EXHIBIT 1

FIELD CONSTRUCTION OBSERVATION REPORT

August 30, 1990

Prepared By:

Western Technologies Inc.

WESTERN
TECHNOLOGIES
INC.
13949 West Colfax Avenue, No. 140
Golden, Colorado 80401
(303) 233-2991

RECEIVED
JUL - 6 1990
Regulatory Affairs

July 5, 1990

Mr. Richard Blubaugh
Atlas Corporation
370 17th Street, Suite 3150
Denver, Colorado 80203

Project No.: 760-0K-041

Subject: Completion of Field Activities - Atlas Mill, Moab, Utah

Dear Mr. Blubaugh:

The purpose of this letter is to inform you that the field portion of the Corrective Action Plan has been completed. The program was completed in accordance with our Scope of Work dated June 13, 1990 allowing for the additional activities requested by you and Cindy Sunblad during the course of the field operations. Eleven additional wells have been installed in various locations between the existing pond and the crest of the tailings impoundment. Each well was constructed using 4 inch diameter PVC with .020 slot screen and sand packed using 8-12 sand. Upon completion of the well construction, the wells were developed by bailing with a 3 inch diameter, 10 foot long bailer for a minimum of 1 hour. Gould 1/2 horsepower pumps were installed in 10 of the wells. The 11th pump installed was a Grundfos 1/2 horsepower pump. It is our understanding that the pumps were rated at 14 gallons per minute (gpm) at 100 feet of head (Gould pumps) and 20 gpm at 100 feet of head (Grundfos), respectively.

The discharge line from the pumps are equipped with flow meters that indicate the total cumulative flow. These were selected due to the problems encountered in the field with low well yields requiring intermittent pumping and recovery.

The sodium hydroxide treatment equipment Atlas personnel installed, consisted of three 8 foot diameter by 16 foot high storage tanks connected in series. These tanks were connected to a stainless steel treatment mixing tank equipped with an impeller type mixer. Intake and outlet pumps were also installed. The well field manifold main trunk consists of 2 inch diameter Nypak piping that will be connected to the treatment system intake.

It is our understanding that each well discharge line will be directly connected to a sprinkler for spray enhanced evaporation of the discharge. As per Atlas's agreement with the NRC, if the pH drops below 6.0 standard units, the effluent will be pumped to the main manifold line currently installed and treated with sodium hydroxide at the treatment area.

We are in the process of preparing the field construction observation report at this time. It is anticipated that this report should be completed by July 31, 1990. Please contact our office if you have any questions concerning the contents of this letter or when further consultation is necessary.

Sincerely,

WESTERN TECHNOLOGIES, INC.

Daniel F. Schneider, P. E.
Senior Project Manager

DFS/ds

FIELD CONSTRUCTION OBSERVATION REPORT ATLAS MOAB TAILINGS IMPOUNDMENT MOAB, UTAH

RECEIVED
SEP 4 1990
Regulatory Affairs

WESTERN TECHNOLOGIES INC.
The Quality People

PREPARED FOR:

Atlas Minerals
Division of Atlas Corporation
370 17th Street, Suite 3150
Denver, Colorado 80203

PREPARED BY:

Western Technologies Inc.
13949 W. Colfax Ave.
Suite 140
Golden, CO 80401
(303) 233-2991

(303) 233-2982 - FAX

August 30, 1990

ARIZONA

Phoenix
P.O. Box 21387 85036
3737 East Broadway Road
Phoenix, Arizona 85040
(602) 437-3737

Mesa
952 East Baseline Road, No. 104
Mesa, Arizona 85204
(602) 926-2113

Sun City
17200 North Dysart Road, No. 13
P.O. Box 2431
Sun City, Arizona 85372
(602) 975-2154

Flagstaff
2400 East Huntington Drive
Flagstaff, Arizona 86004
(602) 774-8708

Lakeside
Route 1, Box 1030
Lakeside, Arizona 85929
(602) 368-5568

Tucson
3480 South Dodge Boulevard
Tucson, Arizona 85713
(602) 748-2262

Sierra Vista
1827 South Paseo San Luis
Sierra Vista, Arizona 85635
(602) 458-0364

Laughlin / Bullhead City
1610 Riverview Drive, No. 5
Bullhead City, Arizona 86442
(602) 758-8378

CALIFORNIA

Concord
1001 Galaxy Way, No. 107
Concord, California 94520
(415) 689-9378

Riverside
16801 Van Buren Boulevard, Suite A
Riverside, California 92504
(714) 780-7482

COLORADO

Golden
13949 West Colfax Avenue, No. 140
Golden, Colorado 80401
(303) 233-2991

NEVADA

Las Vegas
3611 West Tompkins Avenue
Las Vegas, Nevada 89103
(702) 798-8050

Environmental Services
4085 Nevso Drive, Suite G
Las Vegas, Nevada 89103
(702) 252-0580

NEW MEXICO

Albuquerque
8305 Washington Place, N.E.
Albuquerque, New Mexico 87113
(505) 823-4488

Farmington
400 South Lorena Avenue
Farmington, New Mexico 87401
(505) 327-4966

TABLE OF CONTENTS

FIGURES

APPENDICES

FIELD CONSTRUCTION OBSERVATION REPORT
ATLAS MOAB TAILINGS IMPOUNDMENT
MOAB, UTAH

1.0 INTRODUCTION

This report presents the results of field construction activities pertaining to the implementation of the Corrective Action Plan (CAP) for the tailings pond-impoundment near Moab, Utah.

The purpose of the field construction activities was to install a tailings dewatering system to accelerate the dewatering of the tailings material. The system was designed to include a series of recovery wells installed with dedicated pumps . These pumps were designed to discharge to a treatment and enhanced evaporation system.

The scope of work includes:

1. Drilling, installation, testing and sampling of recovery wells and well points.
2. Installation of the treatment system and connection to the enhanced evaporation system.
3. Preparation of a report on field construction activities including subsurface conditions recovery system installation observations, recovery well yields and the description of the treatment and evaporation system.

2.0 BACKGROUND

Atlas Minerals, a division of Atlas Corporation (Atlas) retained Western Technologies Inc. (WT) to provide a CAP for their Moab Mill and tailings impoundment. The CAP was prepared by WT and submitted to Atlas in March, 1989 under the title Draft/Final Atlas/Moab Uranium Mill A... Tailings Corrective Action Plan,Moab,Utah. The CAP was based on a review of previous geotechnical and engineering studies conducted on site (referenced in the CAP) and WT's experience with similar projects.

In response to a letter to Atlas from the Nuclear Regulatory Commission (NRC) on May 31,1989 WT was retained by Atlas to complete an Addendum to the Draft/Final CAP. This addendum was submitted in June, 1989. The stated objective of the addendum was to test the feasibility of decreasing the time necessary to dewater the tailings material by implementing a well recovery and enhanced evaporation system.

A pilot recovery well project was completed during the spring of 1990 and included the installation of two recovery wells and field testing of the aquifer characteristics. An additional review of existing geotechnical and engineering studies was completed to compare the field data with historical hydrogeological conditions. The studies reviewed included geotechnical evaluations by Dames and Moore (1975,1979,1981) and a hydrologic study by Solution Engineering, Inc. (1979). Refer to Appendix "A" for a total list of references.

The field testing during the pilot project indicated that the in-situ permeability of the tailings was approximately an order of magnitude less than that derived in the previous studies. Atlas requested that WT perform a reevaluation of the CAP to reflect the impact of reduced permeabilities on the CAP's efficiency and related costs. WT submitted a scope of work based on the impact of the reevaluation in May,1990. Subsequent meetings with the NRC resulted in stipulation that a specific technical approach (ALARA demonstration) of the CAP would be implemented and operational by July 1, 1990. A revised scope of work for implementation of the CAP was determined in the June 7, 1990 meeting with Atlas, WT and the NRC.

On June 22,1990 the NRC, at the request of Atlas, amended Source Material License SUA-917 by revising License Condition No.17 and adding License Condition No.49(f). Part C of License Condition No.17 specifically deals with the CAP (ALARA demonstration) by outlining the minimum components for implementation of the corrective action program.

The field activities discussed in this report were completed in general accordance with the Scope of Work as outlined in WT's Work Plan dated June 13, 1990 and by revised license condition no. 17 of the amended Source Material License SUA-917.

This report presents the observations noted during field activities conducted between June 14 and 30, 1990 at the tailings impoundment site in Moab, Utah. Field activities included the drilling and completion of 13 recovery wells and installation of two well points. In addition, two recovery wells which had been installed during March, 1990 are included in the recovery system. Discharge pumps were installed in ten wells with the greatest projected potential for recovery. Locations are shown on figure 1.

3.0 SUBSURFACE CONDITIONS

According to previous reports by Dames and Moore (1975, 1979, 1981) the plant and tailings pond are situated upon unconsolidated deposits primarily of windblown, silty fine sand interbedded with stream and slope wash deposited sands. These deposits are generally low to moderately permeable. Adjacent to the Colorado River are river deposited sandy gravels of high permeability. IN 1979, Dames and Moore stated that natural soils underlying the tailings materials are composed of medium dense to dense random layers and zones of silt, fine sandy silt, silty fine sand, fine to medium sand with traces of silt and silty sand with gravel.The apparent random distribution of soil types is indicative of the various types of soil deposition throughout the site area.

The site subsurface conditions were investigated during the recent field program by drilling and lithologically logging the borehole cuttings during advancement of the augers. Bulk samples were taken at 5 foot intervals and visually inspected by a field geologist and classified. In addition, upon advancement of the borehole into the clay zone found below the saturated tailings (as noted below), a split spoon sample was taken to visually inspect and verify the consistency of the clay material.

Four general types of lithology were encountered in the borings drilled across the site during the recent and March field programs. The lithology was found to vary both laterally and vertically. The site subsurface conditions can be generalized as follows (in the order they were encountered):

Depositional Tailings	brown to gray Sand, clayey Sand and Silt; generally dry to 15 to 30 feet, increasing moisture content with depth; saturated at a depth of 15 to 30 feet below ground surface, soft
Gray Clay	slightly moist to dry, very resistant
Red Sand and Clay	silty Sand and sandy Clay, slightly moist to moist, moderately resistant
Colorado River Alluvium	brown saturated sands and gravels of the Colorado River

These lithologies are described in more detail below and their respective thicknesses are summarized in Table 3.1.

3.1 Depositional Tailings

The upper layer of depositional tailings consists of fine to very fine sand, silt and sandy clays, ranging in thickness from approximately 50 feet to 90 feet. In locations closer to the existing ponded solution, the tailings layer tends to be predominantly finer and is characterized by saturated sand, clay, or silty clay, and very fine silty sand. Somewhat further from the existing ponded solution, this material becomes coarser grained and slightly more well sorted (poorly graded). In general, the tailings sands in these areas are predominantly brown to gray, very fine to fine, slightly silty, with variable moisture contents. The moisture content qualitatively increases from dry in the upper 15-30 feet to moist to saturated in the lower zones (greater than 15 to 30 feet).

3.2 Gray Clay

With the exception of PW-3, a layer of moderately rigid clay was encountered below the tailings material. This clay was found to have a low moisture content and is thought to have a low permeability. The clay layer was found to be about 10 to 15 feet thick in two locations on the southern side of the tailings pile, at borings PW-1 and PW-2. In all other locations this layer was not completely penetrated.

The low moisture content and anticipated low permeability of this clay layer indicate it potentially may serve as an effective barrier or partial barrier to seepage from the impoundment. Over 40 borehole logs from previous drilling programs were reviewed to confirm the extent of the clay layer. Drilling logs in Dames and Moore geotechnical reports (1979,1981) reported a similar layer below the tailings sands which was usually described as a very stiff gray clayey silt or silt.

Lithologic logs of three borings drilled outside the tailings embankment show the nature of the natural deposits northeast, east and southeast of the tailings (WT,1988). A red clay layer is present at the surface and to a depth of 30 feet in boring AMM-3 which is located outside the tailings embankment and south of the recovery well locations. This is also shown on figure 1. The log of AMM-3 in the geologist's field book indicates that the red color becomes brown to gray with depth.

This clay layer is considered to be either a natural deposit associated with the local river and talus deposits or a consolidated slimes layer which was discharged from the mill. A review of available drilling logs indicates that the resistant clay layer apparently always lies under the tailings sands. No logs were observed where tailings sands were located under the clay layer. The clay layer also apparently always overlies either the reddish sand and clay layer or the brownish alluvial gravel deposits.

It has been suggested that the clay layer may have been deposited as a fine facies during the acid leach and lime neutralization process used in the early mill operations. The alternative to this origin is that the clay represents an overbank deposit of the Colorado River. The descriptions of the clay in boring logs reveals that the clay is very resistant and stiff. This is in sharp contrast to the descriptions of the soft tailings sands above the clay. Although the weight of the overlying tailings sands should cause some compaction of the clay the degree of stiffness is much higher than would be expected. In addition, if the clay is a natural deposit there should be evidence that it exists outside the tailings embankment. Such a deposit is found in boring AMM-3 although it is described in the log book as being very soft.
Although the findings are not conclusive, the evidence suggests that the resistant gray clay layer can be a natural deposit. It is very well indurated compared to the rest of the tailings materials and there is evidence that it exists outside the embankment.

3.3 Red Sand & Clay

In PW-2 and PW-3 on the south side of the tailings impoundment a red, silty sand and sandy clay layer was encountered. In PW-2 this red layer was encountered immediately beneath the clay described above. In PW-3 this layer was encountered immediately beneath the upper sandy tailings material.

This layer is variable in moisture content generally ranging from dry to moist and comprised of abundant silty sand and silty, sandy clay. The clay content appears to be high enough in this layer to indicate a fairly low in-situ permeability. The total thickness was measured at 22 feet in PW-2 which is the only location where it was fully penetrated.

The red sand and clay is thought to be a natural soil composed of slope wash and wind blown sands of local origin possibly interlayered with alluvial clay. The red color is thought to originate from the nearby red sandstones and shales cropping out to the west. The abundance of angular grains observed in the samples during the recent drilling project indicates transport over relatively short distances. Alluvial sands which have traveled greater distances are more well rounded.

3.4 Colorado River Alluvium

Based on available information, the tailings and impoundment area is partially underlain with alluvial sands and gravels. This strata was encountered during the March 1990 field program in two borings (PW-1 and PW-2). It is presumed to be alluvial material associated with stream channel deposition of the Colorado River. This material is highly saturated, and was encountered at a depth of 105 feet in PW-1 and 110 feet in PW-2. Please note that the log for PW-2 identifies the interval from 90 to 110 feet as being alluvium. This lithology is the same as that described for the red sand and clay layer described above. As corrected, the log for PW-2 should show tailings sands from surface to approximately 88 feet, red sand and clay from 88 to 110 feet and alluvial gravel from 110 to TD.

TABLE 3.1: DEPTHS OF MAJOR LITHOLOGIES

	DEPOSITIONAL TAILINGS	GRAY CLAY	RED SAND AND CLAY	ALLUVIAL SOILS	TOTAL DEPTH
PW-1*	0-90	90-105	---	105-120	120
PW-2*	0-78	78-88	88-110	110-120	120
PW-3	0-73	---	73-75		75
PW-40BA	0-39	---	---	---	39
PW-40BB	0-67	67-70	---	---	70
PW-4	0-70	70-71.5	---	---	71.5
PW-5	0-71	71-75	---	---	75
PW-6	0-71	71-75	---	---	75
PW-7	0-73	73-80.5	---	---	80.5
PW-8	0-70	70-71.5	---	---	71.5
PW-9	0-65	65-71.5	---	---	71.5
PW-10	0-60	60-73.5	---	---	73.5
PW-11	0-60	60-66.5	---	---	66.5
PW-12	0-68	68-71.5	---	---	71.5
PW-13	0-50	50-51	---	---	51

NOTE: All depths are in feet from ground surface and should be considered approximate.

* Installed during the March 1990 field program

A conceptual interpretation of the drilling data for the south side of the tailings pond is presented in figure 2. This is a simplified east-west cross section showing the interlayering of lithologies encountered.

4.0 DRILLING AND RECOVERY SYSTEM INSTALLATION PROGRAM

4.1 Drilling Program

A total of 15 borings and two well points were completed during this phase of the CAP implementation. The wells were located on the southern, eastern, and northern ends of the tailings impoundment (refer to Figure 1, Recovery System Schematic). The wells were drilled and installed by Datum Exploration, Ltd. of Wheat Ridge, Colorado. A CME 75 drill rig was used to advance the 10 5/8" diameter hollow stem auger. Two of the wells, PW-3 and PW-40BB, were damaged during completion. Two well points were driven on the northern end of the tailings impoundment. Drilling operations for the 13 additional wells and two well points began on June 14, 1990 and were completed by June 28, 1990.

Bulk samples were collected during advancement of the test holes at five foot intervals and were visually inspected and lithologically logged. Split spoon samples were obtained to confirm the presence of the low permeability clay layer below the sandy tailings material. These samples were taken to determine the saturated thickness of the tailings.

4.2 Well Point Installation

The two well points were installed by pushing a five foot length of 2 inch diameter stainless steel 260 screen attached to a drive point. Five foot lengths of galvanized pipe were threaded to the well point and pushed into the tailings. The final depth for each well point was approximately 23 feet below ground surface. The well points were installed to determine the feasibility for use in dewatering the tailings. An economic and technically feasible method for recovery from the well points continues to be investigated.

4.3 Recovery Well Construction

Refer to Appendix B for Lithologic Logs of Monitor Wells and Well Completion Diagrams. The recovery wells were constructed using 4.0 inch I.D. schedule 40 PVC casing. The screen is .020 inch and was factory slotted. All joints were threaded flush mount. The wells were capped with a slip cap on the top and a threaded bottom cap. The annulus between the hole and the casing was backfilled with 8-12 Colorado Silica Sand to approximately 2 feet above the top of the screen. A bentonite seal was then placed above the filter pack and neat cement grout was placed in the remainder of the hole to surface. A fiberglass (Nipak) protective casing was placed in each location. Table 4.1 gives casing depth information for each location.

Wells PW-3 and PW-40BB were damaged during completion. This happened during placement of the filter pack in the annulus between the casing and boring wall. As the level of the filter pack rose in the well annulus the augers were pulled to prevent the filter pack from wedging between the auger and casing. At approximately 32 feet below ground surface, the saturated tailings flowed into the annulus between the casing and auger, forcing up and wedging some of the filter pack. The casing was broken when the driller attempted to pull the auger. The remainder of each well was completed with filter pack, bentonite seal and neat cement, and a protective casing and slip cap. Recovery well PW-40BA was completed without filter pack at the request of Atlas for future comparison of production rates with the wells completed with filter pack.

The two damaged wells have been retained as observation wells; however, the amount of useful data is limited. Since there are no bottom caps, the depth of each well is expected to change in response to bottom sediment fill inside the casing. Secondly, the wells penetrate only a shallow upper zone of the saturated portion of the tailings.

The water table elevations given in Table 4.1 indicate an apparent wide variance in water table elevations across the impoundment. There are three explanations for this variance. The hydrologic properties of the tailings material are heterogeneous in response to variable lithologic conditions across the tailings impoundment (see section 5.0). As a result, irregular perched water zones are expected to exist at random across the impoundment.

Under the flow conditions which exist in the impoundment, the water level in each of the recovery wells depends on the length of the screen and its vertical position with respect to the saturated thickness. The water level is equal to the average potential over the length of the screen. The vertical position of the screened intervals in the recovery wells is somewhat variable. In addition, the length of the screens ranges from approximately 20 to 70 feet.
The water table elevations are also expected to decline toward the embankment of the tailings pond.

TABLE 4.1
WELL CONSTRUCTION DATA

RECOVERY WELL NO.	SCREENED INTERVAL (FT. BGS)*	SATURATED THICKNESS	BOTTOM OF CASING (FT. BGS)*	DEPTH TO WATER (FT. BGS)*	DATE	WATER TABLE ELEVATION
PW-1	49.37-89.44	31.6	98.0***	66.4	6/21/90	3987.31
PW-2	35.77-75.77	14.4	82.0***	67.6	6/30/90	3982.25
PW-3**	8.5-32.30	18.2	32.3[2]	14.00	6/29/90	4030.20
PW-40BA	8.3-38.55	16.4	38.55	22.2	6/28/90	4027.80
PW-40BB**	8.5-30.0	8.8	30.00[2]	21.2	6/29/90	4028.30
PW-4	8.2-68.51	40.0	68.51	28.1	6/21/90	4022.70
PW-5	4.3-74.60	49.3	74.60	25.3	6/29/90	4023.20
PW-6	3.55-73.55	45.2	73.55	28.3	6/29/90	4020.10
PW-7	7.8-78.14	41.0	78.14	37.1	6/28/90	4015.60
PW-8	8.8-69.05	35.0	69.05	34.0	6/28/90	4013.70
PW-9	8.6-68.96	32.9	68.96	36.05	6/29/90	4013.35
PW-10	10.0-70.32	34.3	70.32	36.00	6/29/90	4011.70
PW-11	5.0-65.00	34.1	65.00	30.9	6/29/90	4014.80
PW-12	8.61-68.92	40.1	68.92	28.8	6/29/90	4018.60
PW-13	6.5-46.80	9.0	46.80	37.75	6/30/90	4015.70
WP-1	18.3-23.3	10.6	23.30	12.70	6/29/90	4032.30
WP-2	18.34-23.34	10.6	23.34	12.79	6/29/90	4034.25

NOTES:

* (ft. bgs) feet below grou d surface

** Damaged casing - snapped off, no bottom cap

*** Double screened wells; a packer is in place above the alluvial water at the depths given for bottom of casing

4.4 Well Development

The wells were developed after completion with a ten foot dart bailer. Each well was bailed for approximately one hour or until dry. Initially, the water bailed contained high amounts of silt and fine sand material. During bailing, the amount of this fine ground material decreased over time. The wells continue to pump large amounts of silt. PW-1 and PW-8 are fairly clean.

4.5 Pump Installation

To estimate the initial pumping rates, each well was pumped using an electric pump. Time, water level, and pumping rates were recorded during pumping. Each well was pumped dry, after which time the recovery of the water was recorded.

The pumps that were installed were manufactured by Gould and are rated at one-half horsepower and 10 gallon per minute. Ten of the pumps installed were fitted with a set of adjustable high and low on and off probe controls. In addition, one stainless steel, 110 volt, one-half horsepower Grundfos pump was made available. It was decided that the pumps would be placed approximately five feet above the bottom of each well because of the tendency of some to fill in with silt. The depths were chosen based on existing water levels, the depths of the wells and on apparent siltation tendencies.

5.0 RECOVERY WELL YIELD

The production capability of each well is dependant on a number of factors including permeability, saturated thickness, homogeneity and well design.

When tailings were deposited in the tailings pond, the lithologic properties such as grain size, angularity and sorting were a function of the nature of the ore being processed and the process method. Since ore from different deposits was processed at the mill and the milling process was altered periodically, it was expected that a vertical layering effect would be present in the tailings. In addition, the horizontal distribution of the tailings material was controlled by the slurry discharge configuration. This system consisted of spigots spaced at approximately 100 foot intervals creating a beach wedge of tailings sand between the dam embankment and the ponded water. The lighter, finer particles were carried toward the center of the pond (Refer to Decommissioning Plan for the Moab Mill, Atlas Minerals, November 30, 1987).

The vertical and horizontal fluctuations of the lithologic properties of the tailings material correspond to changes in the permeability from location to location. Because of this the recovery wells have varying production rates. During the field program it was not possible to choose favorable well locations.

The permeability of the tailings is largely dependant upon the tailings grain size, shape and sorting. In general, it was found that the holes drilled close to the pond (i.e. PW-3) had smaller grain sizes, were more poorly sorted and had high clay content. The holes drilled farthest from the existing pond and closer to the tailings embankment (i.e. PW-1,7,and 13) had larger grain sizes, with less clay and were more well sorted. The majority of the wells were located about halfway between these two distances and exhibited a range of lithologic characteristics representative of both extremes.

The production rates of each well did reflect, to a certain extent, the relative permeability inferred from the lithologic characteristics of the tailings. Table 5.1 indicates that the highest initial production came from wells PW-4 and PW-10. The lithologic descriptions for PW-4 indicated predominantly fine grained, well sorted sand in the saturated interval. The tailings in PW-10 appear to be finer grained and less well sorted. Lowest initial production was in PW-7 and PW-13. The tailings in each of these borings also were found to be predominantly fine grained and well sorted. However, the initial production was extremely low. The water level in PW-7 is lower than in wells closer to the existing pond; however, the saturated thickness is relatively high due to thicker tailings near the edge of the embankment. The saturated thickness in PW-13 is low.

It should be noted that a grain size distribution for selected holes is recommended before a correlation can be attempted between production rate and lithology. There is a drawback to using these samples for the testing. An undisturbed sample is preferable for grain size distribution tests. Because of time limitations, the scope of work did not include sampling for this purpose, however, the bulk samples can be used to draw some relationships between production rates and lithology. It is recommended that sieve analyses be performed on samples from the worst three and best three yielding wells. The samples chosen should range from the initial point of saturation down to and including the gray clay layer.The borings chosen should include PW-1,4,5,7,8 and 11.

Table 5.1 presents, for each well, the approximate initial volume pumped and subsequent flow rates based on calculations from the totalizing flow meters and a calibrated volume container.

TABLE 5.1

INITIAL VOLUMES PUMPED AND RECOVERY SYSTEM WELL YIELDS

WELL NO.	DATE (1990)	INITIAL VOLUME PUMPED (GALLONS)	TIME PUMPED (MINUTES)*	FLOW RATE IN GALLONS PER DAY FLOW METER	CONTAINER
PW-1	5-22	26.0	13.0		
	7-13			600	
	7-19				1157
PW-2	5-2	24.0	4.1		
	7-9			63	
PW-4	6-29	38.6	2.7		
	7-9			1,357	
	7-19				1,955
PW-5	6-21	37.0	20.3		
	7-9			740	
	7-19				909
PW-6	6-29	18.0	1.5		
	7-9			374	
	7-19				558
PW-7	6-30	6.3	0.7		
	7-9			147	
	7-19				351
PW-8	6-30	12.7	0.7		
	7-9			146	
	7-19				207

TABLE 5.1 - CONTINUED

INITIAL VOLUMES PUMPED AND RECOVERY SYSTEM WELL YIELDS

WELL NO.	DATE (1990)	INITIAL VOLUME PUMPED (GALLONS)	TIME PUMPED (MINUTES)*	FLOW RATE IN GALLONS PER DAY FLOW METER	CONTAINER
PW-9	6-29	22.1	1.8		
	7-9			3[illegible]2	
	9-19				785
PW-10	6-25	50.0	7.0		
	7-9			519	
	7-19				578
PW-11	6-29	20.0	2.5		
	7-9			281	
	7-19				413
PW-12	6-30	17.1	1.4		
	7-9			101	
	7-19				413
TOTAL					
GALLONS PER DAY				4,644	7,326
GALLONS PER MINUTE				3.22	5.08

* Initial volume and time pumped were determined from pumping each well until dry.

Atlas personnel have periodically monitored the production rates of each well since installation. It has been determined that the totalizing meters are being adversely affected by the high Total Dissolved Solids (TDS) property of the water and are not reliable beyond the first few days of operation. In some cases the total error is greater than 50%. Production calculations have since been conducted by Atlas by pumping into a calibrated volume container for more precise determinations. Results are given in Table 5-1.

Total production calculations were made over three 24 hour periods beginning on July 24,1990. The totalizing meter values were compared with the volumes measured using the calibrated volume container. Results are given below.

TABLE 5.2

FLOW METER INDICATION

DATE	METERS	CONTAINER
7/24	1.4 gpm	4.0 gpm
7/25	1.4 gpm	4.1 gpm
7/26	1.4 gpm	3.9 gpm

The same properties of the water which affected the meters also affected the pressure probes in each well, rendering them inoperable. A timer system was substituted for the probes. Groups of wells were hooked to each timer and set at appropriate intervals to pump according to recovery time.

An initial attempt was made to estimate the production rates for each pumping well after they had been developed. A water level indicator was used to determine the water level in the wells during and after pumping. Also, an air line was lowered to a specific measured depth in each well and a pressure gauge was attached to the line. The line was then pressurized until a stabilized gauge reading was obtained. This device works on the principle that the air pressure required to expel the water from the submerged portion of the line equals the water pressure of a water column of that height. The gauge was calibrated in pounds per square inch (psi) and a conversion factor was used to derive the water column in feet. This method of water level determination is described in the second edition of Ground Water and Wells edited by Driscoll and published by Johnson Division.

There are two characteristics of the recovery wells which were observed in the field program that probably will affect the extended production of the recovery system. These characteristics are the high TDS levels mentioned in section 5.0 of this report and the siltation tendencies mentioned in section 4.5.

Due to the relatively high percentage of silt and clay size particles in the tailings material, the wells have a tendency to fill with this material. Some of this fine material is pumped out with the water but in some wells there is such an abundance of the material that it builds up more quickly than it can be removed. To a certain extent this tendency is expected to diminish with time as the wells are pumped. However, some wells are expected to experience diminishing yields due to siltation in the well. In addition, the high volume of silt is expected to adversely affect the longevity of the pumps because of inpellar corrosion.

The high TDS level may also adversely affect the production of the recovery system with time. As the pumps are periodically started and stopped in response to recovery intervals for the wells silts are expected to precipitate in the pumps and discharge lines. Over time the pumps and lines may require cleaning or possible replacement.

5.1 Field Tests for pH

The readings for water pH in each well were taken in the field with a portable Hach pH meter. The values were adjusted to a standard calibration blank and verified daily in the field. The pH readings were generally taken after the wells were developed and during production testing. The pH values are presented as follows:

TABLE 5.3

pH VALUES IN RECOVERY WELLS

RECOVERY WELL NO.	pH	DATE
PW-1 [1]	8.37	7/18/90
PW-2 [1]	8.96	7/18/90
PW-3	7.0	6/16/90
PW-4	6.6	6/29/90
PW-5 [1]	7.28	7/18/90
PW-6	7.1	6/29/90
PW-7	7.3	6/30/90
PW-8	7.2	6/30/90
PW-9	8.3	6/29/90
PW-10	8.1	6/25/90
PW-11	6.7	6/29/90
PW-12	7.0	6/30/90
PW-13 [1]	6.7	7/09/90
WP-1	7.8	6/30/90
WP-2	8.5	6/30/90

NOTES:

1 pH data supplied by Atlas field personnel.

The pH values are higher than expected based on the low pH of the ponded solution. The surface water in the pond is at a pH of approximately 1.5. The pH of the well water is in excess of 6.5. There are several reasons for the discrepancies.

The history of milling operations at the site includes alternating acid leach and alkaline process methods. Early operations used an acid leach process in which the tails were neutralized by adding lime. This was followed with an alkaline leach process in which tailings were neutralized.

For a period of time both an acid and an alkaline circuit were operated and tailings were neutralized. From 1982 through 1984 an acid leach process was utilized with no neutralization of process water.

The various process methods have resulted in neutralized tailings and process waters comprising the majority of the tailings impoundment until 1982. Thereafter, for a period of two years, acidic process water was recycled with no neutralization. This resulted in low pH water being added to the pond. Acidic water percolating downward into the tailings since then has been neutralized by the older neutral tails. The acidity of the pond has increased over time with continued evaporation of the pond.

6.0 TREATMENT SYSTEM

The pumps in each well use an inflexible discharge line fitted with an in-line C-700 Series Kent totalizing flow meter. Problems with the flow meter have made it necessary to use an alternative device. This is being investigated at this time. A valve was also installed to allow water quality sampling. A trunk line consisting of 2 inch ABS plastic piping runs along the perimeter of the pumping well field and extends along the eastern side of the tailings pond to a treatment area. The trunk line is fitted to connect to the individual pump discharge line as necessary for independent control for trunk line attachment or detachment. This trunk line runs to the treatment area which is located in the northeastern side of the pond.

The treatment system consists of four 6,000 gallon fiberglass effluent storage tanks connected in series to a smaller stainless steel mixing tank. Sodium hydroxide can be added in the mixing tank to raise the pH of the water to the minimum of 6.0 as outlined by Atlas. The treatment system is designed to temporarily store water to treat, prior to evaporation sprinkling. The trunk line and tanks are fitted with valve attachments which allow incoming water in the line to be routed into the mixing tank. The purpose of this tank is for adding lime or soda ash which is at the site. The lime in solution mixture can then be added to the holding tanks.

7.0 SUMMARY

The recovery well system is installed and operational. Flow calculations based on the totalizing flow meters were made on July 9, 1990 and July 13, 1990. These calculations are inaccurate because of the adverse effects of the tailings water on the meter operation. Subsequent calculations are available based on calculations using a calibrated volume container. The average total production based on these calculations is 4.0 gallons per minute.

The treatment system equipment is installed and operational. This includes the mixing and holding tanks as well as sprinkler system attachment.

The perfc...ance of the recovery and treatment systems are being monitored daily to establish optimum system efficiency and to identify and verify problems which occur.

APPENDIX A

REFERENCES

Solution Engineering Inc. May 1979.
"Uranium Feasibility, Preliminary Hydrological Study for the Design of a Dewatering System for the Atlas Minerals Tailings Pond, Moab, Utah". Prepared for Atlas Minerals.

Dames & Moore, February 16, 1979.
"Report of Supplementary Study, Geotechnical Evaluation of Tailings Pond - Embankment System, Moab, Utah, For Atlas Minerals." Prepared for Atlas Minerals.

Dames & Moore, May 26, 1981.
"Report of Engineering Design Study Additions to Tailings Pond - Embankment System, Moab, Utah, for Atlas Minerals." Prepared for Atlas Minerals.

Western Technologies Inc., March 1989.
"Draft/Final, Atlas/Moab, Uranium Mill and Tailings Corrective Action Plan, Moab, Utah." Prepared for Atlas Minerals.

Western Technologies Inc. June 14, 1989.
"Addendum to Moab Corrective Action Plan." Prepared for Atlas Minerals.

Western Technologies Inc., May 29, 1990.
"Pilot Dewatering Project Report." Prepared for Atlas Minerals.

Driscoll, F.G., 1986.
"Groundwater and Wells", Johnson Division, St. Paul, Minnesota.

Cleary, R.W., Miller, D.W. and Pinder, G.F. 1990.
"Groundwater Pollution and Hydrology, the Princeton Course," Groundwater Associates of Princeton coordinated by Omni Environmental Corporation, The Princeton Corporate Center, Princeton, New Jersey.

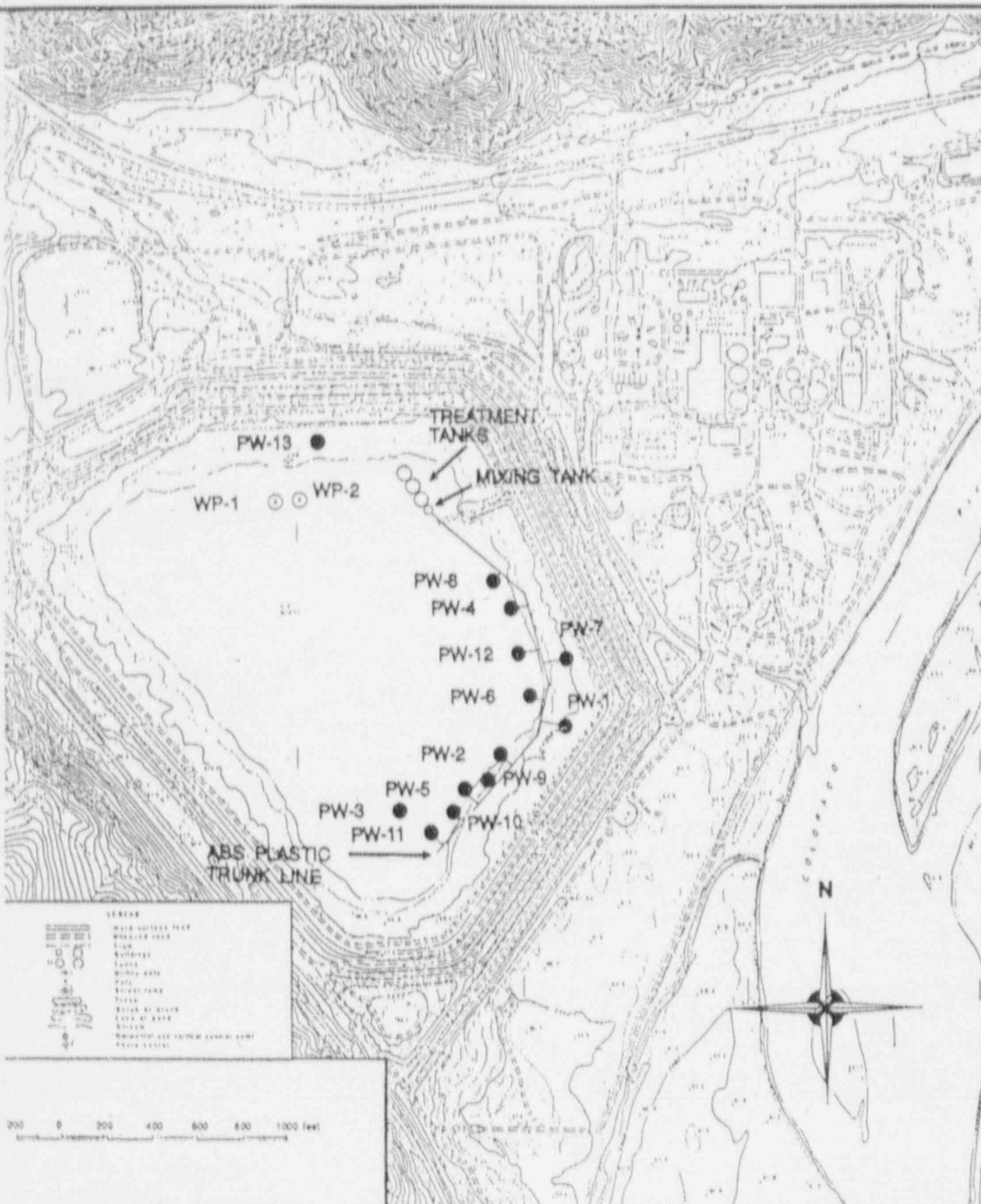
Atlas Minerals, 1987.
"Decommissioning Plan for the Moab Mill, Moab Utah." Prepared for the U.S. Nuclear Regulatory Commission, Uranium Recovery Field Office, Denver, Colorado, November 30, 1987.

Dames & Moore, 1975.
"Safety Analysis Report", Prepared for Atlas Minerals Division, Atlas Corporation Moab Uranium M ll.

Western Technologies Inc., 1988.
"Atlas Moab Mill Ground Water Detection Monitoring Program", Atlas Minerals Moab Uranium Mill, Grand County, Utah. Prepared for Atlas Minerals.

APPENDIX B

GEOLOGIC LOGS AND WELL COMPLETION DIAGRAMS



WESTERN TECHNOLOGIES INC.		RECOVERY SYSTEM SCHEMATIC Atlas Moab Mill Moab, Utah	
BY: GC	DATE: 08/24/90	PROJECT NO.: 769-0K-041	FIGURE NO.: 1

GEOLOGIC LOG

PROJECT Atlas - Moab　JOB NO. 769-OK-041　DATE DRILLED June 15, 1990

WELL/BORING PW-3　LOCATION Sec. 27, Township 25S, Range 21E　LOGGER Curtiss

DRILL METHOD Hollow Stem Auger　Coordinates: 3701.6 N, 5372.6 E　PAGE 1 OF 1

DEPTH IN FEET		DESCRIPTION
FROM	TO	
0	1	Fill, brown sand, dry.
1	10	Silty sand, gray, very fine grained, approximately 50% silt, slimey, moist at 5'.
10	11.5	Split Spoon Sample (spoon pushed through interval under its own weight) Top 6" is sand, light gray, fine grained, sub-rounded to rounded, well sorted, becoming finer with depth, wet. Bottom 6" is silt and clay, wet to moist.
11.5	23	Silt and clay, greenish-gray, slimey, very wet.
23	30	Clayey silt and sand, sand is very fine to fine grained, very slimey, abundant silt with clay, becomes stiffer, very wet.
30	40	Sand and silt, light gray to gray, sandier than above, slimey, very wet.
40	55	Sand, light gray, very fine grained, sub-angular to sub-rounded, silty, moderately well sorted, very slimey, very wet.
55	65	Sand (as above) with increase in silt, very wet.
65	73	Sand, light gray, very fine (90 - 95%) to fine grained, silty, sub-angular to sub-rounded, very slimey, very wet.
73	75	Sand, silt and clay, red, sand is very fine to fine grained, sub-angular, silt and clay also abundant, dry.
		TD = 75.0'

WESTERN TECHNOLOGIES INC.

DATE: July 31, 1990　Project No. 769-OK-041　PLATE: B-1

GEOLOGIC LOG

PROJECT: Atlas - Moab
JOB NO.: 769-OK-041
DATE DRILLED: June 21, 1990
WELL/BORING: PW-4
LOCATION: Sec. 27, Township 25S, Range 21E
LOGGER: Schwieger
DRILL METHOD: Hollow Stem Auger
Coordinates: 4651.9 N, 5947.3 E
PAGE 1 OF 1

DEPTH IN FEET		DESCRIPTION
FROM	TO	
0	2	Fill, red and brown sand and gravel.
2	5	Sand, light gray to yellow, fine to medium grain, sub-rounded to sub-angular, moderately well sorted, dry.
5	10	Sand, brown, fine grained, sub-angular to sub-rounded, well sorted, moist.
10	15	Sand, light gray to green, angular, high clay content, saturated.
15	25	Sand, light gray to green, poorly sorted, angular, high clay content, moist.
25	30	Sand, light gray to brown, angular, poorly sorted, high clay content, moist.
30	40	Sand, light brown, well sorted, slight clay content, saturated.
40	45	Sand, light brown, well rounded, well sorted, slight clay content, saturated.
45	50	Sand, light brown, well rounded with smaller percentage of angular grains, extremely saturated.
50	60	Sand, light brown, well rounded to angular, slight amount of clay, highly saturated.
60	65	Sand, light brown, well rounded to angular, silty, slight amount of clay, highly saturated.
65	70	Sand, light gray to tan, fine grained, very silty, moderate clay, highly saturated.
70	71.5	Split Spoon Sample (pushed) Clay, gray to brownish gray, thinly laminated, moderately rigid, moderately plastic, dry to moist.
		TD = 71.5'

WESTERN TECHNOLOGIES INC.

DATE: July 31, 1990 | Project No. 769-OK-041 | PLATE: B-2

GEOLOGIC LOG

PROJECT Atlas - Moab JOB NO. 769-OK-041 DATE DRILLED June 16, 1990

WELL/BORING PW-4-OB-A LOCATION Sec. 27, Township 25S, Range 21E LOGGER Curtiss

DRILL METHOD Hollow Stem Auger Coordinates: 4617.77 N, 5832.2 E PAGE 1 OF 1

DEPTH IN FEET		DESCRIPTION
FROM	TO	
0	3	Fill, brown sandy clay and gravel, dry
3	5	Sand, yellow to light gray with depth, fine grained with minor medium to coarse grains, sub-angular, moderately well sorted, dry.
5	10	Sand, brown, fine grained, sub-angular, slightly clayey, damp.
10	20	Sand, brown, medium grained with some fine grains, sub-angular, slightly clayey, becomes finer with depth, clay increases with depth, water at 12.0'.
20	25	Sand, brown, fine grained, slightly clayey, wet.
25	29	Silty clay, brown, plastic, dry to damp.
29	39	Sand, brown, fine (50%) to medium (50%) grained, moderately well sorted, sub-rounded with some sub-angular grains, slightly clayey at top, minor silt, very wet.
		TD = 39.0'

WESTERN TECHNOLOGIES INC.

DATE: July 31, 1990 | Project No. 769-OK-041 | PLATE: B-3

GEOLOGIC LOG

PROJECT Atlas - Moab JOB NO. 769-OK-041 DATE DRILLED June 20, 1990
WELL/BORING PW-4-OB-B LOCATION Sec. 27, Township 25S, Range 21E LOGGER Curtiss
DRILL METHOD Hollow Stem Auger Coordinates: 4643.4 N, 5932.6 E PAGE 1 OF 1

DEPTH IN FEET		DESCRIPTION
FROM	TO	
0	2	Fill, brown to reddish-brown sand and gravel, dry.
2	5	Sand, light gray to yellow, fine to medium grained, sub-rounded to sub-angular, moderately well sorted, dry.
5	10	Sand, brown, fine grained, sub-angular to sub-rounded, well sorted, damp.
10	13	Sand, brown, very fine to medium grained, moderate sorting, sub-angular, minor clay, damp.
13	15	Sand, brown, very fine to fine grained, clayey, water at 13.0'.
15	25	Clayey sand, brown, very fine to medium grained, poorly sorted, grain size decreases with depth, wet.
25	35	Clayey sand, brown, fine grained, sub-rounded, poorly sorted, wet.
35	60	Sand, brown, fine to medium grained, moderate well sorted, sub-angular, to sub-rounded, slightly clayey, some silt to 50', grain size decreases with depth to greater than 90% fine at 50', very wet.
60	65	Sand, brown, very fine grained, silty and clayey, moderate to poor sorting, very wet.
65	67	Sand (as above) very clayey, wet.
67	70	Split Spoon Sample pushed at 69.0' - 70.0'. Clay, gray to brownish gray, thinly laminated, moderately rigid and plastic.
		TD = 70.0'

WESTERN TECHNOLOGIES INC.

DATE: July 31, 1990	Project No. 769-OK-041	PLATE: B-4

GEOLOGIC LOG

PROJECT Atlas - Moab JOB NO. 769-OK-041 DATE DRILLED June 17, 1990

WELL/BORING PW-5 LOCATION Sec. 27, Township 25S, Range 21E LOGGER Schwieger

DRILL METHOD Hollow Stem Auger Coordinates: 3781.7 N, 5686.2 E PAGE 1 OF 1

DEPTH IN FEET		DESCRIPTION
FROM	TO	
0	2	Fill, red to brown sand and gravel.
2	5	Sand, tan, very fine to fine grained, moderately well sorted, sub-angular, dry.
5	10	Sand, brown, very fine (70%) to fine (30%) grained, sub-angular, water encountered at 8'.
10	15	Sand (as above) some clay, wet.
15	20	Sand, brownish gray, very fine grained, sub-angular, very clayey and silty, very wet.
20	25	No samples.
25	30	Clayey sand, greenish-gray, very fine grained, very silty, very wet.
30	55	Clayey sand, greenish-grey to brownish-gray, very fine grained, sub to well rounded, very silty, moderate sorting, very wet.
55	60	Sand (as above) less clay. slight increase in grain size.
60	71	Sand, brown, very fine grain (90%) to fine grain (10%), moderately well sorted, sub-rounded to sub-angular, less clay than above, wet.
71	75	Clay, gray, very hard, dramatic increase in formation resistance, dry.
		TD = 75.0'

WESTERN TECHNOLOGIES INC.

DATE July 31, 1990 | Project No. 769-OK-041 | PLATE B-5

GEOLOGIC LOG

PROJECT Atlas - Moab | JOB NO. 769-OK-041 | DATE DRILLED June 18, 1990
WELL/BORING PW-6 | LOCATION Sec. 27, Township 25S, Range 21E | LOGGER Curtiss
DRILL METHOD Hollow Stem Auger | Coordinates: 4250.7 N, 6035.6 E | PAGE 1 OF 1

DEPTH IN FEET		DESCRIPTION
FROM	TO	
0	2	Fill, brownish-red sand and gravel, dry.
2	3.5	Sand, tan, very fine to medium grained, predominantly medium grained, sub-angular to sub-rounded, moderately well sorted, dry.
3.5	5	Clay and silt, brown, abundant silt, moist.
5	10	Sand, light brown, fine to very fine grained, sub-angular, very clayey, moist becoming wet at 8.0'.
10	20	Sand, brown, very fine to fine grained, very clayey, poorly sorted, wet.
20	25	Sand (as above) with decreasing clay content with depth, wet.
25	71	Sand, brown, very fine (30%) to fine (70%) grained, sub-angular to sub-rounded, moderately well sorted, wet. This interval has characteristics of good permeability in relative uniformity of grain size.
71	75	Clay, moderately rigid and hard.
		TD = 75.0'

WESTERN TECHNOLOGIES INC.

DATE July 31, 1990 | Project No. 769-OK-041 | PLATE: B-6

GEOLOGIC LOG

PROJECT Atlas - Moab　JOB NO. 769-OK-041　DATE DRILLED June 19, 1990

WELL/BORING PW-7　LOCATION Sec. 27, Township 25S, Range 21E　LOGGER Curtiss

DRILL METHOD Hollow Stem Auger　Coordinates: 4428.9 N, 6212.5 E　PAGE 1 OF 1

DEPTH IN FEET		DESCRIPTION
FROM	TO	
0	2	Fill, brownish-red sand and gravel.
2	10	Sand, tan, very fine to medium grained, moderate sorting, sub-angular to sub-rounded, dry, becomes light brown at 3'.
10	15	Sand, brown, very fine to fine grained, sub-angular, moderately well sorted, slightly moist.
15	19	Sand, brown, very fine to medium grained, sub-angular to sub-rounded, moderately well to well sorted, slightly moist.
19	20	Sand, brown, very fine to fine grained, slightly clayey, slightly moist to moist.
20	30	Sand, reddish-brown, very fine to fine grained (50 - 50%), moderately well sorted, sub-angular to sub-rounded, dry to slightly moist.
30	55	Sand, brown, fine grained, sub-rounded to sub-angular, moderately well sorted, slightly clayey. Water encountered at 33', samples wet below that depth.
55	73	Sand, brown, very fine to fine grained, sub-angular, moderately well sorted, slightly clayey or silty, wet.
73	79	Clay, gray to brownish-gray, resistant and harder to drill than above, thinly laminated in spots, dry to moist.
79	80.5	Split Spoon Sample (pushed) Clay (as above).
		TD = 80.5'

WESTERN TECHNOLOGIES INC.

DATE: July 31, 1990	Project No. 769-OK-041	PLATE: B-7

GEOLOGIC LOG

PROJECT Atlas - Moab JOB NO. 769-OK-041 DATE DRILLED June 22, 1990

WELL/BORING PW-8 LOCATION Sec. 27, Township 25S, Range 21E LOGGER Schwieger

DRILL METHOD Hollow Stem Auger Coordinates: 4787.9 N, 5858.2 E PAGE 1 OF 1

DEPTH IN FEET		DESCRIPTION
FROM	TO	
0	5	Silty sand, brown, angular, with green rock (fill) less than 0.25 inches in diameter.
5	10	Silty sand, brown, well rounded with small amount of angular grains, moist.
10	15	Silty sand, brown, fine grained, uniformly sorted, increase in moisture.
15	25	Silty sand, brown, high clay content, fine grained, well rounded with small amount of angular grains, saturated.
25	30	Silty sand, brownish-green, fine grained, angular, less saturated than above.
30	35	Silty sand, brown to green, well rounded, angular, moist.
35	45	Silty sand, brownish-green, fine grained, well sorted, saturated.
45	55	Sand, reddish-brown, fine grained, mostly rounded, minor angular grains increasing with depth, less saturated than above.
55	60	Sand (as above), very moist.
60	65	Sand, reddish-brown, high clay content, significant angular grains, moist.
65	70	Sand, reddish-brown, high clay content, abundant angular grains, stiff, slightly moist.
70	71.5	Split Spoon Sample (pushed) Clay, gray to brownish gray, thinly laminated, moderately rigid, moderately plastic, dry to moist.
		TD = 71.5'

WESTERN TECHNOLOGIES INC.

DATE: July 31, 1990 | Project No. 769-OK-041 | PLATE: B-8

GEOLOGIC LOG

PROJECT Atlas - Moab　JOB NO. 769-OK-041　DATE DRILLED June 23, 1990

WELL/BORING PW-9　LOCATION Sec. 27, Township 25S, Range 21E　LOGGER Schwieger

DRILL METHOD Hollow Stem Auger　Coordinates: 3866.5 N, 5787.3 E　PAGE 1 OF 1

DEPTH IN FEET		DESCRIPTION
FROM	TO	
0	5	Sand, fine grained, well sorted, dry.
5	10	Sand, brown, fine grained, well sorted, high clay, content, moist.
10	20	Sand, brown to light green, fine grained, well sorted, high clay content, some angular grains from 15.0' - 20.0' depth, saturated.
20	25	Sand (as above) with minor angular grains, less saturated.
25	30	Sand (as above) with moderate amount of angular grains, moist.
30	40	Sand, brown, fine grained, high clay content with minor angular grains. Also light green from 35.0' - 40.0', saturated.
40	45	Sand (as above), uniform sorting, saturated.
45	55	Sand, brown, fine to medium grained, moderate angular grains, high clay content, becomes medium grained with depth, moist.
55	60	Sand, brown to light green, fine grained, minor angular grains, high clay content, slightly saturated.
60	65	Sand, green, high clay content, minor amount of weathered shale, saturated.
65	70	Sand, light tan to grayish-green, fine grained, silty, high clay content, minor flakes of weathered shale-claystone, highly saturated.
70	71.5	Split Spoon Sample (pushed) Claystone, light grey, thinly laminated, highly plastic, moist.
		TD = 71.5'

WESTERN TECHNOLOGIES INC.

	DATE: July 31, 1990	Project No. 769-OK-041	PLATE: B-9

GEOLOGIC LOG

PROJECT: Atlas - Moab | JOB NO.: 769-OK-041 | DATE DRILLED: June 24, 1990

WELL/BORING: PW-10 | LOCATION: Sec. 27, Township 25S, Range 21E | LOGGER: Schwieger

DRILL METHOD: Hollow Stem Auger | Coordinates: 3689.0 N, 5619.6 E | PAGE 1 OF 1

DEPTH IN FEET		DESCRIPTION
FROM	TO	
0	5	Sand, light tan, fine grained, well sorted, dry.
5	10	Sand, brown, fine grained, small amount of angular grains, high clay content, moist.
10	20	Sand, light gray to green, fine grained, moderate amount of angular grains decreasing to minor with depth, high clay content, slightly saturated.
20	30	Silty clay, gray to green, fine grained, well sorted, saturated.
30	35	[illegible] clay, gray to green, fine grained, minor angular grains, saturated.
35	45	Silty clay, gray to green, fine grained, poorly sorted with moderate amount of angular grains, saturated.
45	60	No cuttings return.
60	72	Silty clay, gray to green, very fine grained, well sorted, rounded, saturated.
72	73.5	Split Spoon Sample (pushed) Silty clay, gray to green, highly plastic, moist.
		TD = 73.5'

WESTERN TECHNOLOGIES INC.

DATE: July 31, 1990 | Project No. 769-OK-041 | PLATE: B-10

GEOLOGIC LOG

PROJECT Atlas - Moab JOB NO. 769-OK-041 DATE DRILLED June 25, 1990

WELL/BORING PW-11 LOCATION Sec. 27, Township 25S, Range 21E LOGGER Schwieger

DRILL METHOD Hollow Stem Auger Coordinates: 3564.9 N, 5500.2 E PAGE 1 OF 1

DEPTH IN FEET		DESCRIPTION
FROM	TO	
0	5	Sand, light tan, medium grained, well sorted, dry.
5	10	Sandy clay, light gray to green, medium grained, rounded with moderate amount of angular grains, poorly sorted, moist.
10	15	Sand clay (as above), slightly saturated.
15	30	Sandy clay (as above) with slight decrease in the amount of angular grains, saturated.
30	45	Silty clay, reddish-brown, very fine grained, very saturated.
45	60	Silty clay, light gray to green, very fine grained, very saturated.
60	65	Silty clay (as above) with moderate amount of angular grains, very saturated.
65	66.5	Split Spoon Sample (pushed) Clay, light gray to green, plastic, evidence of lamination, moist.
		TD = 66.5'

WESTERN TECHNOLOGIES INC.

DATE: July 31, 1990 Project No. 769-OK-041 PLATE: B-11

GEOLOGIC LOG

PROJECT Atlas - Moab   JOB NO. 769-OK-041   DATE DRILLED June 27, 1990

WELL/BORING PW-12   LOCATION Sec. 27, Township 25S, Range 21E   LOGGER Schwleger

DRILL METHOD Hollow Stem Auger   Coordinates: 4450.1 N, 5997.9 E   PAGE 1 OF 1

DEPTH IN FEET		DESCRIPTION
FROM	TO	
0	5	Sand, light gray, fine grained, well sorted, dry.
5	10	Sand and clay, light gray, fine grained sand with silty brown clay, moderate amount of angular grains, moist.
10	30	Clay, sandy, light gray. Sand is medium grained and angular, moderate amount of coarse gravel material (less than one inch in diameter), moist.
30	40	Clay, light gray, with fine grained sand and silt, mostly rounded with minor angular grains, saturated.
40	50	Sandy clay, [illegible]ht [illegible]ay to reddish-brown. Sand is fine grained, mostly rounded w[illegible] [illegible]ino[illegible] [illegible]ngular grains, saturated.
50	65	Clay, reddis[illegible] with fine grained sand in a silty matrix, saturated.
65	70	Clay, reddish-brown, minor amounts of laminated gray clay. Water content slightly less than above, saturated.
70	71.5	Split Spoon Sample (pushed) Clay, light gray, laminated, fairly rigid, well sorted, silty, moist.
		TD = 71.5'

WESTERN TECHNOLOGIES INC.

DATE July 31, 1990 | Project No. 769-OK-041 | PLATE B-12

GEOLOGIC LOG

PROJECT Atlas - Moab　　JOB NO. 769-OK-041　　DATE DRILLED June 28, 1990

WELL/BORING PW-13　　LOCATION Sec. 27, Township 25S, Range 21E　　LOGGER Schwieger

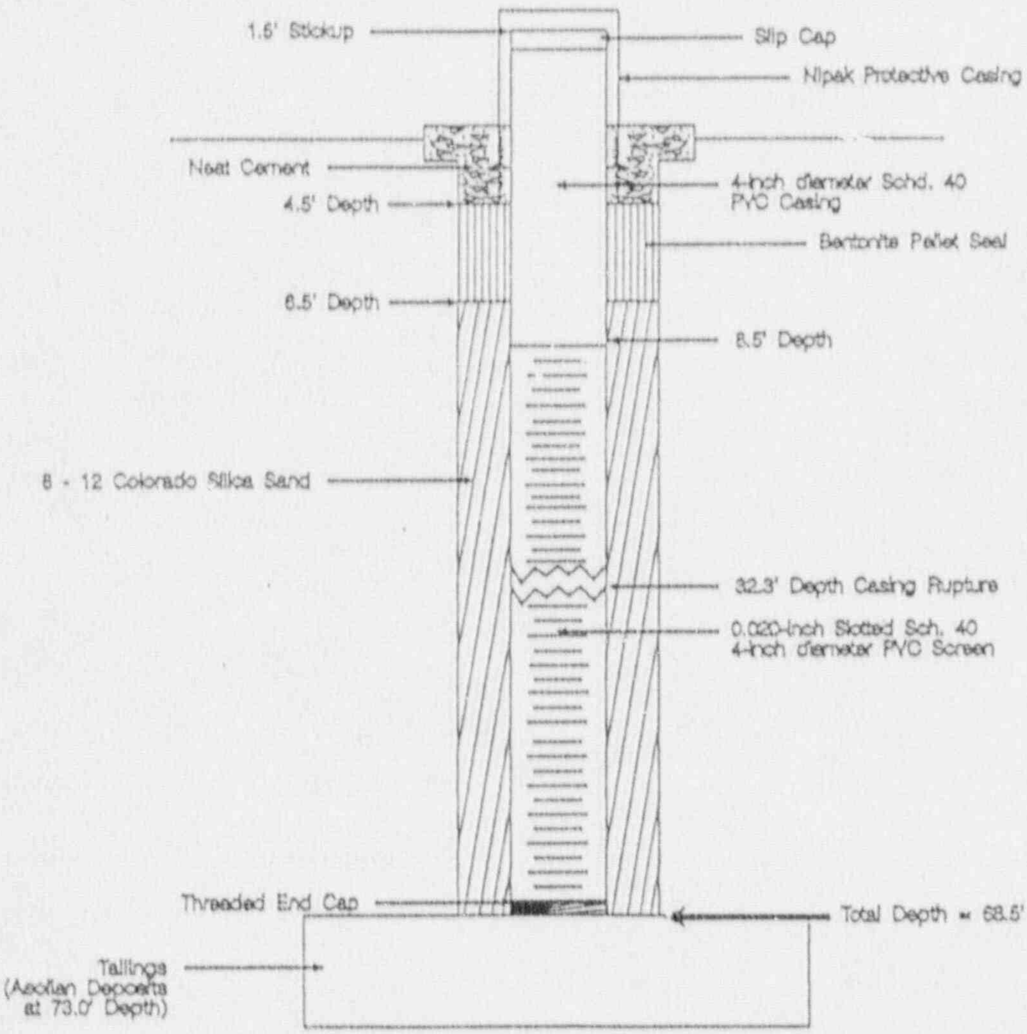
DRILL METHOD Hollow Stem Auger　　Coordinates: 5501.1 N, 5021.7 E　　PAGE 1 OF 1

DEPTH IN FEET FROM	TO	DESCRIPTION
0	5	Sand, light gray, fine grained, gravel approximately 0.5 inch diameter, dry.
5	10	Sand, light gray, larger gravel material (1.0 - 1.5 inch diameter), slightly moist.
10	15	Sand, light gray, gravel (1.5 inch in diameter), slightly moist.
15	24	Sand, reddish, fine grained, mostly rounded with small amount of angular grains, slightly moist.
24	25	Sandy clay, light gray. Sand is fine grained and mostly rounded with minor amount of angular grains, moist.
25	30	Sandy clay, reddish-brown, as above, moist.
30	50	Clay, light gray to light brown, stiff, minor amount of angular sand, slightly saturated.
50	51	Split Spoon Sample (pushed) Clay, light gray, laminated, slightly saturated.
		TD = 51.0'

WESTERN TECHNOLOGIES INC.

DATE July 31, 1990　　Project . 769-OK-041　　PLATE: B-13

WELL COMPLETION DIAGRAM
PW-3

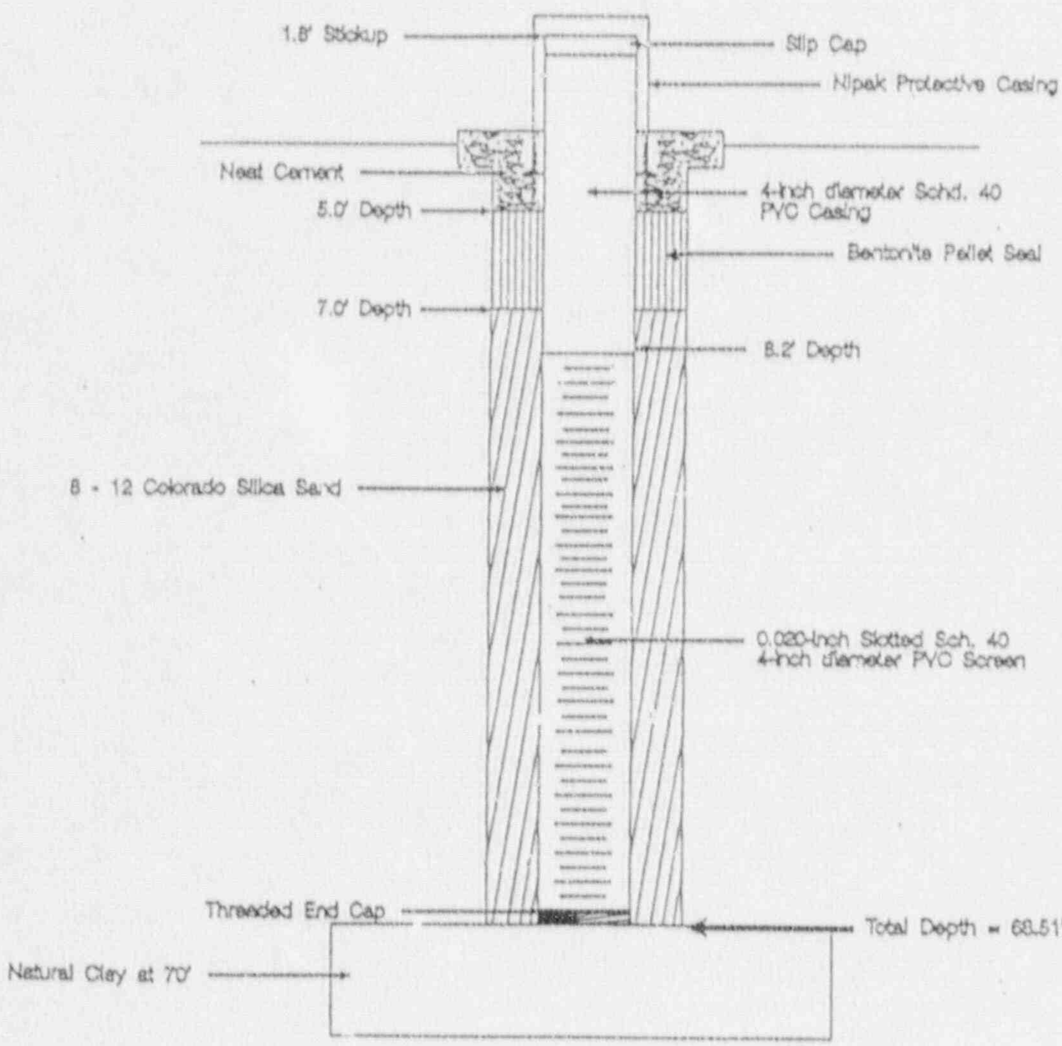


NOT TO SCALE

WESTERN TECHNOLOGIES INC.

DATE: July 31, 1990	Project Number: 769-0K-041	PLATE: B-14

WELL COMPLETION DIAGRAM
PW-4

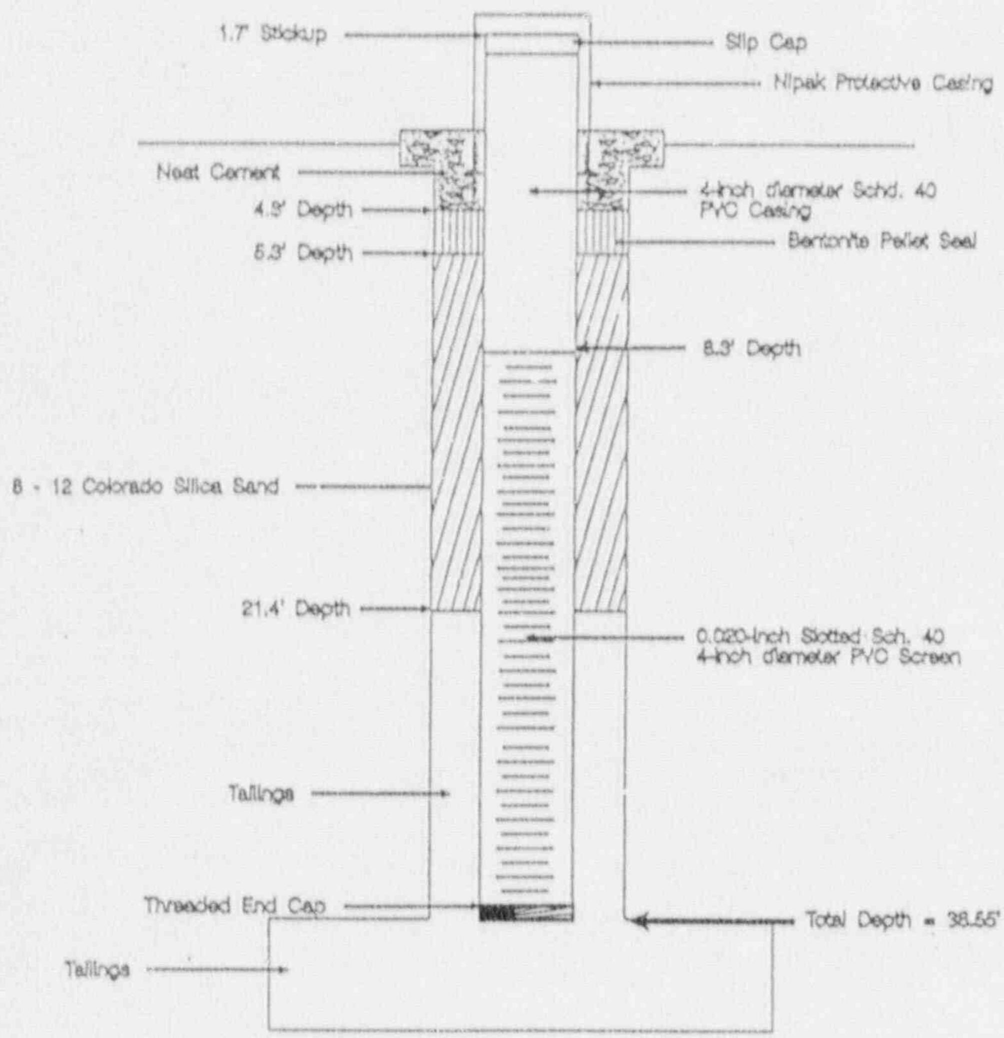


NOT TO SCALE

WESTERN TECHNOLOGIES INC.

DATE: July 31, 1990	Project Number: 769-0K-041	PLATE: B-15

WELL COMPLETION DIAGRAM
PW-4-OB-A

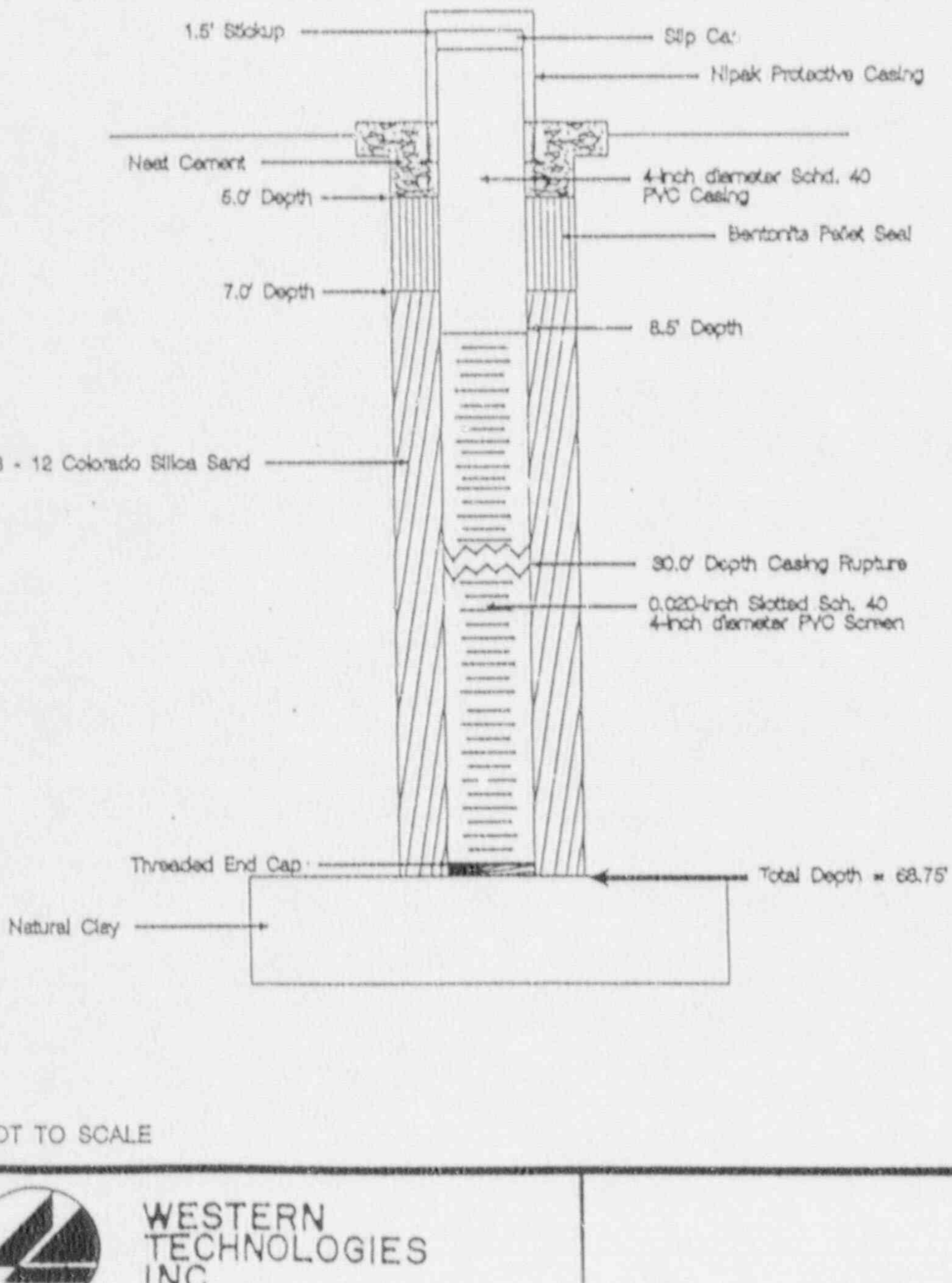


NOT TO SCALE

WESTERN TECHNOLOGIES INC.

	DATE: July 31,1990	Project Number: 769-OK-041	PLATE: B-16

WELL COMPLETION DIAGRAM
PW-4-OB-B

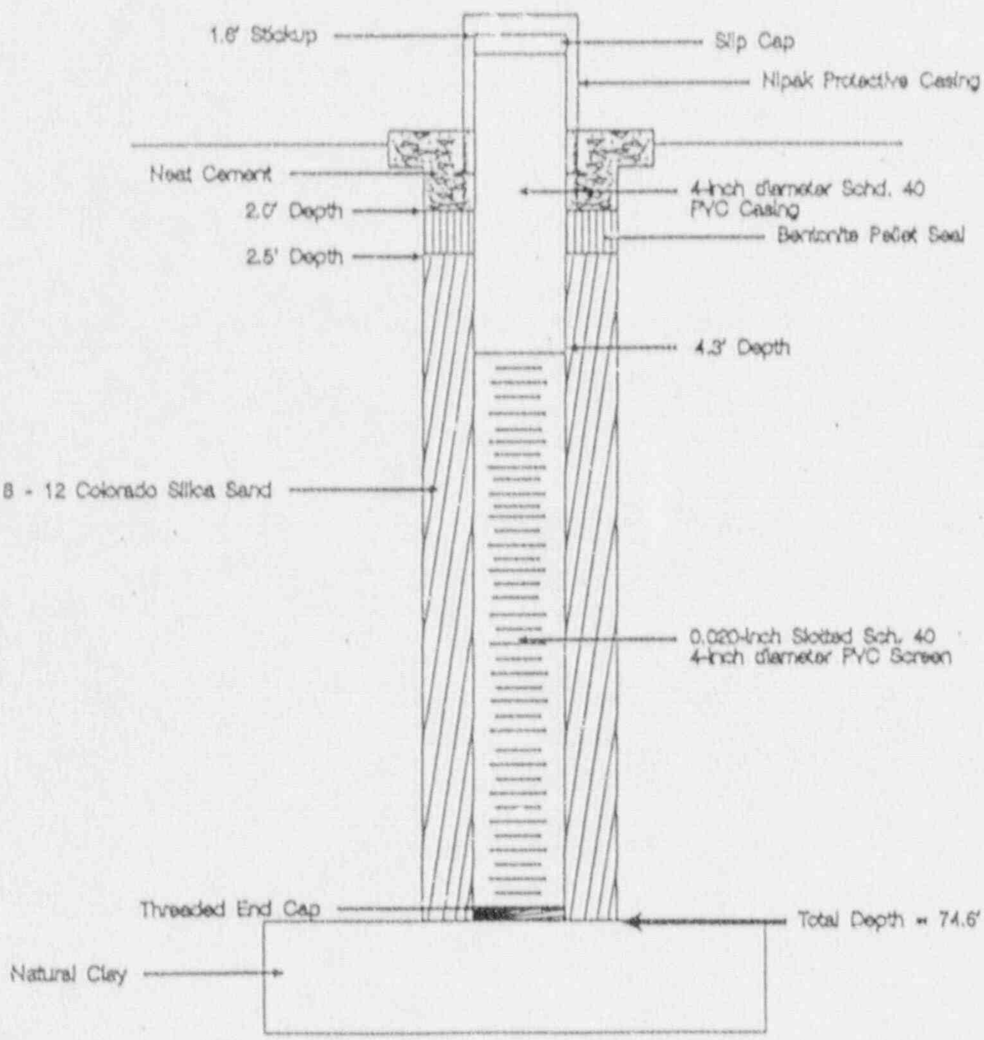


NOT TO SCALE

WESTERN TECHNOLOGIES INC.

DATE: July 31, 1990	Project Number: 769-0K-041	PLATE: B-17

WELL COMPLETION DIAGRAM
PW-5

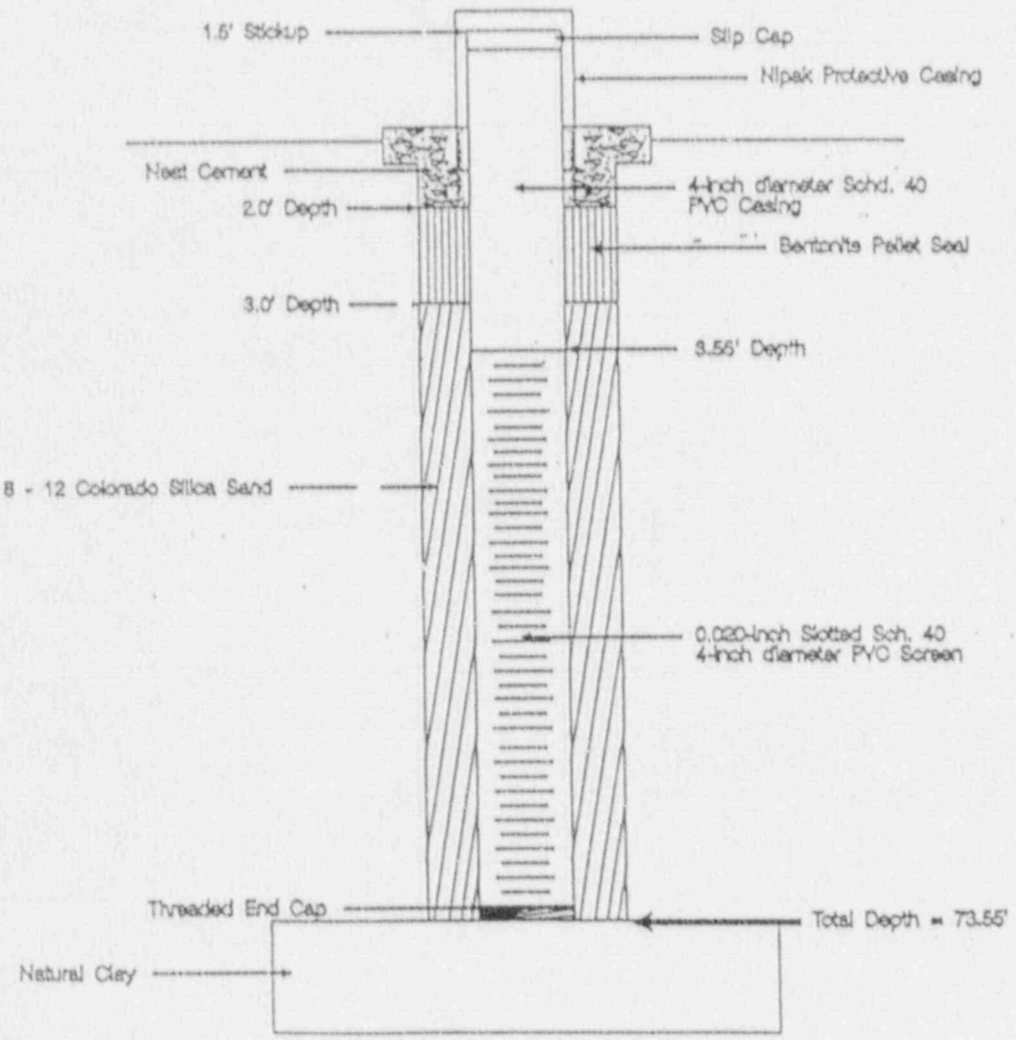


NOT TO SCALE

WESTERN TECHNOLOGIES INC.

	DATE: July 31,1990	Project Number: 769-0K-041	PLATE: B-18

WELL COMPLETION DIAGRAM
PW-6

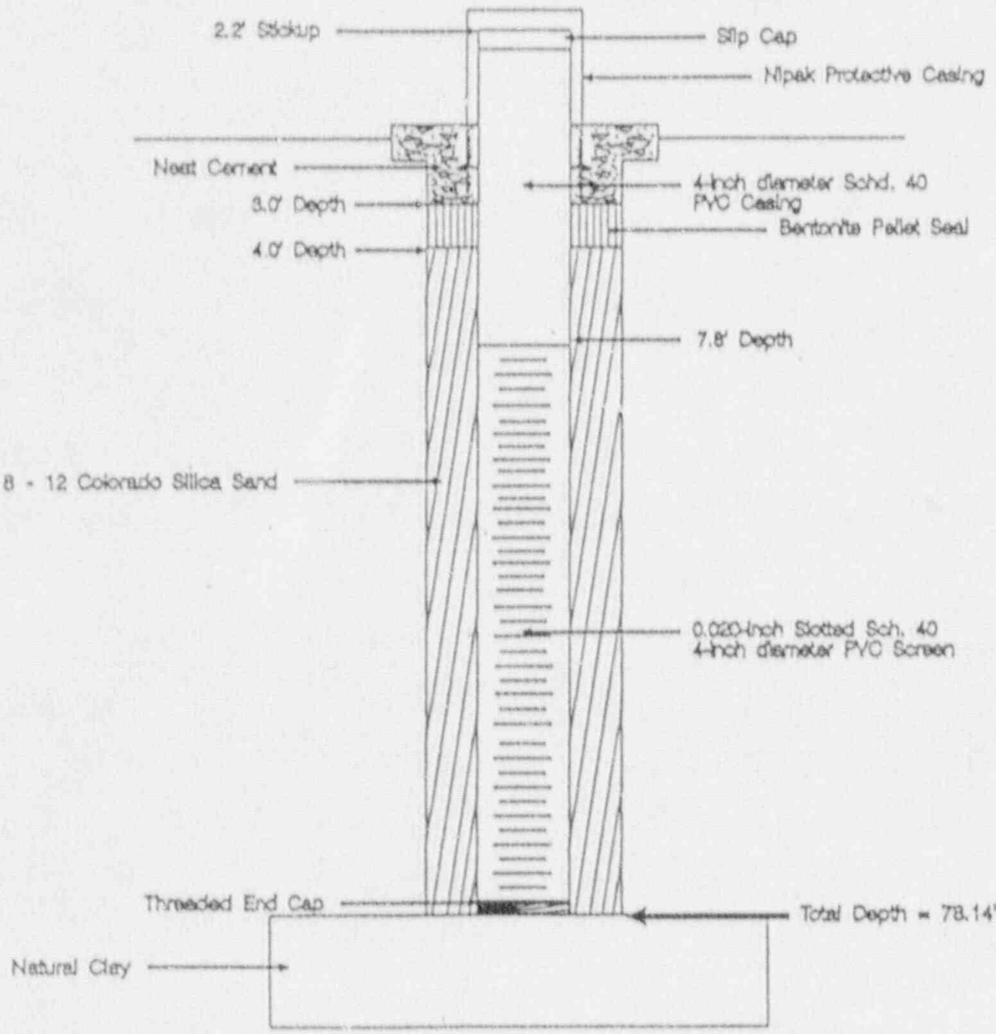


NOT TO SCALE

WESTERN TECHNOLOGIES INC.

DATE: July 31, 1990	Project Number: 769-0K-041	PLATE: B-19

WELL COMPLETION DIAGRAM
PW-7

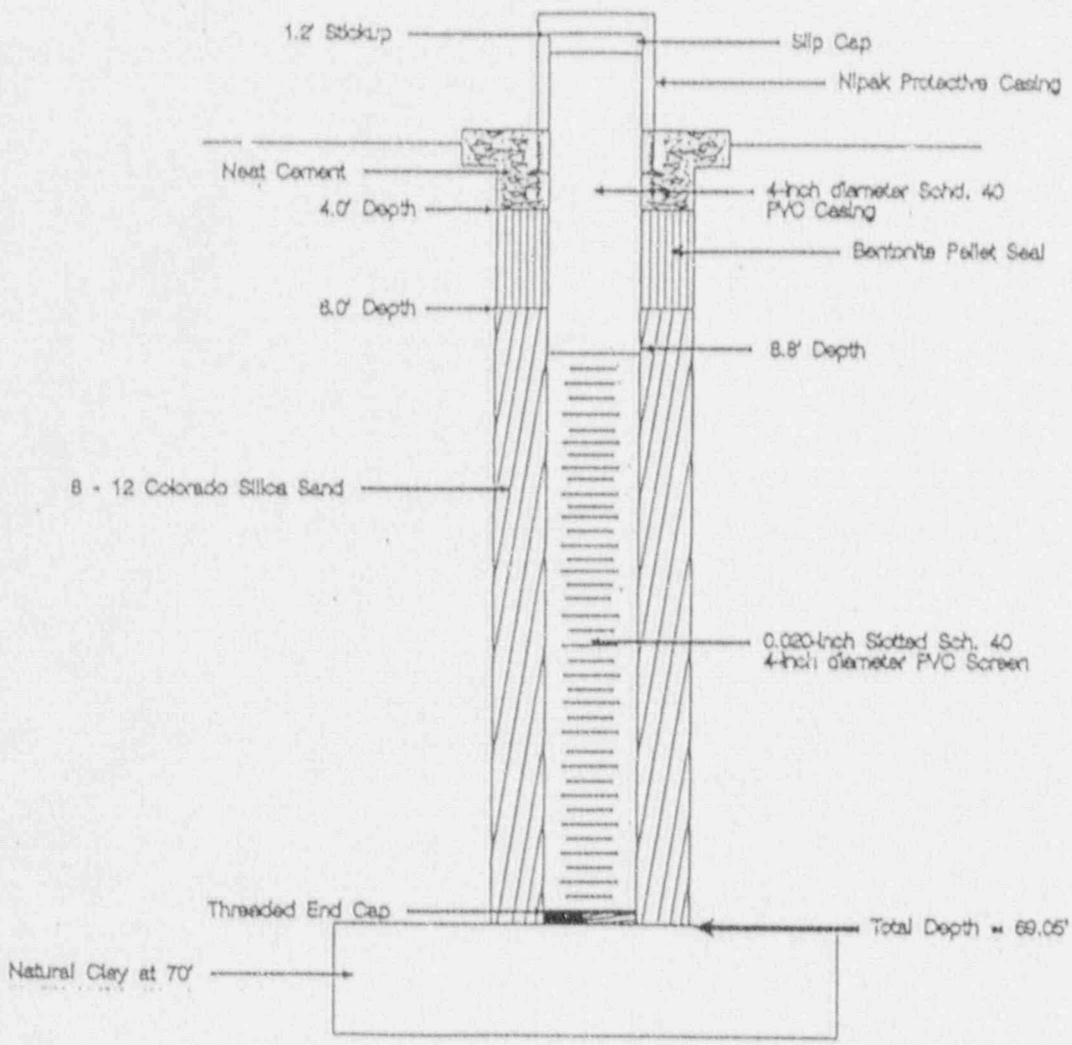


NOT TO SCALE

WESTERN
TECHNOLOGIES
INC.

	DATE: July 31,1990	Project Number: 769-0K-41	PLATE: B-2

WELL COMPLETION DIAGRAM
PW-8

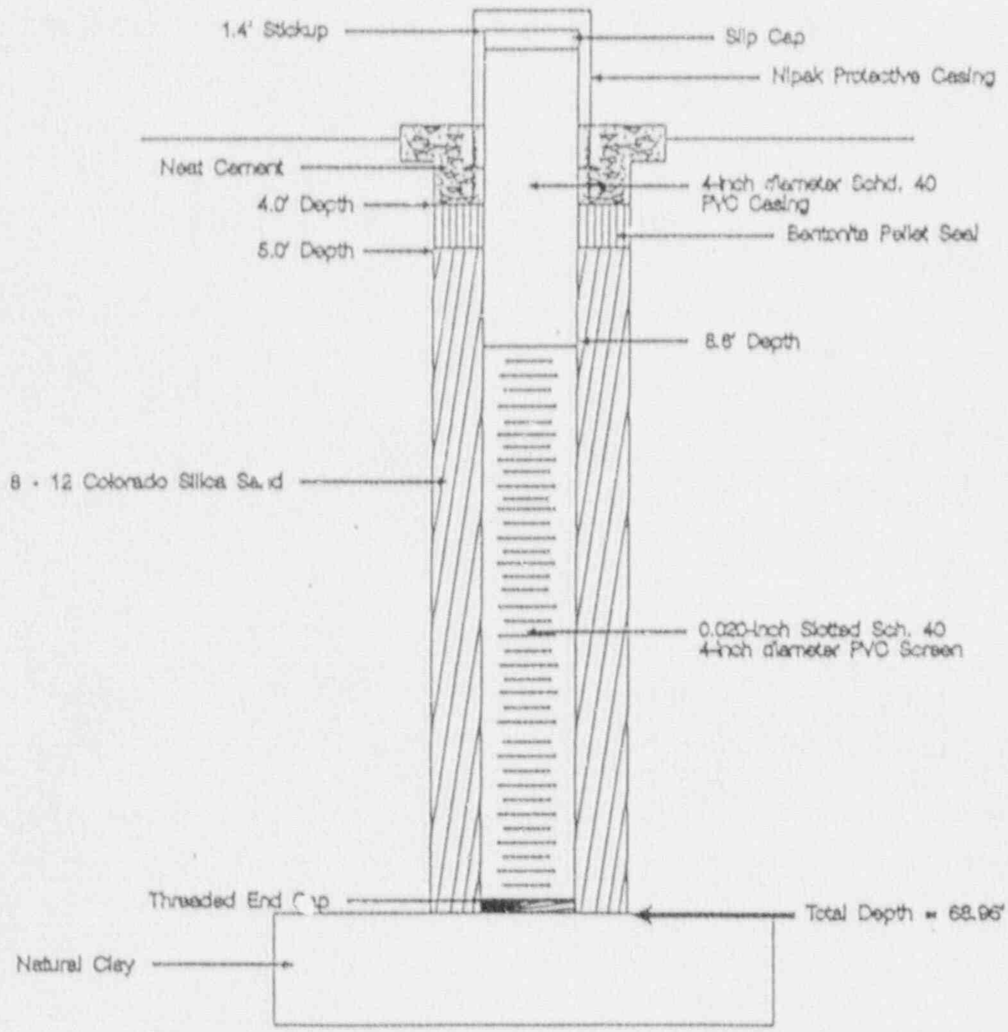


NOT TO SCALE

WESTERN TECHNOLOGIES INC.

	DATE: July 31, 1990	Project Number: 769-0K-41	PLATE: B-21

WELL COMPLETION DIAGRAM
PW-9

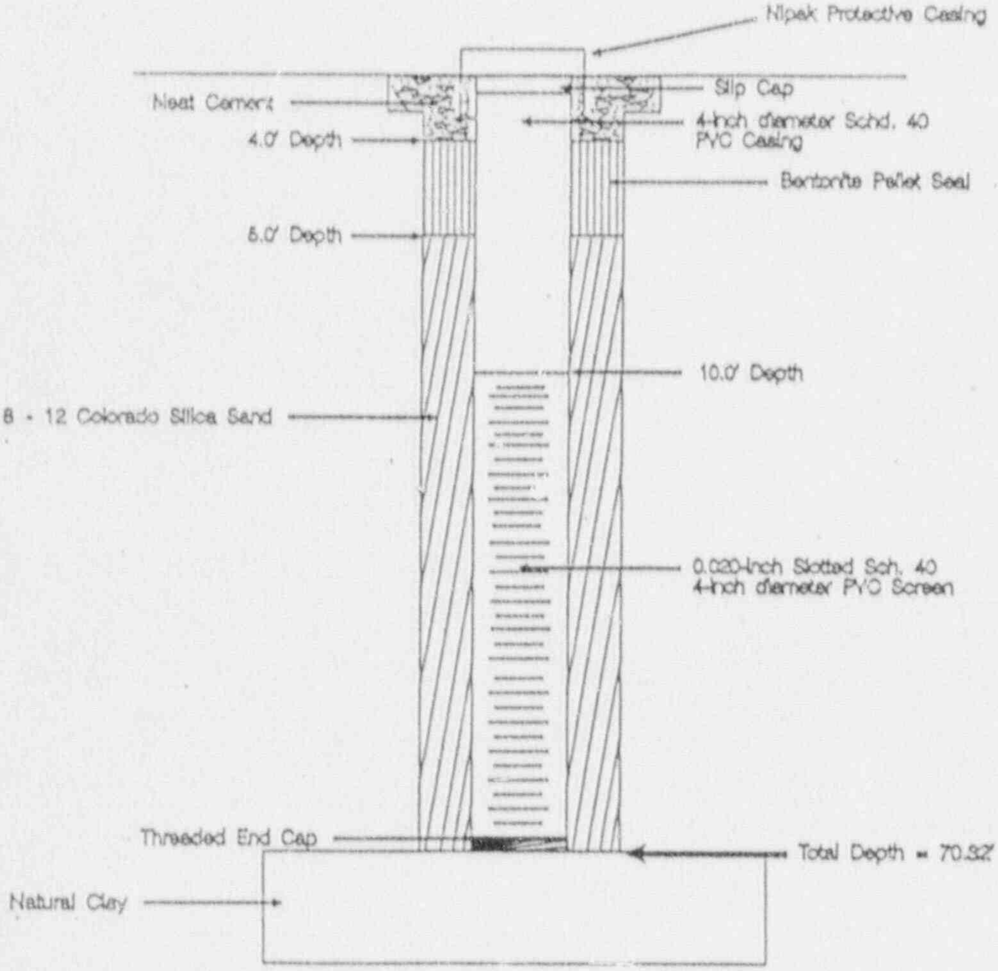


NOT TO SCALE

WESTERN TECHNOLOGIES INC.

	DATE: July 31, 1990	Project Number: 769-0K-41	PLATE: B-22

WELL COMPLETION DIAGRAM
PW-10

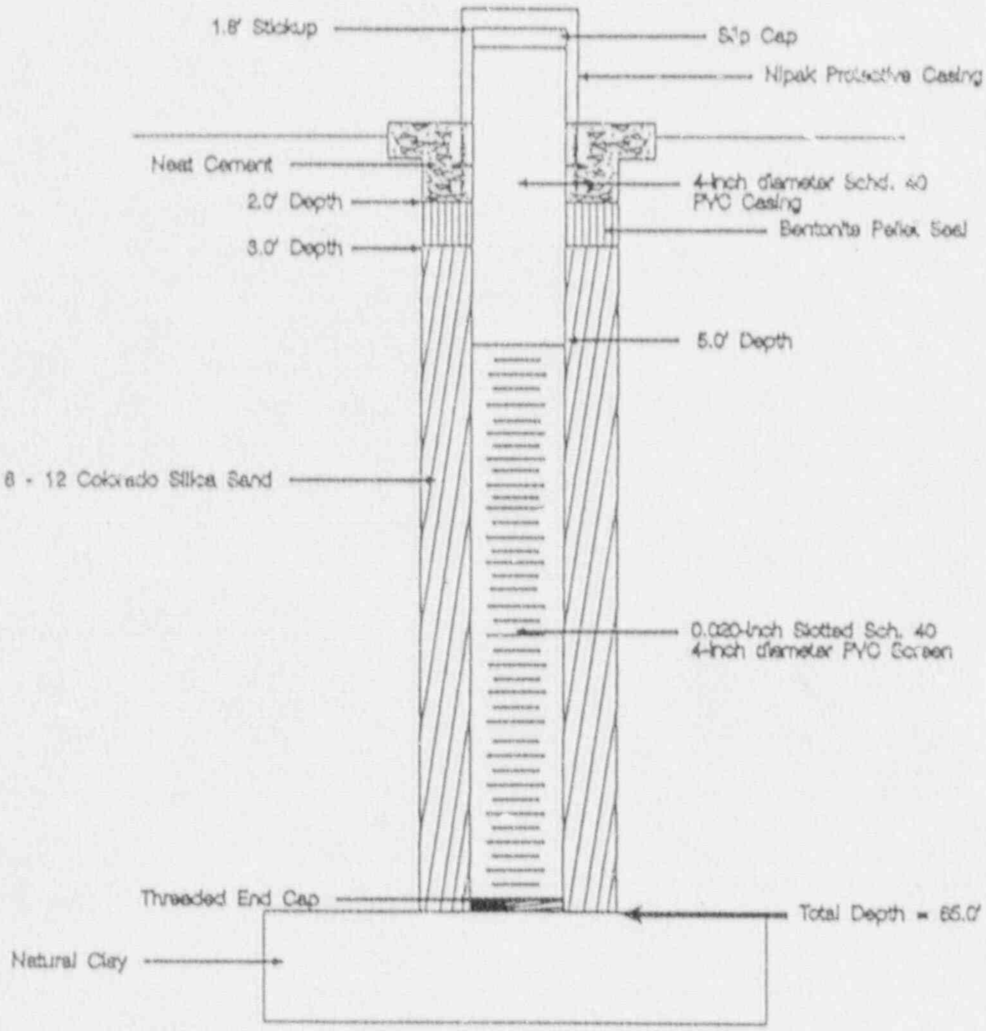


NOT TO SCALE

WESTERN TECHNOLOGIES INC.

	DATE: July 31, 1990	Project Number: 769-0K-041	PLATE: B-23

WELL COMPLETION DIAGRAM
PW-11

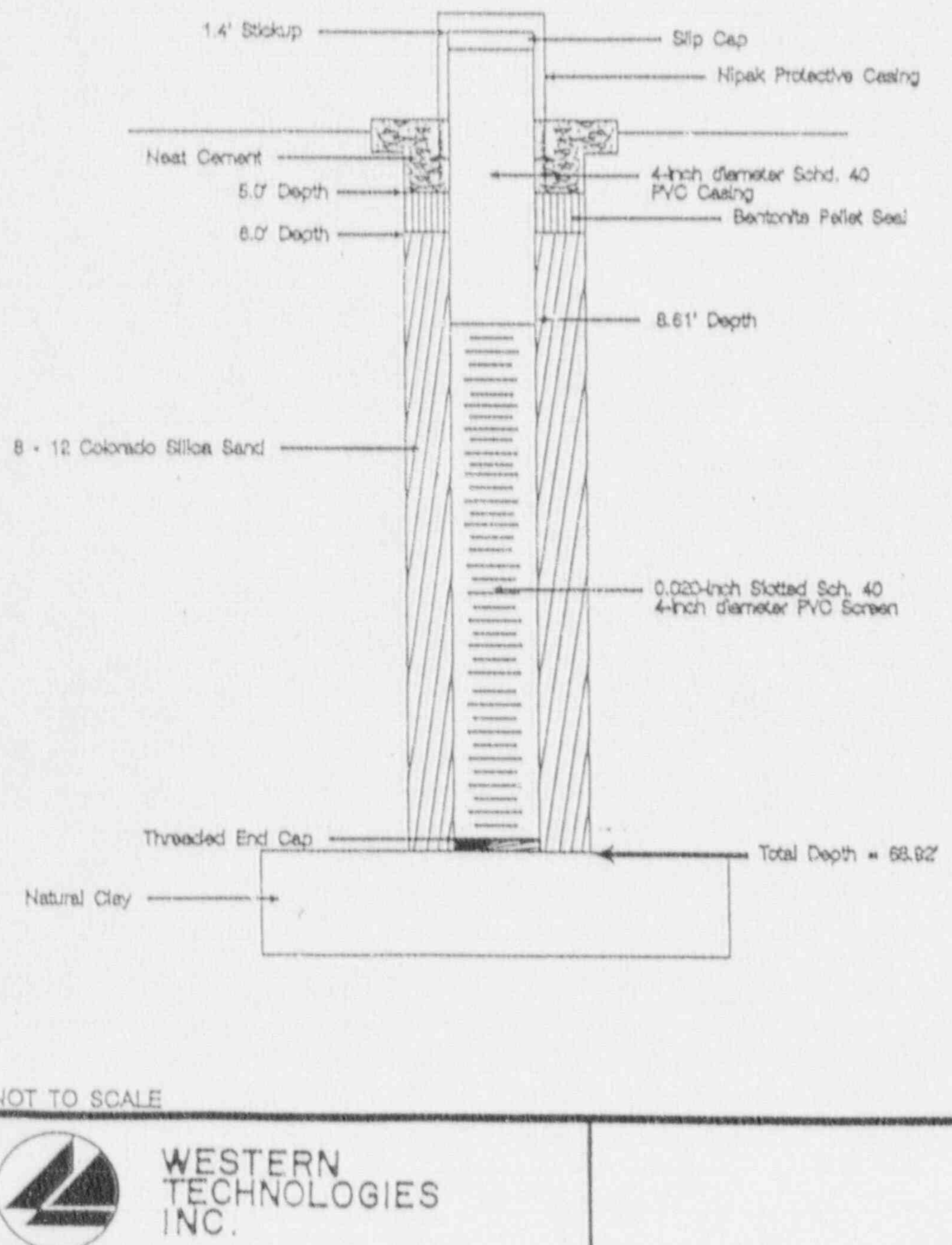


NOT TO SCALE

WESTERN TECHNOLOGIES INC.

	DATE: July 31, 1990	Project Number: 769-0K-041	PLATE: B-24

WELL COMPLETION DIAGRAM
PW-12

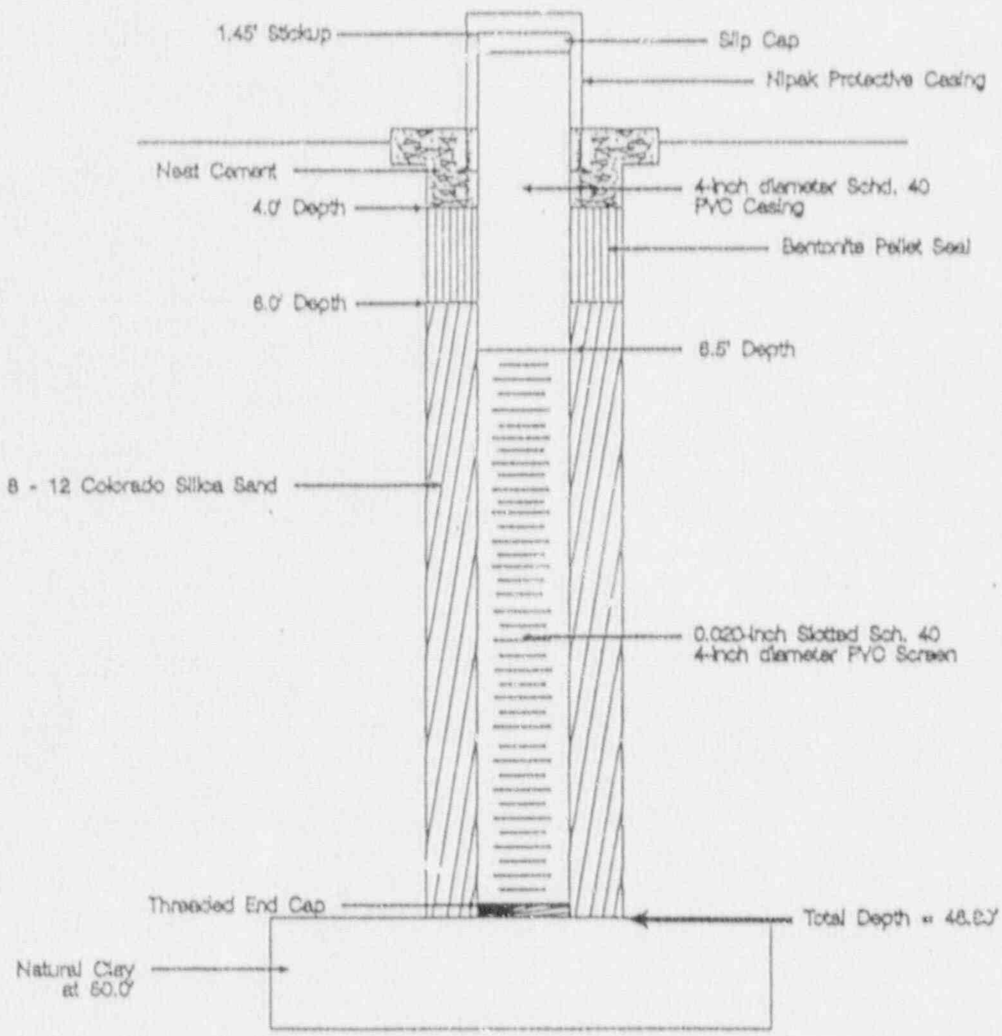


NOT TO SCALE

WESTERN TECHNOLOGIES INC.

DATE: July 31, 1990 | Project Number: 769-0K-041 | PLATE: B-25

WELL COMPLETION DIAGRAM
PW-13

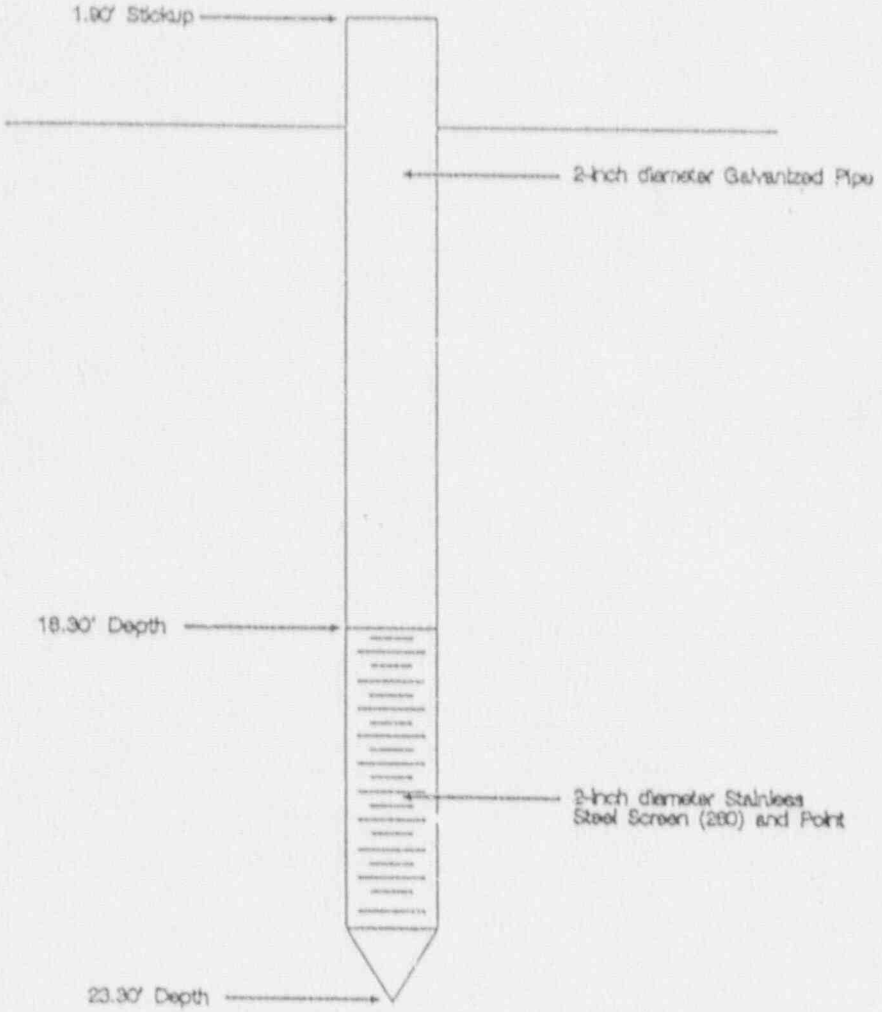


NOT TO SCALE

WESTERN TECHNOLOGIES INC.

DATE: July 31, 1990	Project Number: 769-0K-041	PLATE: B-2

WELL POINT DIAGRAM
WP-1

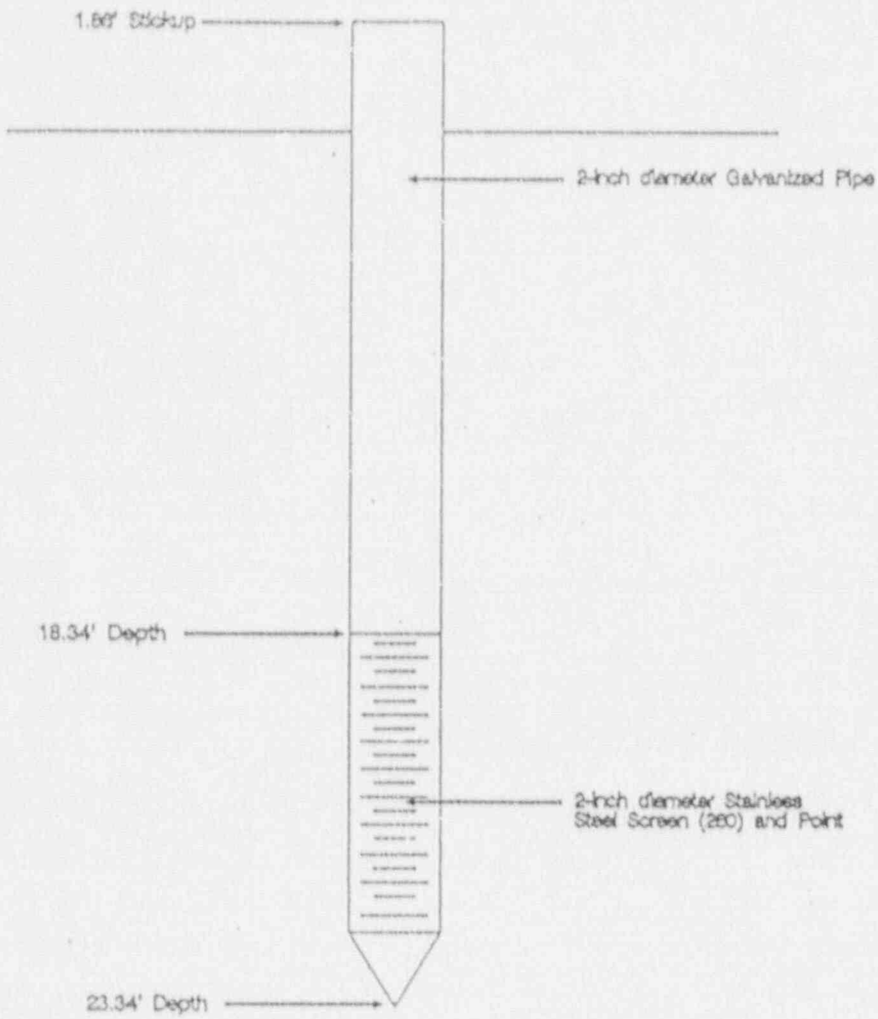


NOT TO SCALE

WESTERN TECHNOLOGIES INC.

	DATE: July 31, 1990	Project Number: 769-0K-041	PLATE: B-27

WELL POINT DIAGRAM
WP-2



NOT TO SCALE

WESTERN TECHNOLOGIES INC.

	DATE: July 31, 1990	Project Number: 769-0K-041	PLATE: B-28

EXHIBIT 2

BARRINGER LABORATORIES INC.

15000 W. 6TH AVE., SUITE 300
GOLDEN, COLORADO 80401
PHONE (303) 277-1687

1455 DEMING WAY, SUITE 15
SPARKS, NEVADA 89431
PHONE (702) 358-1158

17-Aug-90

Dale Edwards
ATLAS MINERALS
P.O. Box 1207
Moab, UT 84532

Attn:
Project:

Received: 19-Jul-90 10:41
PO #: A-7025

Job: 902820E Status: Final

Sample Type: Water

Sample Id	Na Dissolved mg/l	Cl mg/l	SO4 mg/l	NO3 as N mg/l	Cr Dissolved mg/l	Pb Dissolved mg/l
PW Comp. #1	5220	1130	17600	73.3	<0.01	0.34
PW Comp. #2	5100	1160	15600	51.6	<0.01	0.34

Sample Id	Mo Dissolved mg/l	Ni Dissolved mg/l	Ag Dissolved mg/l	V Dissolved mg/l	Se Dissolved mg/l	TDS mg/l
PW Comp. #1	1.01	0.24	0.02	3.04	0.29	25100
PW Comp. #2	0.73	0.19	0.03	2.94	0.23	22900

Sample Id	pH unit	Gross Alpha Dissolved pCi/l	Error 2σ*	Gross Beta Dissolved pCi/l	Error 2σ*	Ra-226 Dissolved pCi/l	Error 2σ*
PW Comp. #1	7.39	26000	±1000	16500	±400	35	±3
PW Comp. #2	7.35	24000	±1000	15000	±400	30	±2

Sample Id	Ra-228 Dissolved pCi/l	Error 2σ*	U Dissolved mg/l
PW Comp. #1	1.8	±1.3	22.9
PW Comp. #2	2.6	±1.5	22.0

PW Comp. #1 : volume weighted sample
PW Comp #2 : equivalent volume sample, not used in calculation for mass of constituents

BARRINGER LABORATORIES INC.
15000 W. 6TH AVE., SUITE 300
GOLDEN, COLORADO 80401
PHONE (303) 277-1687

6-Nov-90

Dale Edwards
ATLAS MINERALS
P.O. Box 1207
Moab, UT 84532

Page: 1
Copy: 1 of 2
Set : 1

Attn:
Project:

Received: 2-Oct-90 13:23
PO #: A-7043

Job: 903290E   Status: Final

Sample Type: Water

Sample	Na Dissolved mg/l	Cl mg/l	SO4 mg/l	NO3 as N mg/l	Cr Dissolved mg/l	Pb Dissolved mg/l
#1 Comp	5100	1260	17200	85.4	<0.1	<0.02

Sample	Mo Dissolved mg/l	Ni Dissolved mg/l	Ag Dissolved mg/l	V Dissolved mg/l	Se Dissolved mg/l	TDS mg/l
#1 Comp	1.79	0.25	0.02	0.33	0.23	24300

Sample	pH unit	Gross Alpha Dissolved pCi/l	Error 2σ*	Gross Beta Dissolved pCi/l	Error 2σ*	Ra-226 Dissolved pCi/l	Error 2σ*
#1 Comp	7.22	12000	±1000	1200	±200	22	±2

Sample	Ra-228 Dissolved pCi/l	Error 2σ*	U Dissolved mg/l
#1 Comp	1.1	±0.8	19.3

EXHIBIT 3

CALCULATIONS OF CONSTITUENT MASS RECOVERED FROM TAILINGS

Prepared by:

Dale L Edwards

RECEIVED
DEC 14 1998
Regulatory Affairs

Ra^{228}

Assays 1.1 & 1.8 = 1.45 pci/L Avg.

July Gallons 117,092.71 gal

$$\frac{(T\tfrac{1}{2} \times At\ wgt)\ Ra^{226}}{(T\tfrac{1}{2} \times At\ wgt)\ Element}$$

$$\frac{(1602y)(226)}{(5.75y)(228)} = \frac{362052}{1311} = 276\ ci/gm\ Ra^{228}$$

$\frac{1\,ci}{ci/gm}$ = gm 1 ci = .0036 gm Ra^{228}

1 pci = 3.6×10^{-15} gm Ra^{228}

$(3.6 \times 10^{-15}\ gm/pci)(1.45\ pci) = 5.22 \times 10^{-15}\ gm$

$$\frac{(5.22 \times 10^{-15}\ gm)(3.785\ L/gal)}{453.6\ g/lb} = 4.36 \times 10^{-17}\ lbs/gal$$

July $(4.36 \times 10^{-17}\ lbs/gal)(117{,}092.71\ gal) = \underline{5.10} \times 10^{-12}\ lbs$

Aug. $(4.36 \times 10^{-17}\ lbs/gal)(159{,}640.6\ gal) = \underline{6.96} \times 10^{-12}\ lbs$

Sept. $(4.36 \times 10^{-17}\ lbs/gal)(152{,}844.78\ gal) = \underline{6.66} \times 10^{-12}\ lbs$

Oct. $(4.36 \times 10^{-17}\ lbs/gal)(142{,}599.2\ gal) = \underline{6.21} \times 10^{-12}\ lbs$

Nov. $(4.36 \times 10^{-17}\ lbs/gal)(136{,}299.3\ gal) = \underline{5.94} \times 10^{-12}\ lbs$

Est. Dec. $(4.36 \times 10^{-17}\ lbs/gal)(132{,}000\ gal) = \underline{5.76} \times 10^{-12}\ lbs$

Ra^{226}

Assays 22 & 35 = 29 pci/L Avg.

July Gallons 117,092.71 gal

$1\ g\ Ra^{26} = 1\ ci\ Ra^{226}$

$29\ pci = 2.9\times10^{-11}\ ci = 2.9\times10^{-11}\ gm$

$$\frac{(2.9\times10^{-11}\ gm)(3.785\ L/gal)}{453.6\ g/lb} = 2.42\times10^{-13}\ lbs/gal$$

$(2.42\times10^{-13}\ lbs/gal)(117,092.71\ gal) = \underline{2.83\times10^{-8}}\ lbs$

Aug. Gallons 159,640.6 gal

$(2.42\times10^{-13}\ lbs/gal)(159,640.6\ gal) = \underline{3.86}\times10^{-8}\ lbs$

Sept. Gallons 152,844.78 gal

$(2.42\times10^{-13}\ lbs/gal)(152,844.78\ gal) = \underline{3.70}\times10^{-8}\ lbs$

Oct. Gallons 142,599.2 gal

$(2.42\times10^{-13}\ lbs/gal)(142,599.2\ gal) = \underline{3.45}\times10^{-8}\ lbs$

Nov. Gallons 136,299.3 gal

$(2.42\times10^{-13}\ lbs/gal)(136,299.3\ gal) = \underline{3.30}\times10^{-8}\ lbs$

Est. Dec. Gallons 132,000 gal

$(2.42\times10^{-13}\ lbs/gal)(132,000\ gal) = \underline{3.19}\times10^{-8}\ lbs$

U

Assays 19.3 & 22.9 = 21.1 mg/L Avg.

July Gallons 117,092.71 gal

$$\frac{(21.1\ mg)(3.785\ L/gal)}{(1000\ mg/g)(453.6\ g/lb)} = .0002\ lbs/gal$$

(.0002 lbs/gal)(117,092.71 gal) = __21__ lbs

Aug. Gallons 159,640.6 gal

(.0002 lbs/gal)(159,640.6 gal) = __28__ lbs

Sept. Gallons 152,844.78 gal

(.0002 lbs/gal)(152,844.78 gal) = __27__ lbs

Oct. Gallons 142,599.2 gal

(.0002 lbs/gal)(142,599.2 gal) = __25__ lbs

Nov. Gallons 136,299.3 gal

(.0002 lbs/gal)(136,299.3 gal) = __24__ lbs

Est. Dec. Gallons 132,000 gal

(.0002 lbs/gal)(132,000 gal) = __23__ lbs

TDS

Assays 24,300 & 25,100 = 24,700 mg/L Avg.

July Gallons 117,092.71 gal

$$\frac{(24{,}700\ \text{mg})(3.785\ \text{L/gal})}{(1000\ \text{mg/g})(453.6\ \text{g/lb})} = .2061\ \text{lbs/gal}$$

(.2061 lbs/gal)(117,092.71 gal) = <u>24,135</u> lbs

Aug. Gallons 159,640.6 gal

(.2061 lbs/gal)(159,640.6 gal) = <u>32,903</u> lbs

Sept. Gallons 152,844.78 gal

(.2061 lbs/gal)(152,844.78 gal) = <u>31,502</u> lbs

Oct. Gallons 142,599.2 gal

(.2061 lbs/gal)(142,599.2 gal) = <u>29,390</u> lbs

Nov. Gallons 136,299.3 gal

(.2061 lbs/gal)(136,299.3 gal) = <u>28,091</u> lbs

Est. Dec. Gallons 132,000 gal

(.2061 lbs/gal)(132,000 gal) = <u>27,205</u> lbs

Se

Assays .23 & .29 = .26 mg/L Avg.

July Gallons 117,092.71 gal

$$\frac{(.26\ mg)(3.785\ L/gal)}{(1000\ mg/g)(453.6\ g/lb)} = 2.17 \times 10^{-6}\ lbs/gal$$

$(2.17 \times 10^{-6}\ lbs/gal)(117,092.71) = \underline{.25}\ lbs$

Aug. Gallons 159,640.6 gal

$(2.17 \times 10^{-6}\ lbs/gal)(159,640.6\ gal) = \underline{.35}\ lbs$

Sept. Gallons 152,844.78 gal

$(2.17 \times 10^{-5}\ lbs/gal)(152,844.78\ gal) = \underline{.33}\ lbs$

Oct. Gallons 142,599.2 gal

$(2.17 \times 10^{-6}\ lbs/gal)(142,599.2\ gal) = \underline{.31}\ lbs$

Nov. Gallons 136,299.3 gal

$(2.17 \times 10^{-6}\ lbs/gal)(136,299.3\ gal) = \underline{.30}\ lbs$

Dec. Gallons 132,000 gal

$(2.17 \times 10^{-6}\ lbs/gal)(132,000\ gal) = \underline{.29}\ lbs$

✓

Assays .33 + 3.04 = 1.69 mg/L Avg.

July Gallons 117,092.71 gal

$\frac{(1.69\ \ )(3.785\ L/gal)}{(1000\ mg/g)(453.6\ g/lb)} = 1.41 \times 10^{-5}$ lbs/gal

$(1.41 \times 10^{-5}$ lbs/gal$)(117,092.71$ gal$) =$ <u>1.65</u> lbs

Aug. Gallons 159,640.6 gal

$(1.41 \times 10^{-5}$ lbs/gal$)(159,640.6$ gal$) =$ <u>2.25</u> lbs

Sept. Gallons 152,844.78 gal

$(1.41 \times 10^{-5}$ lbs/gal$)(152,844.78$ gal$) =$ <u>2.16</u> lbs

Oct. Gallons 142,599.2 gal

$(1.41 \times 10^{-5}$ lbs/gal$)(142,599.2$ gal$) =$ <u>2.01</u> lbs

Nov. Gallons 136,299.3 gal

$(1.41 \times 10^{-5}$ lbs/gal$)(136,299.3$ gal$) =$ <u>1.92</u> lbs

Dec. Gallons 132,000 gal

$(1.41 \times 10^{-5}$ lbs/gal$)(132,000$ gal$) =$ <u>1.86</u> lbs

Ag

Assays .02 & .02 = .02 mg/L Ag.

July Gallons 117,092.71 gal

$$\frac{(.02\ mg)(3.785\ L/gal)}{(1000\ mg/g)(453.6\ g/lb)} = 1.67\times10^{-7}\ lbs/gal$$

$(1.67\times10^{-7}\ lbs/gal)(117,092.71\ gal) = .020\ lbs$

Aug. Gallons 159,640.6 gal

$(1.6.\times10^{-7}\ lbs/gal)(159,640.6\ gal) = .027\ lbs$

Sept. Gallons 152,844.78 gal

$(1.67\times10^{-7}\ lbs/gal)(152,844.78\ gal) = .026\ lbs$

Oct. Gallons 140,599.2 gal

$(1.67\times10^{-7}\ lbs/gal)(140,599.2\ gal) = .024\ lbs$

Nov. Gallons 136,299.3 gal

$(1.67\times10^{-7}\ lbs/gal)(136,299.3\ gal) = .023\ lbs$

Dec. Gallons 132,000 gal

$(1.67\times10^{-7}\ lbs/gal)(132,000\ gal) = .022\ lbs$

Ni

Assays .25 & .24 = .25 mg/L Avg.

July Gallons 117,092.71 gal

$$\frac{(.25\ mg)(3.785\ L/gal)}{(1000\ mg/g)(453.6\ g/lb)} = 2.09 \times 10^{-6}\ lbs/gal$$

$(2.09 \times 10^{-6}\ lb/gal)(117,092.71\ gal) = \underline{.24}\ lbs$

Aug. Gallons 159,640.6 gal

$(2.09 \times 10^{-6}\ lbs/gal)(159,640.6\ gal) = \underline{.33}\ lbs$

Sept. Gallons 152,844.78 gal

$(2.09 \times 10^{-6}\ lbs/gal)(152,844.78\ gal) = \underline{.32}\ lbs$

Oct. Gallons 140,597.2 gal

$(2.09 \times 10^{-6}\ lbs/gal)(140,597.2\ gal) = \underline{.29}\ lbs$

Nov. Gallons 136,299.3 gal

$(2.09 \times 10^{-6}\ lbs/gal)(136,299.3\ gal) = \underline{.28}\ lbs$

Dec. Gallons 132,000 gal

$(2.09 \times 10^{-6}\ lbs/gal)(132,000\ gal) = \underline{.28}\ lbs$

1.74

Mo

Assays 1.79 & 1.03 = 1.41 mg/L Avg.

July Gallons 117,092.71 gal

$$\frac{(1.41 mg)(3.785 L/gal)}{(1000 mg/g)(453.6 g/lb)} = 1.18 \times 10^{-5} lbs/gal$$

$(1.18 \times 10^{-5} lb/gal)(117,092.71 gal) = \underline{1.38}$ lbs

Aug. Gallons 159,640.6 gal

$(1.18 \times 10^{-5} lbs/gal)(159,640.6 gal) = \underline{1.88}$ lbs

Sept. Gallons 152,844.78 gal

$(1.18 \times 10^{-5} lbs/gal)(152,844.78 gal) = \underline{1.80}$ lbs

Oct. Gallons 140,599.2 gal

$(1.18 \times 10^{-5} lbs/gal)(140,599.2 gal) = \underline{1.65}$ lbs

Nov. Gallons 136,299.3 gal

$(1.18 \times 10^{-5} lbs/gal)(136,299.3 gal) = \underline{1.60}$ lbs

Est. Dec. Gallons 132,000

$(1.18 \times 10^{-5} lbs/gal)(132,000) = \underline{1.55}$ lbs

9.86 lbs

Pb

Assays <.02 & .34 = .18 mg/L Avg.

July Gallons 117,092.71 gal

$$\frac{(.18\ mg)(3.785\ L/gal)}{(1000\ mg/g)(453.6\ g/lb)} = 1.50 \times 10^{-6}\ lbs/gal$$

$(1.5 \times 10^{-6}\ lbs/gal)(117,092.71\ gal) =$ <u>.18</u> lbs

Aug. Gallons 159,640.6 gal

$(1.5 \times 10^{-6}\ lbs/gal)(159,640.6\ gal) =$ <u>.24</u> lbs

Sept. Gallons 152,844.78 gal

$(1.5 \times 10^{-6}\ lbs/gal)(152,844.78\ gal) =$ <u>.23</u> lbs

Oct. Gallons 140,599.2 gal

$(1.5 \times 10^{-6}\ lbs/gal)(140,599.2\ gal) =$ <u>.21</u> lbs

Nov. Gallons 136,299.3 gal

$(1.5 \times 10^{-6}\ lbs/gal)(136,299.3\ gal) =$ <u>.21</u> lbs

Est. Dec. Gallons = 132,000 gal

$(1.5 \times 10^{-6}\ lbs/gal)(132,000\ gal) =$ <u>.20</u> lbs

1.27 lbs

Cr

Assays < .1 + < .01 = used .01 mg/L Avg.

July Gallons = 117,092.71 gal

$\frac{(.01 \text{ mg})(3.785 \text{ L/gal})}{(1000 \text{ mg/g})(453.6 \text{ g/lb})} = 8.3 \times 10^{-8}$ lbs/gal

$(8.3 \times 10^{-8}$ lbs/gal$)(117,092.71$ gal$) = .010$ lbs

Aug. Gallons = 159,640.6 gal

$(8.3 \times 10^{-8}$ lbs/gal$)(159,640.6$ gal$) = .013$ lbs

Sept. Gallons = 152,844.78 gal

$(8.3 \times 10^{-8}$ lbs/gal$)(152,844.8$ gal$) = .013$ lbs

Oct. Gallons = 140,599.2 gal

$(8.3 \times 10^{-8}$ lbs/gal$)(140,599.2$ gal$) = .012$ lbs

Nov. Gallons = 136,299.3 gal

$(8.3 \times 10^{-8}$ lbs/gal$)(136,299.3$ gal$) = .011$ lbs

Est. Dec. Gallons = 132,000 gal

$(8.3 \times 10^{-8}$ lbs/gal$)(132,000$ gal$) = .011$ lbs

.07 lbs

NO_3

Assays 85.4 & 73.3 = 79.4 mg/L Avg.

July Gallons = 117,092.71 gal

$$\frac{(79.4\ mg)(3.785\ L/gal)}{(1000\ mg/g)(453.6\ g/lb)} = .00066\ lbs/gal$$

(.00066 lbs/gal)(117,092.71 gal) = 78 lbs

Aug. Gallons = 159,640.6 gal

(.00066 lb/gal)(159,640.6 gal) = 106 lbs

Sept. Gallons = 152,844.78 gal

(.00066 lbs/gal)(152,844.78 gal) = 101 lbs

Oct. Gallons = 140,599.2 gal

(.00066 lbs/gal)(140,599.2 gal) = 93 lbs

Nov. Gallons = 136,299.3 gal

(.00066 lbs/gal)(136,299.3 gal) = 90 lbs

Est. Dec. Gallons = 132,000 gal

(.00066 lbs/gal)(132,000 gal) = 87 lbs

555 lbs

SO_4

Assays 17200 & 17600 = 17,400 mg/L Avg.

July Gallons = 117,092.71 gal

$$\frac{(17{,}400\ mg)(3.785\ L/gal)}{(1000\ mg/g)(453.6\ g/lb)} = .14519\ lbs/gal$$

(.14519 lbs/gal)(117,092.71 gal) = <u>17002</u> lbs

Aug. Gallons = 159,640.6 gal

(.14519 lbs/gal)(159,640.6 gal) = <u>23,179</u> lbs

Sept. Gallons = 152,844.78 gal

(.14519 lbs/gal)(152,844.78 gal) = <u>22,192</u> lbs

Oct. Gallons = 140,599.2 gal

(.14519 lbs/gal)(140,599.2 gal) = <u>20,414</u> lbs

Nov. Gallons = 136,299.3 gal

(.14519 lbs/gal)(136,299.3 gal) = <u>19,789</u> lbs

Est. Dec. Gallons = 132,000 gal

(.14519 lbs/gal)(132,000 gal) = <u>19,165</u> lbs

121,737 lbs [illegible]

Cl

Assays 1130 & 1260 = 1195 mg/L Avg

July Gallons = 117,092.71 gal

$$\frac{(1195 \text{ mg})(3.785 \text{ L/gal})}{(1000 \text{ mg/g})(453.6 \text{ g/lb})} = .00997 \text{ lbs/gal}$$

(.00997 lbs/gal)(117,092.71 gal) = **1168** lbs

Aug. Gallons = 159,640.6 gal

(.00997 lbs/gal)(159,640.6 gal) = **1592** lbs

Sept. Gallons = 152,844.78 gal

(.00997 lbs/gal)(152,844.78 gal) = **1524** lbs

Oct. Gallons = 140,599.2 gal

(.00997 lbs/gal)(140,599.2 gal) = **1402** lbs

Nov. Gallons = 136,299.3 gal

(.00997 lbs/gal)(136,299.3) = **1359** lbs

Est. Dec. Gallons = 132,000 gal

(.00997 lbs/gal)(132,000 gal) = **1316** lbs

8,361 lbs = 4.18 →

Na

Assays 5100 & 5220 = 5160 mg/L avg.

July Gallons = 117,092.71 gal

$$\frac{(5160\ mg)(3.785\ L/gal)}{(1000\ mg/g)(453.6\ g/lb)} = .04306\ lb/gal$$

(.04306 lbs/gal)(117,092.71 gal) = 5,042 lbs

Aug. Gallons = 159,640.6 gal

(.04306 lbs/gal)(159,640.6 gal) = 6,874 lbs

Sept. Gallons = 152,844.78 gal

(.04306 lbs/gal)(152,844.78) = 6582 lbs

Oct. Gallons = 140,599.2 gal

(.04306 lbs/gal)(140,599.2) = 6054 lbs

Nov. Gallons = 136,299.3 gal

(.04306 lbs/gal)(136,299.3) = 5869 lbs

Est. Dec. Gallons = 132,000 gal

(.04306 lbs/gal)(132,000) = 5684 lbs

36,105 lbs = 18.05 T

EXHIBIT 4

BARRINGER LABORATORIES INC.

15000 W. 6TH AVE., SUITE 300
GOLDEN, COLORADO 80401
PHONE: (303) 277-1687

1456 DEMING WAY, SUITE 15
SPARKS, NEVADA 89431
PHONE: (702) 358-1158

20-Jul-90

Dale Edwards
ATLAS MINERALS
P.O. Box 1207
Moab, UT 84532

Page: 1
Copy: 1 of 2
Set : 1

Attn:
Project:

Received: 15-Jun-90 12:24
PO #: A-6291

Job: 902614E Status: Final

Sample Type: Water

Sample Id	Cl mg/l	Cr Dissolved mg/l	Pb Dissolved mg/l	Mo Dissolved mg/l	Ni Dissolved mg/l	NO3 as N mg/l
PW-1	1440	<0.01	<0.02	4.57	0.10	21.4
North Sump	509	<0.01	<0.02	0.20	0.86	228

Sample Id	Se Dissolved mg/l	Ag Dissolved mg/l	Na Dissolved mg/l	TDS mg/l	SO4 mg/l	V Dissolved mg/l
PW-1	<0.001	0.02	4040	14200	8630	2.50
North Sump	<0.001	0.01	3170	30000	22100	0.05

Sample Id	Gross Alpha Dissolved pCi/l	Error 2σ*	Gross Beta Dissolved pCi/l	Error 2σ*	Ra-226 Dissolved pCi/l	Error 2σ*
PW-1	7700	±400	3300	±100	46	±2
North Sump	2300	±200	1400	±200	63	±3

Sample Id	Ra-228 Dissolved pCi/l	Error 2σ*	U Dissolved mg/l
PW-1	0.8	±1.1	16.1
North Sump	0.9	±0.8	8.13

~~B~~ SUMP RUNNING 36.5 ML/MIN
36.5 ML = .00964 GAL (.01) } 6/6/90