DISTRIBUTION
WM s/f
WMLU r/f
NMSS s/f
JO Bunting
RE Browning
WM 85 - 301
MJ Bell
DSollenberger
DEMartin
RD Smith, URFO
PDR

JUN 14 1985

WM39/DMS/85/06/14

Mr. John G. Themelis, Project Manager
Uranium Mill Tailings Project Office
Albuquerque Operations Office
U.S. Department of Energy
Post Office Box 5400
Albuquerque, New Mexico 87115

Dear Mr. Themelis:

We have received the UMTRA Project Surveillance and Maintenance Plan (PSMP: UMTRA DOE/AL -350124) transmitted to us by your letter dated April 3, 1985 (received April 8, 1985). Based on our review, we have the following general comments on the PSMP:

1. We were pleased to find that the quality of this document is significantly higher than the earlier site-specific documents prepared in the UMTRA project.

2. In several places, the document refers to actions NRC will take. These references should be deleted, since the purpose of the PSMP is to describe what DOE considers necessary to meet NRC license requirements.

3. The PSMP should be used as guidance for developing site-specific plans In several locations, the PSMP contained language that appears to limit the material considered in the development of site-specific plans or limit the actions to be taken by the inspectors. We recommend that the language in the document be revised to not be so limiting.

These general comments and the attached specific comments were discussed with Mr. John Arthur and Mr. Dave Lechel on June 13, 1985. If you have any questions regarding the comments, please contact Dennis Sollenberger (FTS 427-4789).

Sincerely,

Original signed by
Leo B. Higginbotham

Leo B. Higginbotham, Chief
Low-Level Waste and Uranium
Recovery Projects Branch
Division of Waste Management

Enclosure:
Division of Waste Management Specific Comments on the PSMP

OFC	:WMLU: rb	:WMLU	:WMLU	:	:	:	
NAME	:D Sollenberger	DE Martin	:LB Higginbotham	:	:	:	: :
DATE	:85/06/14	:85/06/14	:85/06/14	:	:	:	

JUN 14 1985

DWM SPECIFIC COMMENTS ON THE
UMTRA PROJECT SURVEILLANCE AND MAINTENANCE PLAN

Section 1.2, P. 1

It is recognized in this section that the plan "may" require modification after the initial 10-year interval because such phenomena as chemical and physical weathering of rock covers would be observable only over a longer time period. It can be anticipated in advance that geological processes will need surveillance beyond 10 years after the completion of remedial action work. Therefore a statement that the plan will require reevaluation beyond the initial 10-year interval for geologic processes would be more appropriate.

Section 1.2.1, Final Site Conditions, P. 2, ¶5

The list of documents and materials used to characterize final site conditions should include available testing and exploration data such as:

- Foundation data and geological features including boring logs, geophysical logs, geological maps, profiles and cross sections, and reports of foundation treatment.

- Properties of embankment and foundation materials including results of laboratory tests, field tests, construction control tests, and assumed design material properties.

Section 2.3.1, Pg.9

This section indicates that descriptive information will be appended to the vicinity map. Some examples of the types of descriptive information to be included are given, but these example exclude geologic information. Geologic descriptive information should also be included such as geologic units, fracture and fault descriptions, and geomorphic feature descriptions.

Section 2.3.2, P. 9

NRC recommends that the PSMP be revised to state that the minimum scale of the topographic site maps should be on the order of 1:2000. If the site is too large to be mapped conveniently on this scale on a single sheet, the map scale could be reduced for the preparation of a base map of smaller scale provided that this base map is accompanied by a series of larger scale maps that collectively depict the topography and relevant features of the site at scales greater than or equal to 1:2000.

Section 2.5, P. 10

The PSMP states that base map overlays will be prepared. The list of information for the overlays should also include surface geomorphic features that represent dynamic processes.

Section 2.6, Horizontal and Vertical Control, P. 11

The description and requirements for erosion control markers as identified in Figures 2.3 and 3.3 are not presented in Section 2.6.1. Additionally markers required to monitor the embankment (horizontal and vertical movement) should be discussed in Section 2.6.

Section 2.6.3, P. 15

The PSMP states that every site will be marked with two site markers and refers to Figure 2.3. Figure 2.3, however, only illustrates one site marker. The plan should be revised to remove this inconsistency by illustrating another marker in Figure 2.3.

Section 2.6.4, Signs, P. 15

Signs that will be placed around the perimeter of the site indicating the presence of uranium mill tailings will be in English and Spanish (where appropriate). In addition, the International symbol indicating the presence of radioactive material should also be displayed.

Section 2.7, P. 17

Continued monitoring of pre-remedial wells during and after remedial actions may provide objective estimates of the success or failure of the remedial actions in protecting water resources. Greater emphasis should be placed on the importance of these wells in the PSMP.

Section 2.7, P. 18

This section indicates that core logs and geophysical logs will be run in boreholes installed following remedial action because such logs are useful in determining site geology. The site geology should be well known and understood prior to initiation of remedial action construction work. Additional geologic information from wells installed after remedial action should be compared to existing well data and geologic cross sections and the results should be documented.

Section 2.7.1, P. 18

The PSMP states that minimum acceptable core recovery will be 90% for core sampling when boreholes are drilled in rock. Core recovery, however, is not solely dependent on the skills and equipment of the driller coring the borehole. Core recovery greater than 50% may be practically impossible in incompetent rock. The PSMP should be revised to state that the driller shall make every reasonable effort to maximize core recovery.

Lithologic logs and the photographs prepared from the core provide a more convenient archival medium than the core itself, which is difficult to transport and communicate. Such secondary references are often critical in the

core archival process, especially since cores are often destroyed or discarded through time if they are not studied. NRC staff recommends that the PSMP core sample analysis be revised to provide for archival of the core and other appropriate records, such as accurate and scaled photographs and lithologic logs based on the core.

With respect to drilling techniques, the PSMP states that all borings through unconsolidated materials will be performed using 6-inch hollow stem augers. Decisions about appropriate drilling techniques, however, are often best made on a site and well specific basis. This degree of detail is inappropriate for a generic document such as the PSMP. Hollow stem augers may not be capable of drillings through certain types of unconsolidated materials (e.g., extremely cobbly gravels). In these situations, the well driller would have to violate the procedures in the PSMP or sacrifice the installation of a monitoring well. NRC recommends that the PSMP be revised to delete the requirement that six-inch hollow stem augers will be used for all borings through unconsolidated materials.

Section 2.7.2, P. 19

The ground-water flow gradients are not listed as a factor for consideration in determination of lengths of screened intervals. During previous reviews of UMTRAP site characterizations, the NRC staff has questioned the selection of screened interval lengths, especially in groundwater systems where vertical hydraulic gradients were significant with respect to estimates of the rates and directions of ground-water flow. The NRC staff considers the hydraulics of the ground-water flow system to be a key factor for consideration in selecting the lengths of screened intervals in ground-water monitoring wells. Consequently, the staff recommends that the PSMP be revised to include ground-water flow gradients as a factor for consideration in selecting the lengths and locations of screened and packed intervals.

The PSMP also states that screened intervals and gravel packs will extend from the measured water level downward. This requirement is ambiguous because the plan does not explain how it would be applied. If, for example, an upper confined aquifer at a site was monitored, the well should only be screened within this aquifer and not up to the water table in an overlying unconfined aquifer, as the plan could be interpreted to require. If the screened interval and gravel pack extended through the unconfined aquifer, water levels from the well may represent a worthless composite head of heads in the unconfined aquifer and heads in the screened/packed interval of the confined aquifer. In addition, extensive screened and packed intervals may serve as preferential conduits for contamination between aquifers. The NRC staff recommends that the PSMP be revised to eliminate the ambiguity in well screen and gravel pack descriptions.

The descriptions of well screens in the PSMP appear to be overly detailed and too prescriptive. The prescription is followed by a caveat that essentially states that all of the above description is subject to modification based on

well-specific determinations. The caveat casts doubt on the need for the prescriptive description in the PSMP.

NRC staff recommends that where decisions will be site-specific, or well-specific in the case of monitoring wells, that the PSMP should merely state the factors that will be considered in making decisions. This type of approach was presented in the plan in the description of factors that will be considered in selecting the length of screened intervals in wells.

Section 2.7.2, P. 20

The borehole log form (Figure 2.8) appears to be an inefficient form for communicating and recording borehole logs. Standard borehole logs that provide a graphical representation of the units penetrated by boreholes are easier to read and in a glance can provide a rapid summary of the lithologies or sediment types encountered in borehole. Examples of such logs have been prepared at several UMTRAP sites, including the logs prepared by Dames and Moore at the South Salt Lake UMTRAP site or the logs by Bendix at the Durango UMTRAP site. If DOE decides to include examples of borehole log forms in the PSMP, the NRC staff recommends that Figure 2.8 be revised to increase the form's efficiency in recording and communicating information (see examples attached).

Section 3.3.1.a, Frequency and Timing of Inspections, P. 29

The PSMP states that at the 10-year point, the responsible agency and the NRC will evaluate all inspection and maintenance reports and records and will specify a new Phase I inspection frequency. The NRC, being in a regulatory role, should only concur with the new Phase I inspection plan.

Section 3.3.1, P. 30

The PSMP states that site inspection teams will be composed of a civil engineer and a soil scientist if only two inspectors are assigned to an inspection. The next sentence in the plan states that this team will be trained in the collection of groundwater samples and water level measurements. It does not appear, however, that civil engineers and soil scientists are qualified to make decisions regarding modifications to sampling procedures that are frequently necessary in the field. NRC staff recommends that the qualifications of site inspectors be determined based on the types of surveillance and maintenance activities to be performed at a particular site.

Section 3.3.1, P. 31

This section includes a list of items to be reviewed by the site inspection team for the purpose of becoming familiar with a site. This list should also include surface and near-surface geological/geomorphic features and processes.

Section 3.4.2, Phase II Procedures and Objectives, P. 39, 40

Since Phase I monitoring relies only on visual inspection by the inspection team to detect settlement and/or creep problems, it is conceivable that these phenomena may not be readily recognized considering the absence of quantified data collected from monitoring instruments and the time interval between inspections. The DOE may consider requiring the Phase I inspection to monitor the lateral deformation of the slope using simple devices such as alignment stakes and the settlement of areas suscepted to have settlement problems. These simple monitoring devices will aid in early detection of any potential problem.

Section 4.0, P. 41

Section 1.1 states that the decision to monitor ground water at UMTRAP sites will be determined by the criteria provided by the PSMP. Section 4.1, however, does not provide criteria to make such a decision and does not specify the party making this decision.

Section 4.1 provides a list of factors for consideration in determining the need for and extent of post-remedial action groundwater monitoring. To transform these factors into criteria, each would have to be rewritten into a decisional statement. For example the consideration listed in the PSMP as "Background water quality of potential water supplies" would be rewritten into a question like "Would water resources potentially affected by the remedial actions be water supplies based on their background qualities?". The PSMP does not provide these criteria and, therefore, cannot be used to determine the need for and extent of ground-water monitoring programs.

If the plan did provide criteria to make a decision, the party responsible for making the decision using the criteria would have to be specified. Under UMTRCA, the NRC will license the UMTRAP sites and require such monitoring, maintenance, and emergency measures that it determines necessary to protect the public health and safety and the environment. Thus NRC would be the appropriate party to determine the need for and extent of ground-water monitoring programs required at UMTRAP sites.

Section 4.2, P. 44

The PSMP states that background and baseline ground-water monitoring programs will sample each well quarterly for one year and determine the concentrations of constituents listed in Table 4.1. Because of high concentrations of nitrate reported in tailings solutions, the use of nitrogen-containing-compounds in uranium milling circuits, and the relative mobility of nitrate in ground-water systems, NRC staff recommends that nitrate be added to the list of detection constituents.

Section 4.2, P. 52

The PSMP states that background and baseline soil and rock chemical quality will be assessed to determine the concentration of water soluble contaminants remaining in the soil or rock. However, the plan does not mention the purpose for determining this information. NRC staff recommends that the PSMP be revised to describe potential uses of the baseline and background chemical quality data in interpreting groundwater monitoring programs.

Similarly, the plan states that baseline well hydraulics will be identified by analyzing the results of three independent slug tests in each monitoring well, yet the plan does not describe the purpose for characterizing well hydraulics. NRC staff recommends that the PSMP be revised to describe the purpose for identifying and characterizing well hydraulics and how these characterizations may be used in developing ground-water monitoring programs and interpreting the results generated by the programs.

Sections 4.3-4.5, P. 52

The PSMP describes a phased approach for ground-water monitoring at UMTRAP sites, where monitoring and mitigative action, if needed, is increased after significant contamination is detected. As currently described, however, the plan does not provide for early consultation between the responsible agency and NRC. The NRC staff recommends that the PSMP be revised to improve the clarity and comprehensiveness of the plan and provide for earlier coordination with NRC with respect to ground-water contamination.

Although specific requirements for ground-water monitoring will be established in the site license, the NRC staff recommends that DOE consider revising the PSMP to be generally consistent with the monitoring protocol outlined below:

1. Responsible agency initiates detection monitoring and reports results and interpretations annually to the NRC.

2. Upon the occurrence of an excursion, the responsible agency notifies the NRC and immediately retests for an excursion.

3. If the retest confirms the excursion, the responsible agency notifies NRC of the confirmed excursion and begins compliance monitoring by submitting a preliminary assessment of the excursion and plan for additional monitoring, or

   If the retest indicates that the excursion did not occur (even for different constituents), the responsible agency resumes detection monitoring.

4. Responsible agency obtains approval of NRC on plan for compliance monitoring and executes plan, which may have been previously approved by NRC and held on standby.

5. Once the compliance monitoring program is operational, the responsible agency submits to NRC a hydrogeologic analysis of the initial monitoring results and recommends appropriate mitigative actions, if necessary, to protect the public health and environment.

6. The responsible agency continues compliance monitoring for the duration of the excursion. After two consecutive years without excursions of any constituents, the responsible agency may resume detection monitoring in consultation with NRC.

This type of phased monitoring approach is generally consistent with the program described in the PSMP. It differs from the PSMP's program, however, in the immediate retesting of excursions prior to initiating compliance monitoring, in requiring submission of plans for compliance monitoring, in requiring submission of hydrogeologic analyses during compliance monitoring to interpret the monitoring results and recommend appropriate actions, and in facilitating ongoing consultation between the responsible agency and NRC during excursions.

Consultation with NRC about other types of violations of site performance, such as by earthquakes or landslides, could also be treated in a similar manner.

Section 4.4, P. 52

The PSMP describes statistical procedures for the analysis of ground-water quality data. However, these descriptions do not explicitly describe critical procedures in the statistical manipulation of the data. For example, the plan does not specify the population of concentrations that will be used to calculate mean concentrations, specifically whether the mean concentration will be determined for each sampling event or for all sampling events in a given sampling year. Averaging concentrations across an entire year may mask important trends in concentration and promote possible determinations of false positive and negative findings with respect to outliers. The plan does not describe how concentrations of split samples will be compared and considered in the statistical analyses or how laboratory performance on standard and blank samples will be considered, perhaps by preferentially weighting the concentrations. The NRC staff recommends that the PSMP be revised to describe explicitly the statistical procedures that will be used to evaluate and compare ground-water monitoring data.

Section 4.5, P. 56

The PSMP defines an excursion as a measured concentration at a downgradient well for one of the detection constituents that is equal to or greater than the mean concentration plus two standard deviations. It appears from the definition of outliers in Section 4.4, however, that most concentrations qualifying as excursions will be discarded as outlier concentrations. In addition, the definition of excursions as concentrations greater than or equal to two standard deviations above mean concentrations may not be an appropriate threshold to precipitate compliance monitoring and mitigative actions.

Further, the plan does not describe how concentrations determined in samples collected from upgradient wells will be compared with downgradient concentrations and what action would be taken if an excursion is detected in an upgradient well.

Depending on site-specific factors such as hydrogeology, local water use, statistical distribution of contaminant concentrations, and the constituent, a two standard deviation increase in the concentration of the constituent may pose an unacceptable risk to downgradient consumers of ground water. Consequently, a generic definition of excursion may not be appropriate for inclusion in the PSMP; definitions of excursions may more appropriately be defined in site-specific licenses. NRC staff recommends that the PSMP be revised to support the current definition of excursion or to indicate that excursion criteria will be established in site licenses.

Increases of two standard deviations in the concentration of a constituent in a downgradient well compared with the mean concentration of the same constituent in an upgradient well may indicate that the stabilized tailings are significantly degrading the quality of ground water beneath a site. Such degradation may require mitigation to protect humans and the environment. The current version of the PSMP does not describe procedures that will be used to compare upgradient and downgradient concentrations, thus suggesting that upgradient water quality monitoring is unnecessary. Upgradient sampling is necessary, however, to monitor the increase in concentration of constituents contributed by the stabilized tailings. In addition, upgradient groundwater quality may significantly change in response to natural and artificial influences. These changes may appear as excursions in downgradient monitoring wells if they are not monitored in upgradient wells, which would artificially trigger compliance monitoring. NRC staff recommends that the PSMP be revised to describe procedures for the comparison of upgradient and downgradient constituent concentrations.

Table 5.1, P. 59

This section specifies that aerial photographic coverage will extend 0.25 miles beyond the site boundaries. Although this distance is only provided as guidance, it seems to be a very limited distance without a rationale. NRC staff recommends that the PSMP be revised to stipulate aerial photographic coverage beyond 0.25 miles or to justify the 0.25 mile guidance.

Table 5.3.1, P. 63

This table lists features to be identified from analyses of air photos. Although wind erosion blow-outs are listed, wind depositional features are omitted. Wind deposition features should also be included because such deposition could change drainage patterns. Also, included should be ground fractures and faults and soil/rock mass movements (e.g., landslides and subsidence) because of the potential for destabilizing the tailings embankments.

Section 6.2, P. 65

The PSMP adequately defines those design features of a remedial action plan which need to be monitored and maintained. However, the plan omits action levels at which maintenance will be performed on any particular design feature. Without clear definition of action levels, it may be difficult to judge if the integrity or efficiency of a particular design feature has been seriously impaired and should be immediately fixed.

Recognizing that the need for maintenance should be based on engineering judgment (depending on the site-specific design), it is nevertheless important that the generic documents should require that site-specific action levels be established to determine if design features should be repaired and/or maintained. Without such criteria, consistency from site to site will be difficult. These action levels should be discussed in the PSMP.

A method should also be established for documenting the long-term degradation of non-durable rock. The method should be able to account for fracturing, decrease in rock size, and any overall reduction in durability of either individual rocks or the total rock layer. The method should be discussed in the PSMP.

Table 6.3, P. 67

This table suggests the placement of inclinometers or tilt meters as part of custodial maintenance or repair actions that could be needed at sites with unstable slopes. These types of instruments could be installed earlier as surveillance features.

As recognized on p. 35, slope creep is subtle and may be difficult to observe. In many cases it is easier, less expensive, and more efficient to install items like inclinometers during remedial action work. This would allow baseline data to be established for comparison over a longer period of time and could detect problems early, before any problems became more difficult and expensive to correct.

Details of slope stability surveillance instrumentation could be determined on a site-specific basis. However, NRC recommends that the PSMP be revised to include installation of slope stability surveillance instrumentation at all sites.

Glossary, P. 79

The term "hydraulic gradient" is incorrectly defined. The PSMP should be revised to define the term correctly as the change of static head (including elevation head and pressure head) per unit distance in a given direction [cf. "Glossary," Permeability and Groundwater Contaminant Transport, ASTM STP-746].

Appendix B

The PSMP does not provide a plan to perform a follow-up literature searches for information that might impact earlier geomorphic, natural resource, or seismic evaluations. New faults or evidence of fault activity near a site might be found or geomorphic processes not previously thought likely in a given area may have occurred. Plate tectonics and studies of large scale/small scale movements in the mantle are rapidly developing areas of geologic knowledge that could impact seismic evaluations. Natural resource exploration often yields information not only about resource potential but also about structural geology. Additional monitoring of seismic recordings might reveal previously undetected active faults. NRC staff recommends that a geoscience literature search be conducted and the results evaluated and documented at the end of the initial 10-year surveillance period. Further, geoscience literature searches will likely be necessary beyond the initial surveillance period.

Section B.6, P. B-15

[illegible]al processes that may cause cracks to develop are detailed in this sec[illegible]n, but 1) vibratory ground motion and 2) fault displacement are not included. These two processes should also be included because they may cause cracks to develop, which may promote erosion.

Appendix C, P. C-3, Items A-4 and B-2b

Every monument, site marker, sign, and monitor well will be inspected and included on the site atlas overlays. Erosion control markers should also be inspected and included on the site atlas overlays.

Appendix C, P. C-4, Item 7e

Aerial photographs will be used to identify landslides. By the time the evidence of a slide or debris flow is found, bare tailings may have been exposed and transported by wind and water erosion. The inspection should also determine if contaminated material has been moved from the pile and identify the extent of contamination resulting from wind and water erosion.

Appendix C, P. C-7, Item 4, Crests

The inspection checklist should include observing evidence of deterioration of riprap or gravel cover. The PSMP should also indicate the level of deterioration that would trigger repair action.

Appendix C, Item 5, P. C-7

The site inspection checklist requires identifying evidence of gradual downslope movement (creep). Since creep is a slow process, it may be difficult to observe the amount of creep deformation that has occurred between site inspections. Alignment stakes are simple and durable monitoring devices which provide evidence of deformations/creep of slopes. It is recommended that

alignment stakes be installed in the critical sections of the slope to help recognize and quantify the amount of creep occurring.

Appendix D

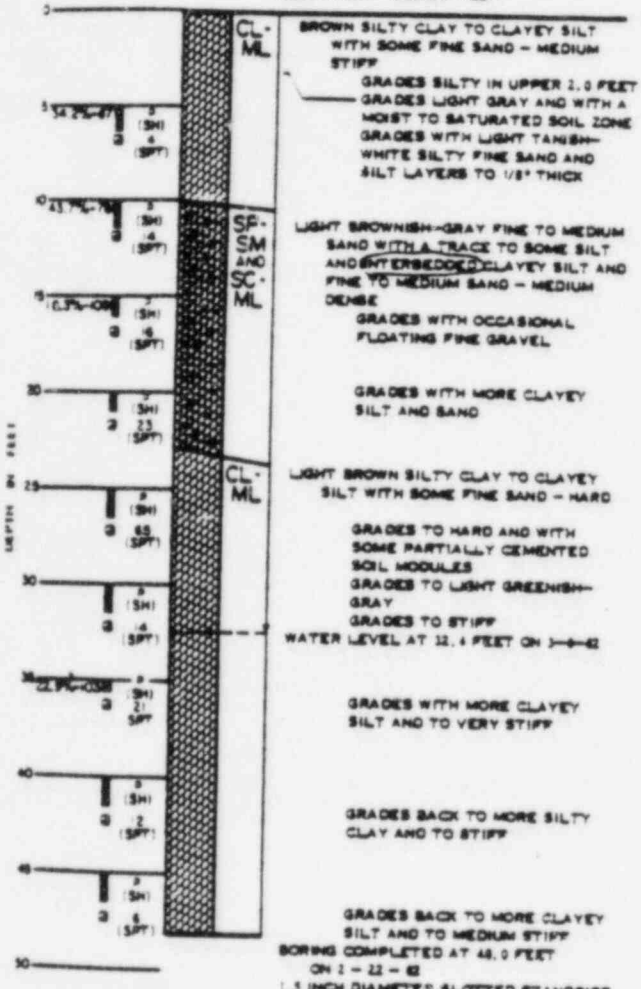
The field procedures described in Appendix D are identical to those previously reviewed by NRC staff with respect to ground-water evaluations at the Shiprock site. Because the field procedures have not been revised since their earlier review, our previous comments also apply to Appendix D.

ATTACHMENT
EXAMPLE BOREHOLE LOGS
(from DOE/EIS-0099-D)

BORING SC-10

COORDINATES N 15007.0
E 23489.5

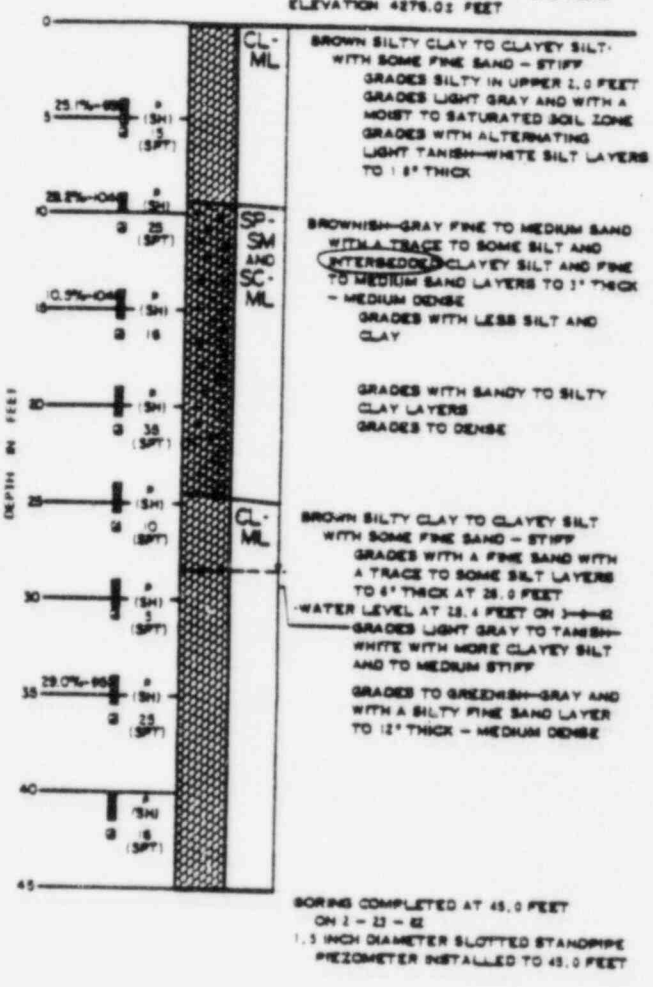
ELEVATION 4290.0± FEET



BORING SC-11

COORDINATES N 14961.8
E 21789.6

ELEVATION 4276.0± FEET



KEY

A – B B C
D

A FIELD MOISTURE EXPRESSED AS A PERCENTAGE OF THE DRY WEIGHT OF SOIL

B DRY DENSITY EXPRESSED IN LBS. PER CUBIC FOOT

C BLOWS PER FOOT OF PENETRATION USING A 140 LB. HAMMER DROPPING 30 INCHES

P PUSHED SAMPLER WAS ADVANCED HYDRAULICALLY

D TYPES OF SAMPLER
(P) – PISTON SAMPLER
(PT) – PITCHER SAMPLER
(SH) – SHELBY SAMPLER
(SPT) – STANDARD PENETRATION TEST
(U) – DAMES & MOORE SAMPLER WITH "U" TYPE DRIVE SHOE
(D) – DAMES & MOORE SAMPLER WITH "D" TYPE DRIVE SHOE

E DEPTH AT WHICH UNDISTURBED SAMPLE WAS EXTRACTED

S STANDARD PENETRATION TEST