal projection of current borehole point.

Closure Distance: A distance between coordinate origin and a horizontal projection of current borehole point.

Course Direction: An angle between Main Reference direction and a tangent to a horizontal projection of the borehole in current point.

ToolFace Gravity: An angle between tool reference mark direction and a tangent to a horizontal projection of the borehole.

ToolFace Gyro: An angle between tool reference mark direction and initial Survey Sight direction (which is gyroscope direction, if gyro drift = 0).

Survey File: C:\GYRO\C3070#2.RAW
 Date: Mar 13, 2000
 Time: 10:24
 Description: C3070 Slant hole
 LOCATION: 200 West area. South of SX tank farm.
 CUSTOMER: CH2MHILL
 OPERATOR: RZ Steffler
 Comments:

 HUMPHREY TOOL IDENTIFICATION

Gyroscope Model: DG69-0901-4 #4654
 TX Series #4656
 EI Series #4658
 AC Series #4657
 Accel.Voltage Limits: Xmax= 9.921 ; Xmin=-9.907 ; Ymax= 9.905 ; Ymin=-9.899
 Comments:

Slant hole demo. Run #2. 1st run OK, but there was a question on the distance that the bottom of the hole was at.

Warm-Up Duration: 0.14 min

-----SURVEY REFERENCE DATA-----

Sight Reference Description: Corresponding Magnetic Compass Reading
 Same green and white stack as the first run.
 Local Magnetic Declination: 19 deg.

REFERENCE SUMMARY

Survey Reference Point: 165 deg.
 Local Grid Offset:-19 deg.
 Drift Correction Method: Least Squares Drift Linearization
 Computation Method: Minimum Curvature

INRUN record set

Measured Depth (feet)	True Vert. Depth	Rectangular Coordinates	
		+N/-S	+E/-W
0.00	0.00	0.00	0.00
10.00	8.70	-0.50	4.90
20.00	17.36	-1.04	9.87
30.00	25.98	-1.60	14.92
40.00	34.54	-2.20	20.05
50.00	43.03	-2.81	25.29
60.00	51.47	-3.45	30.63
70.00	59.81	-4.10	36.10
76.00	64.78	-4.47	39.45

Survey File: C:\GYRO\C3070#2.RAW

Date: Mar 13, 2000

Time: 10:24

Description: C3070 Slant hole

LOCATION: 200 West area. South of SX tank farm.

CUSTOMER: CH2MHILL

OPERATOR: RZ Steffler

Comments:

HUMPHREY TOOL IDENTIFICATION

Gyroscope Model: DG69-0901-4 #4654

TX Series #4656

EI Series #4658

AC Series #4657

Accel.Voltage Limits: Xmax= 9.921 ; Xmin=-9.907 ; Ymax= 9.905 ; Ymin=-9.899

Comments:

Slant hole demo. Run #2. 1st run OK, but there was a question on the distance that the bottom of the hole was at.

Warm-Up Duration: 0.14 min

-----SURVEY REFERENCE DATA-----

Sight Reference Description: Corresponding Magnetic Compass Reading
Same green and white stack as the first run.

Local Magnetic Declination: 19 deg.

REFERENCE SUMMARY

Survey Reference Point: 165 deg.

Local Grid Offset:-19 deg.

Drift Correction Method: Least Squares Drift Linearization

Time (min)	Cable (feet)	Inclination fromVert.	Course Direction	Gimbal Corr	Drift Corr
5.8	0.00	29.23	95.0	-0.21	0.17
7.6	10.00	29.79	96.6	-0.01	0.22
10.1	20.00	30.26	95.9	-0.09	0.30
11.5	30.00	30.74	96.8	0.04	0.34
12.6	40.00	31.53	96.6	0.02	0.37
14.1	50.00	32.10	96.7	0.04	0.42
15.2	60.00	32.98	96.9	0.08	0.45
16.3	70.00	33.87	96.6	0.05	0.48
20.8	76.00	34.42	96.2	-0.01	0.62

Survey File: C:\GYRO\C3070#2.RAW

Date: Mar 13, 2000

Time: 10:24

Description: C3070 Slant hole

LOCATION: 200 West area. South of SX tank farm.

CUSTOMER: CH2MHILL

OPERATOR: RZ Steffler

Comments:

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HUMPHREY TOOL IDENTIFICATION

Gyroscope Model: DG69-0901-4 #4654

TX Series #4656

EI Series #4658

AC Series #4657

Accel.Voltage Limits: Xmax= 9.921 ; Xmin=-9.907 ; Ymax= 9.905 ; Ymin=-9.899

Comments:

Slant hole demo. Run #2. 1st run OK, but there was a question on the distance that the bottom of the hole was at.

Warm-Up Duration: 0.14 min

-----SURVEY REFERENCE DATA-----

Sight Reference Description: Corresponding Magnetic Compass Reading
Same green and white stack as the first run.

Local Magnetic Declination: 19 deg.

REFERENCE SUMMARY

Survey Reference Point: 165 deg.

Local Grid Offset:-19 deg.

	Stat	Minutes	Length (feet)	Inclin	TFGyro	TFHighSide	CourseDir
R	0	0:00	0.00	0.869	87.164	351.656	192.343
S	0	5.80	0.00	29.232	37.308	38.740	95.194
S	1	7.60	10.00	29.793	48.774	48.827	96.774
S	2	10.15	20.00	30.256	96.905	97.458	96.196
S	3	11.46	30.00	30.738	57.268	57.009	97.136
S	4	12.65	40.00	31.529	64.250	64.150	96.953
S	5	14.12	50.00	32.097	67.849	67.610	97.118
S	6	15.20	60.00	32.976	73.180	72.750	97.348
S	7	16.28	70.00	33.874	84.739	84.502	97.121
D	8	17.47	76.00	34.427	96.826	96.949	96.686
D	8	17.83	76.00	34.427	96.829	96.949	96.691
D	8	18.09	76.00	34.427	96.852	96.949	96.718
D	8	18.34	76.00	34.427	96.852	96.949	96.718
D	8	18.60	76.00	34.427	96.856	96.949	96.722
D	8	18.86	76.00	34.427	96.848	96.949	96.714
D	8	19.12	76.00	34.427	96.856	96.949	96.722
D	8	19.37	76.00	34.427	96.852	96.949	96.718
D	8	19.63	76.00	34.423	96.859	96.899	96.788
D	8	19.89	76.00	34.427	96.859	96.949	96.727
D	8	20.15	76.00	34.423	96.852	96.899	96.779
D	8	20.41	76.00	34.423	96.852	96.899	96.779
D	8	20.66	76.00	34.423	96.856	96.899	96.783
S	8	20.84	76.00	34.423	96.856	96.899	96.783
R	9	28.62	0.00	0.947	88.012	357.224	187.623

Survey File: C3070#2.RAW
 CUSTOMER: CH2MHILL

Date: Mar 13, 2000
 Time: 10:24

HORIZONTAL PROJECTION
 Horiz Axis: 90.0 deg to Main Ref.

W/E range: 0.00 to 39.45
 S/N range: -4.47 to 0.00

VERTICAL PROJECTION at 96.5 deg
Scale: Horiz/Vert=1.2

Survey File: C3070#2.RAW
CUSTOMER: CH2MHILL

Date: Mar 13

Time: 10:24

W/E range: 0.00 to 39.45

S/N range: -4.47 to 0.00

Survey File: C3070#2.RAW

CUSTOMER: CH2MHILL

Date: Mar 13, 2000

Time: 10:24

N/E range: 0.00 to 39.45

S/N range: -4.47 to 0.00

64.7
feet

Survey File: C:\GYRO\C30704-4.RAW

RPP-6475 REVO

Date: Apr 04,2000

Time: 11:13

Description: C3070 Demonstration slant hole

LOCATION: 200 West area. Just south of SX tank farm.

CUSTOMER: CH2MHILL

OPERATOR: RZ Steffler

Comments:

Borehole is located in the shallow pit just south of SX tank farms.

HUMPHREY TOOL IDENTIFICATION

Gyroscope Model: DG69-0901-4 #4654

TX Series #4656

EI Series #4658

AC Series #4657

Accel.Voltage Limits: Xmax= 9.921 ; Xmin=-9.907 ; Ymax= 9.905 ; Ymin=-9.899

Comments:

2nd run of 200 west slant hole near SX farm. Demonstration hole.

Warm-Up Duration: 37.53 min

-----SURVEY REFERENCE DATA-----

Sight Reference Description: Corresponding Magnetic Compass Reading

Furthest south green and white fencing stake that they are using to rope off the area. Part of the parking area.

Local Magnetic Declination: 19 deg.

REFERENCE SUMMARY

Survey Reference Point: 169 deg.

Local Grid Offset:-19 deg.

Drift Correction Method: Least Squares Drift Linearization

Computation Method: Minimum Curvature

Target Direction (deg): 0

INRUN record set

Measured Depth (feet)	Course Inclin. from Vert.	Course Direction (deg)	True Vert. Depth (feet)	Rectangular Coordinates +N/-S +E/-W	Dogleg Severety "/100 f	Vertical Section (feet)
0.00	31.97	96.2	0.00	0.00 0.00	0.00	0.0
5.00	30.24	96.9	4.28	-0.29 2.57	35.50	-0.3
10.00	30.30	96.6	8.60	-0.59 5.07	3.50	-0.6
15.00	30.26	96.9	12.92	-0.88 7.57	3.50	-0.9
20.00	30.31	97.0	17.23	-1.19 10.08	1.30	-1.2
25.00	30.53	97.0	21.55	-1.50 12.59	4.40	-1.5
30.00	30.78	97.0	25.85	-1.81 15.12	4.90	-1.8
35.00	31.18	96.7	30.13	-2.11 17.68	8.60	-2.1
40.00	31.56	96.7	34.40	-2.41 20.26	7.70	-2.4
45.00	31.91	96.8	38.66	-2.72 22.87	7.00	-2.7
50.00	32.20	96.8	42.89	-3.04 25.51	5.90	-3.0
55.00	32.60	96.9	47.12	-3.36 28.17	8.00	-3.4
60.00	33.03	96.9	51.32	-3.68 30.86	8.70	-3.7
65.00	33.50	96.9	55.50	-4.01 33.58	9.40	-4.0
70.00	33.94	96.7	59.66	-4.34 36.34	8.90	-4.3
75.00	34.34	97.0	63.79	-4.68 39.12	8.50	-4.7
80.00	34.84	97.2	67.91	-5.03 41.94	10.20	-5.0

Measured Depth (feet)	Course Inclin. from Vert.	Course Direction (deg)	True Vert. Depth (feet)	Rectangular Coordinates		Dogleg Severity "/100 f	Vertical Section (feet)
				+N/-S	+E/-W		
85.00	35.32	97.1	72.00	-5.38	44.79	9.70	-5.4
90.00	35.86	97.0	76.07	-5.74	47.68	10.90	-5.7
95.00	36.49	97.1	80.10	-6.10	50.61	12.60	-6.1
100.00	36.90	97.0	84.11	-6.47	53.57	8.30	-6.5
105.00	37.35	96.5	88.10	-6.82	56.57	10.70	-6.8
110.00	37.83	97.2	92.06	-7.19	59.60	12.90	-7.2
115.00	38.22	97.1	96.00	-7.57	62.65	7.90	-7.6
120.00	38.52	97.1	99.92	-7.96	65.73	5.90	-8.0
125.00	38.84	97.0	103.82	-8.34	68.84	6.60	-8.3
130.00	39.18	96.9	107.71	-8.72	71.96	6.80	-8.7
135.00	39.43	96.9	111.58	-9.10	75.10	5.10	-9.1
140.00	39.66	97.0	115.43	-9.48	78.26	5.00	-9.5
145.00	39.89	97.0	119.28	-9.88	81.44	4.50	-9.9
150.00	40.00	97.3	123.11	-10.28	84.62	3.60	-10.3
155.00	39.99	97.1	126.94	-10.68	87.81	2.10	-10.7
160.00	40.00	97.1	130.77	-11.07	91.00	0.50	-11.1
165.00	40.12	96.9	134.60	-11.47	94.20	2.90	-11.5
170.00	40.09	96.9	138.42	-11.85	97.39	0.80	-11.9
175.00	40.06	97.2	142.25	-12.25	100.59	3.30	-12.2
180.00	40.23	97.2	146.07	-12.65	103.79	3.50	-12.7
183.00	40.95	97.2	148.35	-12.90	105.72	23.90	-12.9

Bottom:

True Vertical Depth 148.35 feet
 Closure Distance 106.5 feet
 Closure Direction 97.0 deg.
 Course Direction 97.2 deg.

DEFINITIONS:

Closure Direction: An angle between Main Reference direction (for example True North) and a line from coordinate origin to horizontal projection of current borehole point.
 Closure Distance: A distance between coordinate origin and a horizontal projection of current borehole point.
 Course Direction: An angle between Main Reference direction and a tangent to a horizontal projection of the borehole in current point.
 ToolFace Gravity: An angle between tool reference mark direction and a tangent to a horizontal projection of the borehole.
 ToolFace Gyro: An angle between tool reference mark direction and initial Survey Sight direction (which is gyroscope direction, if gyro drift = 0).

Survey File: C:\GYRO\C30704-4.RAW

Date: Apr 04, 2000

Time: 11:13

Description: C3070 Demonstration slant hole

LOCATION: 200 West area. Just south of SX tank farm.

CUSTOMER: CH2MHILL

OPERATOR: RZ Steffler

Comments:

Borehole is located in the shallow pit just south of SX tank farms.

HUMPHREY TOOL IDENTIFICATION

Gyroscope Model: DG69-0901-4 #4654

TX Series #4656

EI Series #4658

AC Series #4657

Accel.Voltage Limits: Xmax= 9.921 ; Xmin=-9.907 ; Ymax= 9.905 ; Ymin=-9.899

Comments:

2nd run of 200 west slant hole near SX farm. Demonstration hole.

Warm-Up Duration: 37.53 min

-----SURVEY REFERENCE DATA-----

Sight Reference Description: Corresponding Magnetic Compass Reading

Furthest south green and white fencing stake that they are using to rope off the area. Part of the parking area.

Local Magnetic Declination: 19 deg.

REFERENCE SUMMARY

Survey Reference Point: 169 deg.

Local Grid Offset:-19 deg.

Drift Correction Method: Least Squares Drift Linearization

Computation Method: Minimum Curvature

INRUN record set

Measured Depth (feet)	True Vert. Depth	Rectangular Coordinates	
		+N/-S	+E/-W
0.00	0.00	0.00	0.00
5.00	4.28	-0.29	2.57
10.00	8.60	-0.59	5.07
15.00	12.92	-0.88	7.57
20.00	17.23	-1.19	10.08
25.00	21.55	-1.50	12.59
30.00	25.85	-1.81	15.12
35.00	30.13	-2.11	17.68
40.00	34.40	-2.41	20.26
45.00	38.66	-2.72	22.87
50.00	42.89	-3.04	25.51
55.00	47.12	-3.36	28.17
60.00	51.32	-3.68	30.86
65.00	55.50	-4.01	33.58
70.00	59.66	-4.34	36.34
75.00	63.79	-4.68	39.12
80.00	67.91	-5.03	41.94
85.00	72.00	-5.38	44.79
90.00	76.07	-5.74	47.68
95.00	80.10	-6.10	50.61
100.00	84.11	-6.47	53.57

Measured Depth (feet)	True Vert. Depth	Rectangular Coordinates	
		+N/-S	+E/-W
105.00	88.10	-6.82	56.57
110.00	92.06	-7.19	59.60
115.00	96.00	-7.57	62.65
120.00	99.92	-7.96	65.73
125.00	103.82	-8.34	68.84
130.00	107.71	-8.72	71.96
135.00	111.58	-9.10	75.10
140.00	115.43	-9.48	78.26
145.00	119.28	-9.88	81.44
150.00	123.11	-10.28	84.62
155.00	126.94	-10.68	87.81
160.00	130.77	-11.07	91.00
165.00	134.60	-11.47	94.20
170.00	138.42	-11.85	97.39
175.00	142.25	-12.25	100.59
180.00	146.07	-12.65	103.79
183.00	148.35	-12.90	105.72

Survey File: C:\GYRO\C30704-4.RAW

Date: Apr 04, 2000

Time: 11:13

Description: C3070 Demonstration slant hole

LOCATION: 200 West area. Just south of SX tank farm.

CUSTOMER: CH2MHILL

OPERATOR: RZ Steffler

Comments:

Borehole is located in the shallow pit just south of SX tank farms.

HUMPHREY TOOL IDENTIFICATION

Gyroscope Model: DG69-0901-4 #4654

TX Series #4656

EI Series #4658

AC Series #4657

Accel.Voltage Limits: Xmax= 9.921 ; Xmin=-9.907 ; Ymax= 9.905 ; Ymin=-9.899

Comments:

2nd run of 200 west slant hole near SX farm. Demonstration hole.

Warm-Up Duration: 37.53 min

-----SURVEY REFERENCE DATA-----

Sight Reference Description: Corresponding Magnetic Compass Reading

Furthest south green and white fencing stake that they are using to rope off the area. Part of the parking area.

Local Magnetic Declination: 19 deg.

REFERENCE SUMMARY

Survey Reference Point: 169 deg.

Local Grid Offset:-19 deg.

Drift Correction Method: Least Squares Drift Linearization

Time (min)	Cable (feet)	Inclination fromVert.	Course Direction	Gimbal Corr	Drift Corr
9.6	0.00	31.97	96.2	-0.82	-0.16
11.5	5.00	30.24	96.9	-0.64	-0.19
13.9	10.00	30.30	96.6	-0.70	-0.23
14.8	15.00	30.26	96.9	-0.65	-0.25
15.8	20.00	30.31	97.0	-0.65	-0.27
16.7	25.00	30.53	97.0	-0.66	-0.28
18.1	30.00	30.78	97.0	-0.67	-0.30
18.9	35.00	31.18	96.7	-0.73	-0.32
19.6	40.00	31.56	96.7	-0.74	-0.33
20.3	45.00	31.91	96.8	-0.75	-0.34
21.0	50.00	32.20	96.8	-0.77	-0.35
21.6	55.00	32.60	96.9	-0.77	-0.36
22.2	60.00	33.03	96.9	-0.79	-0.37
22.8	65.00	33.50	96.9	-0.82	-0.38
23.3	70.00	33.94	96.7	-0.87	-0.39
23.9	75.00	34.34	97.0	-0.85	-0.40
24.9	80.00	34.84	97.2	-0.84	-0.42
25.4	85.00	35.32	97.1	-0.88	-0.43
26.1	90.00	35.86	97.0	-0.93	-0.44
26.7	95.00	36.49	97.1	-0.94	-0.45
27.4	100.00	36.90	97.0	-0.98	-0.46

Time (min)	Cable (feet)	Inclination from Vert.	Course Direction	Gimbal Corr	Drift Corr
28.2	105.00	37.35	96.5	-1.10	-0.47
29.3	110.00	37.83	97.2	-0.99	-0.49
30.2	115.00	38.22	97.1	-1.03	-0.51
30.8	120.00	38.52	97.1	-1.05	-0.52
31.3	125.00	38.84	97.0	-1.10	-0.53
31.9	130.00	39.18	96.9	-1.15	-0.54
32.6	135.00	39.43	96.9	-1.16	-0.55
33.3	140.00	39.66	97.0	-1.14	-0.56
33.9	145.00	39.89	97.0	-1.15	-0.57
34.6	150.00	40.00	97.3	-1.11	-0.58
35.2	155.00	39.99	97.1	-1.15	-0.59
35.7	160.00	40.00	97.1	-1.17	-0.60
36.5	165.00	40.12	96.9	-1.20	-0.61
37.1	170.00	40.09	96.9	-1.21	-0.62
37.8	175.00	40.06	97.2	-1.15	-0.63
38.6	180.00	40.23	97.2	-1.17	-0.65
40.3	183.00	40.95	97.2	-1.19	-0.68

Survey File: C:\GYRO\C30704-4.RAW

RPP-6475 REV0

Date: Apr 04, 2000

Time: 11:13

Description: C3070 Demonstration slant hole

LOCATION: 200 West area. Just south of SX tank farm.

CUSTOMER: CH2MHILL

OPERATOR: RZ Steffler

Comments:

Borehole is located in the shallow pit just south of SX tank farms.

HUMPHREY TOOL IDENTIFICATION

Gyroscope Model: DG69-0901-4 #4654

TX Series #4656

EI Series #4658

AC Series #4657

Accel.Voltage Limits: Xmax= 9.921 ; Xmin=-9.907 ; Ymax= 9.905 ; Ymin=-9.899

Comments:

2nd run of 200 west slant hole near SX farm. Demonstration hole.

Warm-Up Duration: 37.53 min

-----SURVEY REFERENCE DATA-----

Sight Reference Description: Corresponding Magnetic Compass Reading

Furthest south green and white fencing stake that they are using to rope off the area. Part of the parking area.

Local Magnetic Declination: 19 deg.

REFERENCE SUMMARY

Survey Reference Point: 169 deg.

Local Grid Offset:-19 deg.

	Stat	Minutes	Length (feet)	Inclin	TFGyro	TFHighSide	CourseDir
	R	0	0.00	0.599	86.545	39.174	148.828
	S	0	9.56	31.974	97.651	102.288	95.993
	S	1	11.47	30.240	65.352	69.460	96.702
	S	2	13.89	30.303	59.653	64.075	96.337
	S	3	14.82	30.256	72.530	76.678	96.656
	S	4	15.80	30.315	63.475	67.581	96.701
	S	5	16.67	30.534	57.960	62.078	96.677
	S	6	18.06	30.777	60.343	64.462	96.664
	S	7	18.94	31.176	64.205	68.575	96.351
	S	8	19.61	31.559	59.880	64.174	96.419
	S	9	20.31	31.908	54.291	58.547	96.444
	S	10	20.98	32.202	57.104	61.338	96.455
	S	11	21.65	32.598	60.257	64.386	96.557
	S	12	22.24	33.033	55.758	59.898	96.520
	S	13	22.83	33.504	60.324	64.470	96.486
	S	14	23.27	33.944	59.814	64.054	96.348
	S	15	23.91	34.343	74.460	78.487	96.582
	S	16	24.92	34.843	71.125	74.976	96.766
	S	17	25.43	35.324	59.565	63.488	96.651
	S	18	26.13	35.863	60.819	64.826	96.515
	S	19	26.75	36.490	64.739	68.630	96.619
	S	20	27.37	36.902	63.970	67.890	96.557
	S	21	28.22	37.346	93.439	97.740	96.050

Stat	Minutes	Length (feet)	Inclin	TFGyro	TFHighSide	CourseDir
S 22	29.27	110.00	37.830	213.393	217.128	96.730
S 23	30.17	115.00	38.224	12.172	15.957	96.641
S 24	30.79	120.00	38.521	23.977	27.783	96.595
S 25	31.33	125.00	38.842	26.290	30.191	96.451
S 26	31.90	130.00	39.176	26.905	30.889	96.321
S 27	32.60	135.00	39.430	30.552	34.506	96.342
S 28	33.27	140.00	39.662	36.315	40.145	96.485
S 29	33.88	145.00	39.885	29.192	33.016	96.477
S 30	34.55	150.00	40.002	38.815	42.478	96.677
S 31	35.17	155.00	39.995	33.819	37.617	96.503
S 32	35.71	160.00	40.000	38.707	42.541	96.456
S 33	36.46	165.00	40.122	25.221	29.150	96.322
S 34	37.05	170.00	40.086	25.029	28.981	96.295
S 35	37.77	175.00	40.059	34.727	38.496	96.535
S 36	38.60	180.00	40.234	26.659	30.436	96.512
S 37	40.30	183.00	40.948	23.757	27.449	96.573
D 37	40.74	183.00	40.948	23.757	27.449	96.573
D 37	40.99	183.00	40.948	23.745	27.449	96.557
D 37	41.25	183.00	40.966	23.757	27.487	96.520
D 37	41.51	183.00	40.948	23.745	27.449	96.557
D 37	41.77	183.00	40.948	23.745	27.449	96.557
D 37	42.05	183.00	40.948	23.767	27.449	96.585
D 37	42.31	183.00	40.948	23.757	27.449	96.573
D 37	42.57	183.00	40.948	23.767	27.449	96.585
D 37	42.82	183.00	40.948	23.757	27.449	96.573
D 37	43.08	183.00	40.948	23.745	27.449	96.557
D 37	43.34	183.00	40.948	23.745	27.449	96.557
D 37	43.60	183.00	40.948	23.773	27.449	96.593
R 38	70.32	0.00	0.424	85.369	34.548	152.276

VERTICAL PROJECTION at 96.8 deg

RPP-6475 REVO

Survey File: C30704-4.RAW

Scale: Horiz/Vert=1.0

Date: Apr 04

CUSTOMER: CH2MHILL

Time: 11:13

W/E range: 0.00 to 105.72

S/N range: -12.90 to 0.00

Survey File: C30704-4.RAW
CUSTOMER: CH2MHILL

Date: Apr 04, 2000
Time: 11:13

HORIZONTAL PROJECTION
Horiz Axis: 90.0 deg to Main Ref.

W/E range: 0.00 to 105.72

S/N range: -12.90 to 0.00

GYROSCOPE DRIFT GRAPH

—■— Least Squares Drift Linearization Method

ATTACHMENT H

Actual Verses Projected Path, Target Location, Tolerance, and Direction the Hole
Deviated from a Straight Line

Slant Borehole Demo - Target and Measured Coordinates

GYRO #1

Casing Length (ft)	Target X, Horizontal Displ. (ft)	Measured Gyro X (+E/-W) (ft)	Adjusted Gyro X (ft)	Target Y, Perpen. Displ. (ft)	Measured Gyro Y (+N/-S) (ft)	Adjusted Gyro Y (ft)	Target Z, Well Depth (ft)	Measured Gyro Z (ft)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10.00	5.00	4.90	4.92	-0.44	-0.50	-0.50	8.66	8.70
20.00	10.00	9.87	9.91	-0.87	-1.04	-1.04	17.32	17.36
30.00	15.00	14.92	14.98	-1.31	-1.60	-1.59	25.98	25.98
40.00	20.00	20.05	20.13	-1.75	-2.20	-2.19	34.64	34.54
50.00	25.00	25.29	25.39	-2.19	-2.81	-2.80	43.30	43.03
60.00	30.00	30.63	30.75	-2.62	-3.45	-3.44	51.96	51.47
70.00	35.00	36.10	36.24	-3.06	-4.10	-4.08	60.62	59.81
76.00	38.00	39.45	39.60	-3.32	-4.47	-4.45	65.82	64.78

GYRO #2

Casing Length (ft)	Target X, Horizontal Displ. (ft)	Measured Gyro X (+E/-W) (ft)	Adjusted Gyro X (ft)	Target Y, Perpen. Displ. (ft)	Measured Gyro Y (+N/-S) (ft)	Adjusted Gyro Y (ft)	Target Z, Well Depth (ft)	Measured Gyro Z (ft)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5.00	2.50	2.57	2.59	-0.27	-0.29	-0.29	4.33	4.28
10.00	5.00	5.07	5.10	-0.54	-0.59	-0.59	8.66	8.60
15.00	7.50	7.57	7.61	-0.81	-0.88	-0.87	12.99	12.92
20.00	10.00	10.08	10.14	-1.09	-1.19	-1.18	17.32	17.23
25.00	12.50	12.59	12.66	-1.36	-1.50	-1.49	21.65	21.55
30.00	15.00	15.12	15.21	-1.63	-1.81	-1.80	25.98	25.85
35.00	17.50	17.68	17.78	-1.90	-2.11	-2.10	30.31	30.13
40.00	20.00	20.26	20.38	-2.17	-2.41	-2.40	34.64	34.40
45.00	22.50	22.87	23.00	-2.44	-2.72	-2.70	38.97	38.66
50.00	25.00	25.51	25.66	-2.72	-3.04	-3.02	43.30	42.89
55.00	27.50	28.17	28.34	-2.99	-3.36	-3.34	47.63	47.12
60.00	30.00	30.86	31.04	-3.26	-3.68	-3.66	51.96	51.32
65.00	32.50	33.58	33.78	-3.53	-4.01	-3.99	56.29	55.50
70.00	35.00	36.34	36.55	-3.80	-4.34	-4.31	60.62	59.66
75.00	37.50	39.12	39.35	-4.07	-4.68	-4.65	64.95	63.79
80.00	40.00	41.94	42.19	-4.35	-5.03	-5.00	69.28	67.91
85.00	42.50	44.79	45.05	-4.62	-5.38	-5.35	73.61	72.00

H-1

90.00	45.00	47.68	47.96	-4.89	-5.74	-5.71	77.94	76.07
95.00	47.50	50.61	50.91	-5.16	-6.10	-6.06	82.27	80.10
100.00	50.00	53.57	53.89	-5.43	-6.47	-6.43	86.60	84.11
105.00	52.50	56.57	56.90	-5.70	-6.82	-6.78	90.93	88.10
110.00	55.00	59.60	59.95	-5.97	-7.19	-7.15	95.26	92.06
115.00	57.50	62.65	63.02	-6.25	-7.57	-7.53	99.59	96.00
120.00	60.00	65.73	66.12	-6.52	-7.96	-7.91	103.92	99.92
125.00	62.50	68.84	69.25	-6.79	-8.34	-8.29	108.25	103.82
130.00	65.00	71.96	72.38	-7.06	-8.72	-8.67	112.58	107.71
135.00	67.50	75.10	75.54	-7.33	-9.10	-9.05	116.91	111.58
140.00	70.00	78.26	78.72	-7.60	-9.48	-9.42	121.24	115.43
145.00	72.50	81.44	81.92	-7.88	-9.88	-9.82	125.57	119.28
150.00	75.00	84.62	85.12	-8.15	-10.28	-10.22	129.90	123.11
155.00	77.50	87.81	88.33	-8.42	-10.68	-10.62	134.23	126.94
160.00	80.00	91.00	91.54	-8.69	-11.07	-11.01	138.56	130.77
165.00	82.50	94.20	94.75	-8.96	-11.47	-11.40	142.89	134.60
170.00	85.00	97.39	97.96	-9.23	-11.85	-11.78	147.22	138.42
175.00	87.50	100.59	101.18	-9.51	-12.25	-12.18	151.55	142.25
180.00	90.00	103.79	104.40	-9.78	-12.65	-12.58	155.88	146.07
183.00	91.50	105.72	106.34	-9.94	-12.90	-12.82	158.48	148.35

Demo Borehole Variance - X Direction

Demo Borehole Variance - Y Direction

H-4

Demo Borehole Variance - Z Direction

ref. - WMTS-DOW-002, Rev. 0

ATTACHMENT I

Final Tip and Shoe Design

PARTS / MATERIAL LIST						
QTY	REF	PART/DASH NUMBER	DESCRIPTION	MATERIAL/REFERENCE	SH	IN
1	1	1	REMOVABLE TIP AND SHOE ASSEMBLY		1	1
1	2	2	7" CASING SHOE		1	2
1	3	3	DRIVE POINT	8620	2	3
1	4	4				4
1	5	5				5

GENERAL NOTES: (UNLESS OTHERWISE SPECIFIED)

1. ALL DIMENSIONS ARE IN INCHES. DIMENSIONING AND TOLERANCING PER ASME Y14.5M-94. TOLERANCES: FRACTIONAL: $\pm 1/16"$, ANGULAR: $\pm 1^\circ$. DECIMAL: $X = \pm .1$, $.XX = \pm .03$, $.XXX = \pm .005$.
2. BREAK ALL SHARP EDGES AND REMOVE ALL BURRS.
3. ALL MACHINED SURFACES SHALL HAVE A $16/32$ OR BETTER FINISH, UNLESS NOTED OTHERWISE.
4. HEAT TREAT ITEM 2 TO A RC RANGE OF 40-42.
5. HEAT TREAT ITEM 3 TO A RC RANGE OF 50-55, .050-.085 DEEP, AREA IDENTIFIED BY LINE.

② 7" CASING SHOE

1 REMOVABLE TIP AND SHOE ASSEMBLY

☐ PROPRIETARY ☒ NON-PROPRIETARY		PROJECT NO. 776028 / 308	
DO NOT SCALE PRINT <small>MEASUREMENTS ARE IN INCHES UNLESS NOTED</small>		S&P FILE # & DWT #	
DATE 05/11/06 BY BD FLANNAGAN CHECKED BY P. SIMPSON DATE 05/11/06		REMOVABLE TIP ASSEMBLY
WASTE MANAGEMENT TECHNICAL SERVICES	
B		B	
SKETCH-001		B	
11		12	
13		14	
15		16	
17		18	
19		20	
21		22	
23		24	
25		26	
27		28	
29		30	
31		32	
33		34	
35		36	
37		38	
39		40	
41		42	
43		44	
45		46	
47		48	
49		50	
51		52	
53		54	
55		56	
57		58	
59		60	
61		62	
63		64	
65		66	
67		68	
69		70	
71		72	
73		74	
75		76	
77		78	
79		80	
81		82	
83		84	
85		86	
87		88	
89		90	
91		92	
93		94	
95		96	
97		98	
99		100	

REVISIONS				
REV	REVISION/DATE	REV TO	REV TO	REV TO

4 CORNER DETAIL

5 GROOVE DETAIL

3 DRIVE POINT
SCALE: 3:4

REMOVABLE
TIP ASSEMBLY

PROJECT NO.	773028 / 308
DATE FILED	05/11/05
DESIGNED BY	BO FLAUGAN
CHECKED BY	R. SIMPSON
DATE	5/11/05
BY	JE. AUTEN
REV	1
REV	2

DO NOT SCALE PRINT
DIMENSIONS ARE IN INCHES UNLESS NOTED
PROPERTY: [] NON-PROPRIETARY

REV	DATE	BY	CHK	APP
1				
2				
3				
4				
5				
6				
7				
8				

REVISIONS

ATTACHMENT J

ResonantSonic® International Procedures for Various Operations Sampling

ResonantSonic® International Procedures for Various Operations

Starting Drive Casing In Ground

- Step 1—Install drive shoe on casing and torque to specifications.
- Step 2—Lower casing in drive shoe to ground surface.
- Step 3—Install O-Ring on drive point, install drive point on inner rod and lower into drive shoe using one to two revolutions to seat drive point into drive shoe.
- Step 4—Measure angle and adjust rig to achieve 30 degrees from vertical.
- Step 5—Measure and record lengths of inner rod and casing.

Driving Casing

- Step 1—Adjust inner drive head for specific rod length.
 - Step 2—Install inner drive head and outer drive head onto casing at specified torque.
 - Step 3—Lower hammer onto casing. Start hammer and drive casing using starting procedure from operators manual.
 - Step 4—Check angle for 30 degrees for the first three joints of casing.
 - Step 5—Adjust fuel pressure to drive casing at a reasonable rate.
 - Step 6—Record blow counts.
 - Step 7—If angle is not holding true at 30 degrees then corrective action must be taken.
- To drive more casing, add a section of inner rod and casing, replace drive heads and repeat Steps 1-5 on Driving Casing heading.

Split Spoon Operation

- Step 1—Trip out all inner rods, remove drive point.
- Step 2—Pull back casing two to four tenths of a foot to relive dirt from drive shoe.
- Step 3—Install down hole hammer on top of head, install sample stinger rod and install split spoon sampler, keeping track of all tool and string lengths.
- Step 4—Trip assembly into hole on inner rods. When getting close to sample depth, driller needs to feel for insertion of split spoon sampler into drive shoe. Stop at this point.
- Step 5—Hook up airlines to down hole swivel.
- Step 6—Install diverter head and polished rod.
- Step 7—Hook up HEPA filter line to diverter head.

Step 8—Engage down feed pressure.

Step 9—Start air to down hole hammer.

Step 10—Do not drive sampler more than 11 inches or to refusal, whichever comes first.

Step 11—Disconnect airline from down hole swivel.

Step 12—Remove HEPA filter line from diverter, and remove diverter from casing.

Step 13—Install inner rod pulling unit. Pull until free.

Step 14—Remove inner rod pulling unit and trip sampler out of hole utilizing remote handling arm.

Handling potentially contaminated sample to be directed by HPTs.

Split spoon sampling method for up hole hammer, the procedures will be the same only with the down hole hammer on the top of the drill string instead of at the bottom.

Cutting Casing

Step 1—Install casing cutter on drill string. Keeping track of tool and string lengths to desired cutting depth.

Step 2—Cut casing using manufactures procedures for cutting tool.

Pulling Back Casing

Step 1—With all inner string removed, install slips in casing puller.

Step 2—Pull back casing, removing joints at each interval until desired sampling depth is reached.

Drive Casing Procedure

Step 1—Measure drill rod length in 100ths/ft. and measure casing length in 100th/ft. and adjust inner drive head to 1/10th/ft. longer.

Step 2—Screw inner drive head into drill rod, insert assembly into outer drive head and secure with removable pin.

Step 3—Using handling arm, swing assembly into place, thread rod into place, remove safety pin and thread outer drive casing up.

Split Spoon Sampler Procedure

Step 1—Disassemble sampler, assure all parts are in correct position, reassemble, tighten with 24" wrench 'ONLY' and trip in hole following drilling procedures.

Step 2—Removal from hole should include sheathing or shielding and should be in place on the hoisting plug in advance.

Step 3—Secure sampler in wrench and remove drill rod, screw in hoisting plug with shielding and remove with handling arm from wrench, allow shield to fall over sampler, tie off bottom and move to cask.

Procedure for Handling Arm

Step 1—After safely securing swing radius area, pick-up casing with drive shoe, thread in place and insert into wrenches.

Step 2—Pick up pre assembled drive head, swing into place and thread up.

Step 3—Repeat steps 1 and 2 until TD has been reached.

Procedure for Handling Pipe Tripping

Step 1—Simply, be in position for driller to tilt head for threading into or out of rod and pick-up of lay-down pipe on rod rack on deck.

Step 2—Sampler and down-hole tools will be handled in sequenced method as procedurally directed by driller.

Procedure for Side Wall Sampler

Step 1—Measure and record sampler length and determine point of 8inches below casing with clearance for opening of scraper.

Step 2—Visually check all moving parts and torque specs on top and bottom points. "BOTTOM JOINT HAND TIGHT"

Step 3—Check and confirm sampler by engaging above ground, and note air press to move scraper incrementally.

Step 4—Trip sampler in and keep account of sampler depth.

Step 5—When sample point has been reached engage scraper with small adjustable air compressor to a predetermined PSI and slowly rotate to the right with as low of torque as possible for 2-4 rotations. While still rotating, increase pressure by 10 lbs. Continue this procedure for 20-30 revolutions.

Step 6—Stop and relieve air pressure to 0 PSI, push sample down in hole a minimum of 8" before pulling out of hole, thus assuring that the formation helps to ensure the collapse of the scraper into the closed position.

Step 7—Slowly retrieve sampler up into casing, rotating slowly if necessary until assured it is completely in casing then proceed with normal rod removal.

NOTE: Caution with wrenches.

ref. — WMTS-DOW-002, Rev. 0

ATTACHMENT K

Centralizing Device

K-0

PARTS / MATERIAL LIST

QTY	UNIT	PART/DASH NUMBER	DESCRIPTION	MATERIAL/REFERENCE	UNIT
1	EA	MMHW STABILIZER ASSEMBLY	MMHW STABILIZER ASSEMBLY		1
1	EA	STABILIZER SUB	STABILIZER SUB	4130 TUBE 5-1/2 DIA	2
1	EA	HYDRAULIC STABILIZER	HYDRAULIC STABILIZER	HYDRAULIC (SEE HYDRAULIC)	2
1	EA	STABILIZER SUB RING	STABILIZER SUB RING	4130 TUBE 5-1/2 DIA	2

GENERAL NOTES: (UNLESS OTHERWISE SPECIFIED)

- ALL DIMENSIONS ARE IN INCHES. DIMENSIONING AND TOLERANCING PER ASME Y14.5M-94. TOLERANCES: FRACTIONS: ±1/8"; DECIMAL: .XX = ±.1, .XXX = ±.005.
- BREAK ALL SHARP EDGES AND REMOVE ALL BURRS.
- ALL MACHINED SURFACES SHALL HAVE A 125 MAX / OR BETTER FINISH, UNLESS NOTED OTHERWISE.

1 MMHW STABILIZER ASSEMBLY
SCALE 1:1

☐ PROPRIETARY ☒ NON-PROPRIETARY		DO NOT SCALE PRINT DIMENSIONS ARE IN INCHES UNLESS NOTED		WASTE MANAGEMENT TECHNICAL SERVICES	
PROJECT NO. 778008 / 306		DATE FILED: 06/11/00 BY: BO FLAMMANN CHECKED BY: R. SIMPSON DATE: 06/11/00		MMHW STABILIZER SUB ASSEMBLY	
SKETCH-001		SKETCH-001		SKETCH-001	

REV	DESCRIPTION	DATE
1	ISSUED FOR FABRICATION	06/11/00

K-1

3 STABILIZER SUB
SCALE 3:4

5 STABILIZER SUB RING
SCALE 3:4

4 NYLATRON STABILIZER
SCALE 3:4

WASTE MANAGEMENT TECHNICAL SERVICES	
MMHW STABILIZER SUB ASSEMBLY	
SKETCH-001	REV. 1
DATE: 09/11/96	BY: R. SIMPSON
CHECKED BY: R. SIMPSON	DATE: 09/11/96
APPROVED BY: R. SIMPSON	DATE: 09/11/96

REV.	DESCRIPTION	DATE
1	ISSUED FOR FABRICATION	09/11/96
2	REVISION	
3	REVISION	
4	REVISION	
5	REVISION	
6	REVISION	
7	REVISION	
8	REVISION	

ref. — WMTS-DOW-002, Rev. 0

ATTACHMENT L

Safety Surveillance Reports

L-0

+ Safety Surveillance Report +

Waste Management Federal Services
Northwest Operations

Date: : March 15, 2000
Time: 07:00
Location: Drill site S SX Tank Farm

Inspectors: Mark Hartney/WMNW Safety
Mark Hasey/RSI Safety

RSI MAPR SITE INSPECTION

Report # 00-003

Background: This surveillance was performed as part of a routine field assessment. Resonant Sonic International (RSI) is currently demonstrating the capabilities of the Multi Angle Percussion Rig (MAPR). This is in preparation for future borings in the SX Tank Farm.

Citation	Findings
1. WAC 296-155-260 Fire protection	<p>1.d) All fire fighting equipment shall be periodically inspected by a competent person, and maintained in operating condition. Defective equipment shall be immediately replaced.</p> <p>3.g) Portable fire extinguishers shall be inspected periodically and maintained in accordance with Maintenance and Use of Portable Fire Extinguishers, NFPA No. 10A-1981 and the general safety and health standards, 296-24 WAC, Part G-3.</p> <p>Fire extinguishers located on the MAPR had not been inspected for the current month or previous months.</p> <p>Action: Deficiency was corrected on the spot.</p>
2. WAC 296-155-330 Rigging equipment for material handling	<p>5) Synthetic webbing (nylon, polyester, and polypropylene).</p> <p>(a) The employer shall have each synthetic web sling marked or coded to show:</p> <p>(i) Name or trademark of manufacturer.</p> <p>(ii) Rated capacities for the type of hitch.</p> <p>(iii) Type of material.</p> <p>Two (2) nylon slings were inspected on the MAPR.</p> <p>Action: No Deficiency</p>
3. WAC 296-155-110 Accident prevention program	<p>(5) Every employer shall conduct crew leader-crew safety meetings as follows:</p> <p>(a) Crew leader-crew safety meetings shall be held at the beginning of each job and at least weekly thereafter.</p> <p>(b) Crew leader-crew meetings shall be tailored to the particular operation.</p> <p>(6) Crew leader-crew safety meetings shall address the following:</p> <p>(a) A review of any walk-around safety inspection conducted since the last safety meeting.</p> <p>(b) A review of any citation to assist in correction of hazards.</p> <p>(c) An evaluation of any accident investigations conducted since the last meeting to determine if the cause of the unsafe acts or unsafe conditions involved were</p>

- properly identified and corrected.
(d) Attendance shall be documented.
(e) Subjects discussed shall be documented.

Records of weekly documented safety meetings were not available on site. According to the RSI Safety Point of Contact (POC/Hasey) they are turned in daily to RSI management and submitted weekly to WMTS.

Recommendation: RSI should develop a method whereby required documented weekly safety inspections are available on site.

Action: This recommendation will be passed to the WMTS Project Manager, Marty Gardner for disposition.

+ Safety Surveillance Report +

Waste Management Federal Services
Northwest Operations

Date: : March 22, 2000

Time: 07:00

Location: Drill site S SX Tank Farm

Inspectors: Mark Hartney/WMNW Safety

Mark Hasey/RSI Safety

RSI MAPR SITE INSPECTION**Report # 00-004**

Background: This surveillance was the second performed as part of a routine field assessment. Resonant Sonic International (RSI) is currently demonstrating the capabilities of the Multi Angle Percussion Rig (MAPR). This is in preparation for future borings in the SX Tank Farm.

Citation	Findings
WAC 296-155-505 Guardrails, handrails and covers.	<ul style="list-style-type: none"> (2) Guarding of floor openings and floor holes. (a) Floor openings shall be guarded by a standard railing and toe boards or cover, as specified in subsections (2)(g) and (5) of this section. <p>The cover boards for the MAPR drill deck were in proper position during the inspection.</p> <p>Action: No Deficiency</p>
RSI Health & Safety Plan Site Housekeeping Practices Page 15	<ul style="list-style-type: none"> Hand tools, slings, chokers, etc., will be kept picked up from work area and stored in their proper place. <p>Action: No Deficiency</p> <ul style="list-style-type: none"> The site will be kept clear of all trash and disposed of as soon as possible in accordance with site-specific requirements. <p>Action: No Deficiency</p>
WAC 296-155-110 Accident prevention program (Note: This was a follow up to surveillance conducted the previous week; item #3)	<ul style="list-style-type: none"> (5) Every employer shall conduct crew leader-crew safety meetings as follows: (a) Crew leader-crew safety meetings shall be held at the beginning of each job and at least weekly thereafter. (b) Crew leader-crew meetings shall be tailored to the particular operation. (6) Crew leader-crew safety meetings shall address the following: (a) A review of any walk-around safety inspection conducted since the last safety meeting. (b) A review of any citation to assist in correction of hazards. (c) An evaluation of any accident investigations conducted since the last meeting to determine if the cause of the unsafe acts or unsafe conditions involved were properly identified and corrected. (d) Attendance shall be documented. (e) Subjects discussed shall be documented.

	<p>Records of weekly documented safety meetings were available on site. Current weeks meeting was posted and subsequent meetings were filed.</p> <p>Action: No Deficiency</p>
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+ Safety Surveillance Report +

Waste Management Technical Services

Date: : April 5, 2000
 Time: 07:10
 Location: Drill site S SX Tank Farm

Inspectors: Mark Hartney/WMNW Safety
 Mark Hasey/RSI Safety

RSI MAPR SITE INSPECTION

Report # 00-005

Background: This surveillance was the third performed as part of a routine field assessment. Resonant Sonic International (RSI) is currently demonstrating the capabilities of the Multi Angle Percussion Rig (MAPR). This is in preparation for future borings in the SX Tank Farm.

Citation	Findings
1. Hanford Site Hoisting and Rigging Manual, DOE-RL-92-36 5.0 HOOKS	<p>5.3 THROAT LATCHES ...Latch equipped hooks shall be used for all hoisting and rigging (H&R) operations unless the application makes use of the latch impractical, or unsafe. The absence of a hook throatlatch is not indiscriminately allowed. Unless a specific impractical or unsafe situation can be substantiated, the hook latch is mandatory.</p> <p>A new rigging device will be used in conjunction with the MAPR grapple. It was inspected and found to meet requirements.</p> <p>Action: No Deficiency</p>
2. RSI Health & Safety Plan Site Housekeeping Practices (Pg. 15)	<ul style="list-style-type: none"> Hand tools, slings, chokers, etc., will be kept picked up from work area and stored in their proper place. <p>Action: No Deficiency-well maintained.</p> <ul style="list-style-type: none"> The site will be kept clear of all trash and disposed of as soon as possible in accordance with site-specific requirements. <p>Action: No Deficiency-well maintained.</p>
3. Hanford Site Hoisting and Rigging Manual SLINGS Manual, DOE-RL-92-36 Section 9.0 9.2.5 Synthetic Web Slings	<p>9.2.5.1.4 Marking (Sling Identification). Synthetic web slings shall be labeled (a sewn-on leather tag is recommended). The label shall state the following:</p> <ol style="list-style-type: none"> 1. Manufacturer's name or trademark 2. Manufacturer's code or stock number 3. Rated loads for the types of hitches used 4. Type of synthetic web material 5. An additional tag, sticker, or other identifier shall be added by the user to indicate when the next periodic inspection is required 6. If the synthetic web sling is to be used for critical lifts, the tag or other identification means shall be used to indicate that a proof test has been performed. <p>Action: No Deficiency</p>

4. RSI-General Health and Safety Plan Site Preparation (pg. 14)	<p>In order to prevent contamination of site surface soil, drill sites will be covered with Visqueen (polyethylene sheeting) to collect and equipment fluid leakage or small quantity product spills or other spillage possible during well construction and installation.</p> <p>Action: No Deficiency-well maintained. - Note: client materials were in place instead of Visqueen.</p>
<p>COMMENTS:</p> <p>The overall appearance and housekeeping of this site is excellent. A spot check was made of the forklift, crane and hammer inspections, no deficiencies. All personnel on the site at the time of this surveillance were wearing the correct Personal Protective Equipment (PPE) and hearing protection. RSI has been doing a very good job of managing their site with regard to health and safety.</p>	