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WM-73

Department of Energy
Albuquerque Operations Office
P.O. Box 5400
Albuquerque, New Mexico 87115

FEB 08 1990

FEDERAL EXPRESS

Mr. Ramon E. Hall
Director, Uranium Recovery
Field Office
Region IV
U.S. Nuclear Regulatory Commission
730 Simms Street, Suite 100
Golden, CO 80401

Dear Mr. Hall:

Enclosed for review and comment are six copies of the draft Surveillance and Maintenance Plan for the Tuba City, Arizona, UMTRA Project site. Please provide your comments to this office by March 23, 1990. An UMTRA document review form is also enclosed for use in submitting your comments.

Should you have any questions, please contact Milt Scoutaris at (505) 845-5630 or Michael Abrams at (505) 845-4628.

Sincerely,

Charles G. Gardner for

Mark L. Matthews
Acting Project Manager
Uranium Mill Tailings Project Office

Enclosures (6)

cc w/enclosures:
S. Mann, EM-451, HQ (1)
M. Tucker, GJPO (1)

cc w/o enclosures:
M. Abrams, UMTRA
K. Agogino, JEG
D. Gillen, NRC-HQ

OFFICIAL DOCKET COPY

90-0276

UMTRA DOCUMENT REVIEW FORM

SECTION 1

Site: _____, Date: _____
Document: _____
Commentor: _____

Comment: Page _____

SECTION 2

Response: Page _____ By: _____ Date: _____

Plans for Implementation:

SECTION 3

Confirmation of Implementation:

Checked by: _____, Date: _____

Approved by: _____, Date: _____

INSTRUCTIONS FOR USE OF UMTRA DOCUMENT REVIEW FORM

1. Commentor to fill out Section 1 of form. Please use one form for each comment unless the comments consist of only one or two lines. If more than one comment is given on a form, those comments should be numbered.

2. Section 2 will be completed by either the TAC or the RAC and reviewed by DOE. A copy of this form will then be forwarded to the reviewing agency.

3. Section 3 will be completed by the DOE. For example, if plans for implementation specify that a comment received on a draft Remedial Action Plan will be implemented in the preliminary design, the DOE will verify that the preliminary design reflects the comment.

4. DOE will maintain a file for each site which will contain UMTRA Document Review Forms for all comments provided on all documents for that site.

Rec'd w/ltr 2/8/90

UMTRA-DOE/AL 350205
.0000

United States Department of Energy

Surveillance and Maintenance Plan for the Tuba City, Arizona, Disposal Site

Draft

February 1990

Box 7

Uranium Mill Tailings Remedial Action Project UMTRAP

90-0276

WM-73

SURVEILLANCE AND MAINTENANCE PLAN FOR THE DISPOSAL SITE, TUBA CITY, ARIZONA

DRAFT

February 1990

90-0276

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1.0 INTRODUCTION

1.1 LICENSING FOR LONG-TERM SURVEILLANCE AND MAINTENANCE

The Uranium Mill Tailings Radiation Control Act (UMTRCA) of 1978, Public Law 95-604, authorized the U.S. Department of Energy (DOE) to perform remedial action at the Tuba City, Arizona, uranium mill tailings site to reduce the potential public health impacts from the residual radioactivity in the tailings pile. Effective on March 29, 1985, the DOE, the Navajo Nation, and the Hopi Tribe entered into a cooperative agreement under the UMTRCA. The cooperative agreement set forth the terms and conditions for cooperative remedial action efforts between the DOE and the tribes. The U.S. Nuclear Regulatory Commission (NRC) and Navajo and Hopi tribes have concurred with the DOE's plan for remedial action at the Tuba City site, which was described and evaluated in an environmental assessment (DOE, 1986a) and remedial action plan (DOE, 1989a) prepared by the DOE.

Remedial action at the Tuba City site under Subpart A requirements of the U.S. Environmental Protection Agency's (EPA's) standards (40 CFR 192) will be completed in the spring of 1990. Groundwater restoration activities as required under Subpart B will be completed at a later date. Upon completion of Subpart A requirements for the remedial action, the DOE shall prepare and execute a withdrawal (custody) agreement with the Navajo Nation and the Hopi Tribe to restrict entry and public use, and to provide access to the disposal site, in perpetuity, for long-term surveillance and maintenance.

When the DOE's remedial action program at the Tuba City site is completed, Title I of the UMTRCA requires that the Tuba City permanent disposal site be cared for under a general license to be issued by the NRC (40 CFR 10). The Federal government will become the long-term care licensee. The general license will become effective upon NRC receipt of a long-term surveillance plan (LTSP) for the Tuba City disposal site that meets the requirements of the general license and after NRC concurrence in completion of remedial action.

As currently required by the UMTRCA, remedial action under Subpart A of the EPA standards (40 CFR 192) must be completed by September 30, 1994, with the exception of groundwater restoration activities as specified under Subpart B of 40 CFR 192. The authority to perform groundwater restoration activities is extended without limitation. The EPA issued proposed groundwater standards in 1987 (52 FR 3600). Until the final standards are promulgated, the UMTRCA requires that the DOE use the available proposed standards. As a result, the NRC is planning to allow licensing of Title I sites in two phases, if needed. The first phase of the licensing process would allow the DOE to complete all remedial actions required under Subpart A. The second phase will deal with groundwater restoration. The general license will become effective for the Tuba City disposal site when the groundwater restoration activities are completed. At that time, the LTSP will be amended, as appropriate.

This document describes the long-term surveillance and maintenance activities that will be carried out at the Tuba City uranium mill tailings disposal site to ensure that the disposal cell continues to function as designed.

1.2 THE TUBA CITY SURVEILLANCE AND MAINTENANCE PLAN

As required under a proposed amendment to 10 CFR 40 (53 FR 32396), the LTSP will provide details that discuss site ownership, disposal site conditions, the surveillance program, required follow-up inspections, and how and when emergency repairs, and, if necessary, planned maintenance, will be accomplished. The DOE has prepared detailed plans, procedures, and specifications for conducting long-term surveillance at UMTRA Project sites, which have been formalized in the "Guidance for UMTRA Project Surveillance and Maintenance" (Guidance Document) (DOE, 1986b). The procedures for implementing surveillance and maintenance activities, as described in the Guidance Document (DOE, 1986b) and used in preparing this SMP, are included in this document only when necessary to facilitate understanding of how a particular activity is carried out. Therefore, the rationale, plans, and detailed procedures of the Guidance Document should be considered part and parcel of this SMP.

This SMP provides the following information:

- Description of final site conditions and permanent surveillance and maintenance features.
- Groundwater and unsaturated zone (infiltration/radon barrier) monitoring.
- Site inspections.
- Maintenance or corrective action programs.
- Record keeping and reporting.

As part of the long-term surveillance and maintenance at the Tuba City disposal site, all disposal site information including as-built drawings, photographs (ground and aerial), inspection and contingency repair reports, maintenance records, monitoring data, and any agreements between the DOE and other agencies will be maintained in a permanent site file. The DOE will provide an annual report to the NRC that details all surveillance and maintenance activities, and certifies that site license requirements continue to be met and that the Tuba City disposal site continues to function as designed, in accordance with the EPA standards.

The DOE will conduct surveillance and maintenance activities until such time, if ever, the President designates another agency to perform these activities. The DOE Uranium Mill Tailings Remedial Action (UMTRA) Project Office will conduct surveillance and maintenance activities at the Tuba City site until the NRC issues Phase I of the license. At that time, the surveillance and maintenance duties will be transferred to the DOE Grand Junction Project Office.

This SMP is a draft document. Upon completion of the remedial action and the Tuba City Completion Report, a final SMP will be submitted to the NRC as a condition of licensing. The final SMP will contain detailed, site-specific details for long-term surveillance and maintenance at the Tuba City disposal site. The provisions of the final Tuba City SMP will become license conditions.

2.0 DISPOSAL SITE FINAL CONDITIONS

2.1 DESCRIPTION OF DISPOSAL SITE AREA

The Tuba City disposal site is in northeastern Arizona, six air miles east of Tuba City in Coconino County, Arizona, Sections 17 and 20, Township 32 North, Range 12 East, Gila and Salt River Meridian (Figure 2.1). The site area is within the Bennett Freeze Order Area on the Navajo Indian Reservation. Under the Bennett Freeze, development (and remedial action) on the Tuba City site requires joint approval by both the Navajo Nation and the Hopi Tribe (DOE, 1989a; 1986a).

The disposal site is about 600 feet south of U.S. Highway 160 and access to the site is provided by an unpaved road that runs south from the highway. The site area is on a gently sloping terrace approximately 6000 feet northwest of Moenkopi Wash, an intermittent stream that drains to the southwest into the Little Colorado River. Surface drainage in the area of the tailings site is to the southwest towards Moenkopi Wash. In the immediate site vicinity, Moenkopi Wash has dissected the terrain, forming cliffs, gullies, and alluvial terrace deposits. Wind erosion has resulted in the formation of active sand dunes and sandy soil deposits.

Land use in the immediate vicinity of the tailings site is limited to grazing. A 16-acre residential area constructed for mill workers by the former mill developers exists immediately northwest of the tailings site. Some of the housing units are occasionally occupied by local Navajos. Within two miles of the site are five traditional Navajo hogans and several Navajo camps. Other hogans and camps are scattered along both sides of U.S. Highway 160 between the tailings site and Tuba City. Residential sections of Tuba City have been expanding eastward toward the tailings site, but are still several miles west of the site (DOE, 1986a).

The primary activity of the remedial action was the stabilization of the tailings pile in place. All contaminated materials, including the demolished mill buildings, at and around the designated site were consolidated with the tailings. The disposal cell covers 50 acres and contains 1,400,000 in-place cubic yards of contaminated materials. The 60-acre disposal site was fenced to restrict access. A legal description of the Tuba City disposal site will be provided in the final SMP.

2.2 DISPOSAL CELL DESIGN

Relocated tailings from the adjacent subpiles and windblown and other contaminated materials were placed in the original tailings pile and compacted for stability. The above-grade disposal cell is roughly triangular in shape with a maximum side length of 1940 feet and a minimum side length of 1585 feet (Figure 2.2). The average height of the disposal cell is 33 feet with a maximum height of 44 feet (DOE, 1989a).

The 3.5-foot-thick infiltration/radon barrier (Figure 2.3) constructed of compacted clay was designed to protect groundwater by minimizing infiltration into the disposal cell and to reduce the radon emanations from the disposal

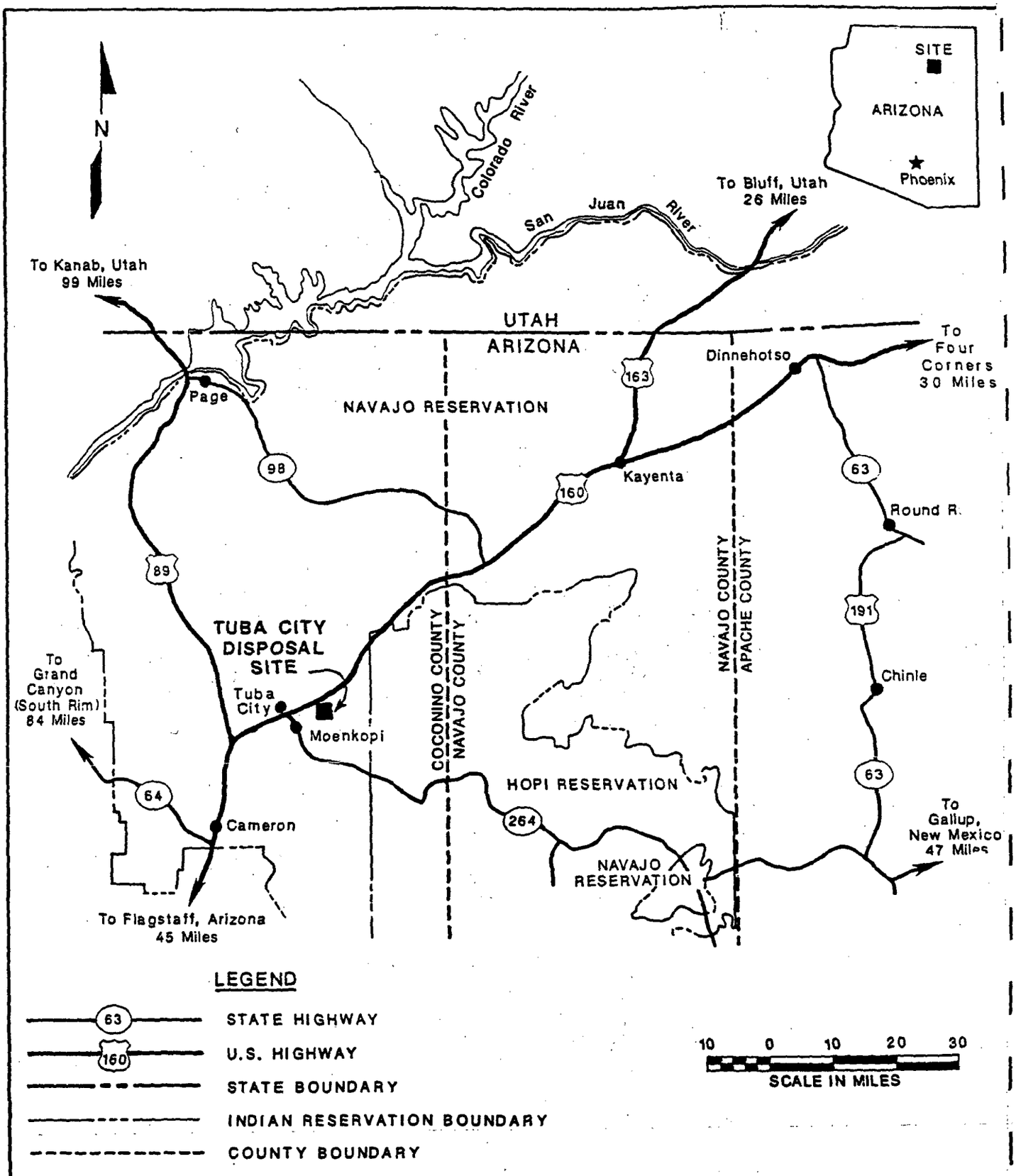

FIGURE 2.1

TUBA CITY, ARIZONA, DISPOSAL SITE LOCATION

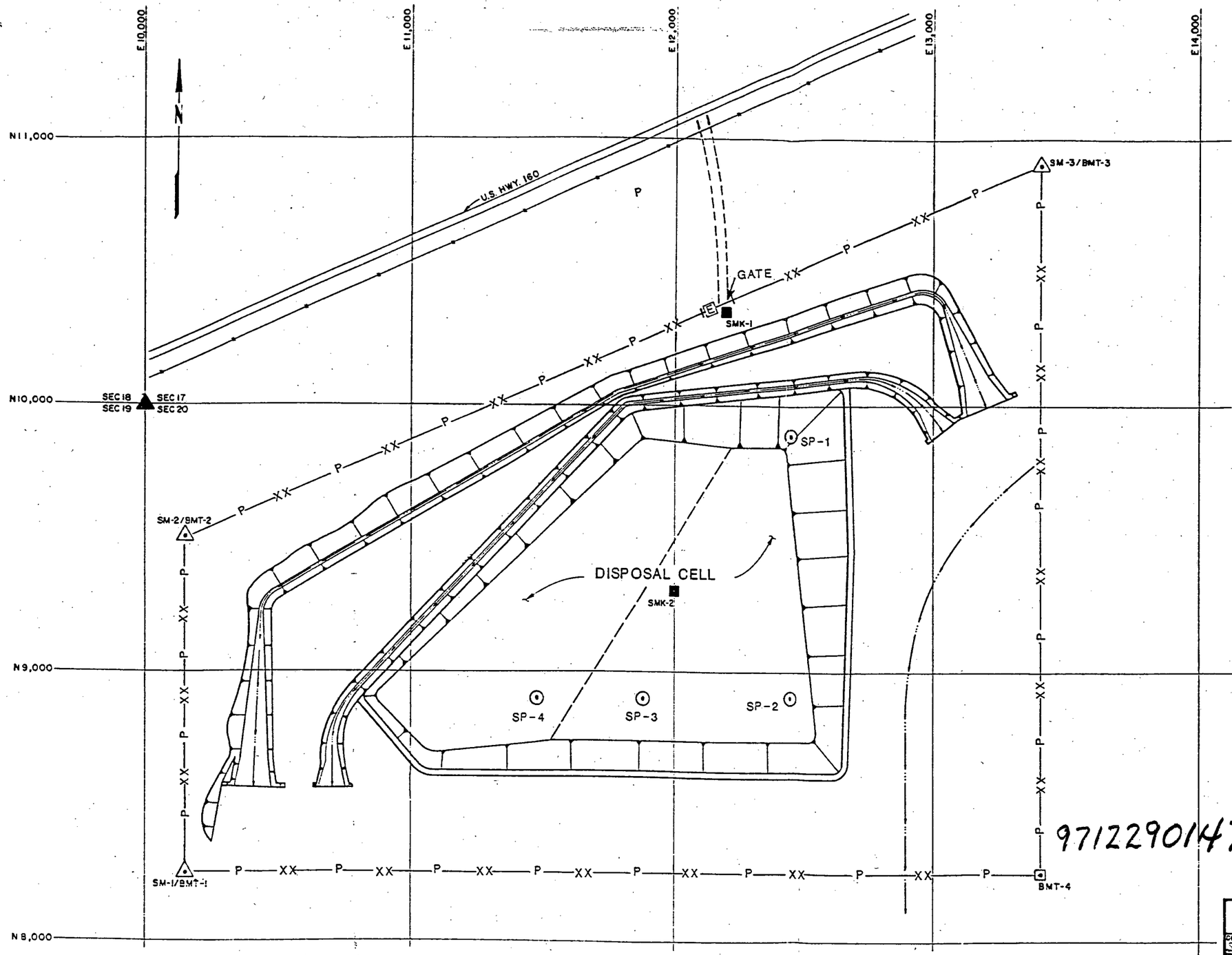

FIGURE 2.2
FINAL SITE CONDITIONS
TUBA CITY, ARIZONA, DISPOSAL SITE

TUBA CITY DISPOSAL SITE LOCATION:
T32N, R12E, SECS. 17&20, COCONINO COUNTY, ARIZONA

LEGEND

- SM-2/BMT-2 — SURVEY MONUMENT
- BMT-4 — BOUNDARY MONUMENT
- SMK-1 — SITE MARKER
- P — PERMETER SIGN
- E — ENTRANCE SIGN
- SP-1 — SETTLEMENT PLATE
- PROJECT SURVEY CONTROL POINT
- EXISTING ROADWAY
- N10,000 — CONSTRUCTION GRID COORDINATE
- PERMANENT DRAINAGE DITCH OR SWALE
- EXISTING FENCE
- DISPOSAL SITE FENCE (SITE BOUNDARY)

NOTES

1. MONITOR WELL LOCATIONS ARE SHOWN ON FIGURE 3.1
2. COORDINATES OF MONUMENTS, MARKERS, AND SETTLEMENT PLATES ARE LISTED IN TABLE 2.1
3. PERIMETER SIGN LOCATIONS ARE APPROXIMATE
4. SURVEY AND BOUNDARY MONUMENTS WILL BE OFFSET INSIDE FENCE CORNERS

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200 0 200 400
SCALE FEET

NO.	DATE	REVISIONS	BY	CK	ESD MGR.	CHIEF ENG.	GA MGR.	DOE APP.
4	8 9 89	ISSUED FOR CONSTRUCTION	—	—	—	—	—	—

U. S. DEPARTMENT OF ENERGY
ALBUQUERQUE, NEW MEXICO

DESIGNED — DRAWN BM — CHECKED — INSPECTED — RECOMMENDED — APPROVED FJ FELIZ 8/7/89

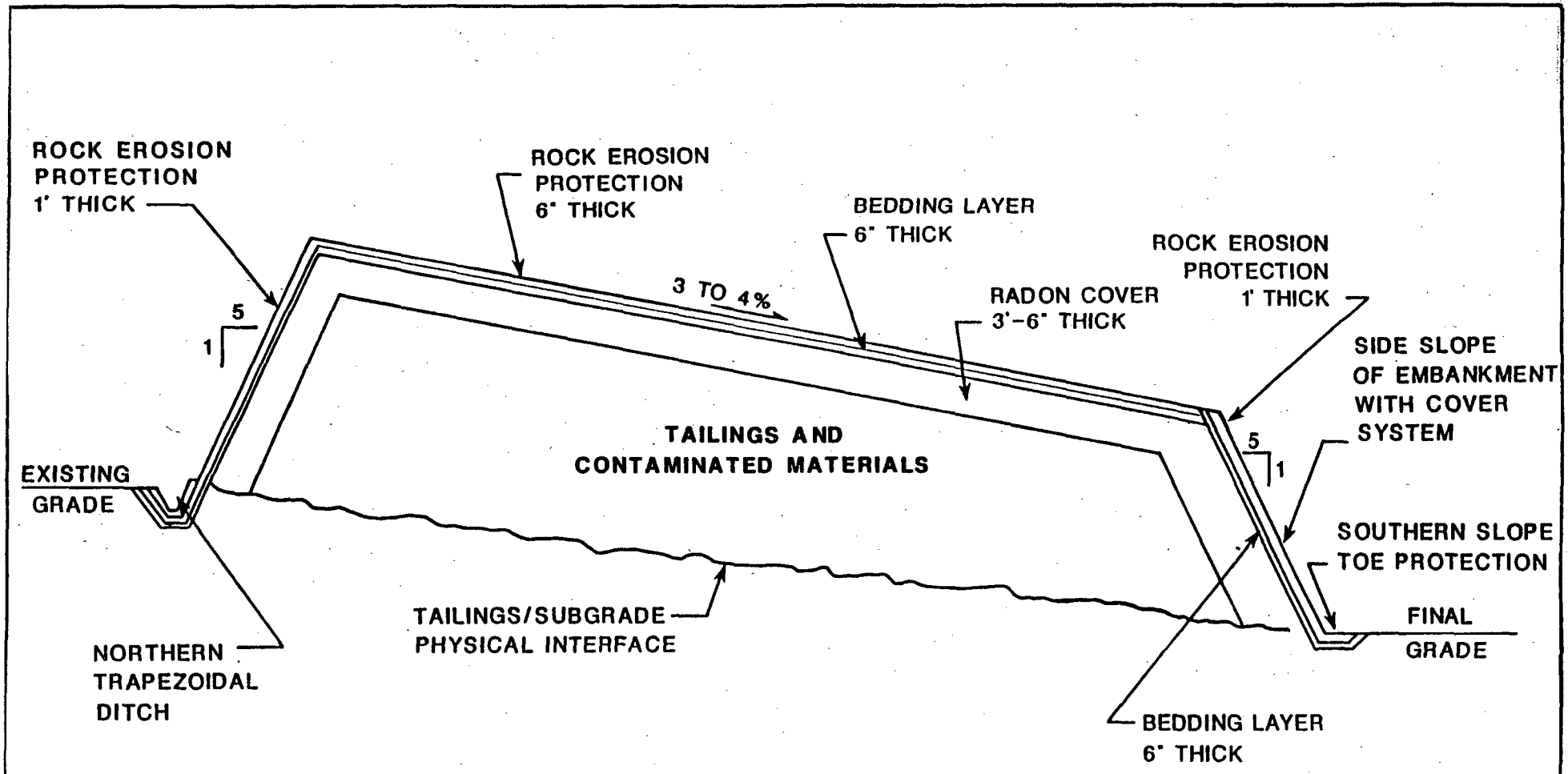
TUBA CITY SITE
TUBA CITY, ARIZONA
SURVEILLANCE AND MAINTENANCE PLAN
DRAFT
LOCATIONS OF MONUMENTS, MARKERS, AND SIGNS.

DOE PROJECT ENGINEER — DATE 2/1/89

MORRISON-KNUDSEN ENGINEERS, INC.
UMTRA PROJECT
100 HOWARD ST., SAN FRANCISCO, CA 94105

PROJECT NO. DE-AC04-83AL18796
DRAWING NO. TUB-PS-10-0834 REV. 0

850731 I 02003800/UMTRA0



NOTE:

COVER THICKNESSES IN EMBANKMENT COVER SYSTEM ARE NOT-TO-SCALE (CONCEPTUAL ONLY).

FIGURE 2.3
DISPOSAL CELL CROSS SECTION, TUBA CITY, ARIZONA, DISPOSAL SITE

cell to less than 20 pCi/m^2s. A field test of the constructability of the cover indicated that the borrow material would ensure that a compacted infiltration/radon barrier would have a saturated hydraulic conductivity of 1×10^{-8} cm/s (DOE, 1988a).

The erosion protection layer was designed to protect the disposal cell from runoff, flooding, and gully development. A six-inch-thick layer of riprap was placed on the topslopes, and was underlain by a six-inch-thick sand filter to promote drainage. A one-foot-thick layer of riprap was placed on the side-slopes and aprons of the disposal cell (Figure 2.3). The erosion protection barrier ties into the rock-armored drainage channels on the north, east, and west sides of the disposal cell. (Figure 2.2)

A drainage ditch diverts surface runoff around and away from the disposal cell.

2.3 PERMANENT SURVEILLANCE AND MAINTENANCE FEATURES

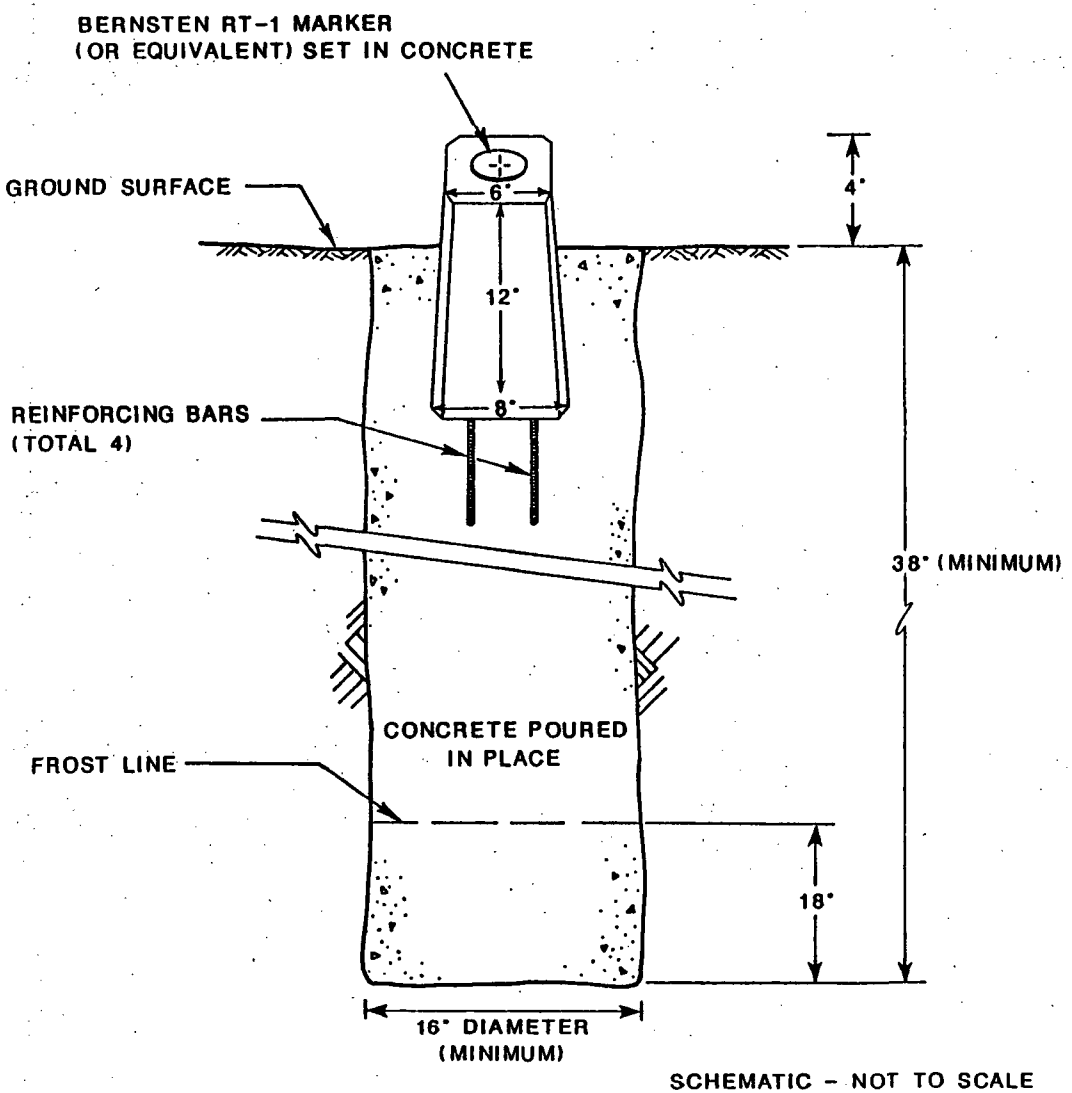
The survey and boundary monuments, site markers, and perimeter signs are the permanent surveillance and maintenance features at the Tuba City disposal site. One boundary monument and three survey monuments will define the four corners of the legal boundaries of the fenced, irregularly shaped perimeter of the permanent disposal site (Figure 2.2). Perimeter (warning) signs will be placed at spaced intervals around the disposal site so that one or more signs will be visible in daylight to a person approaching from any direction. One of the perimeter signs and one site marker will be placed at the official entrance on the northern side of the disposal site. The other site marker will be placed near the center of the crest of the disposal cell (Figure 2.2).

The surveillance and maintenance features will be constructed and emplaced in accordance with specifications described below. The boundary and survey monuments will be surveyed to second-order standards. Supplementary information regarding the construction and placement of these features is available in the Guidance Document (DOE, 1986b).

2.3.1 Permanent survey monuments

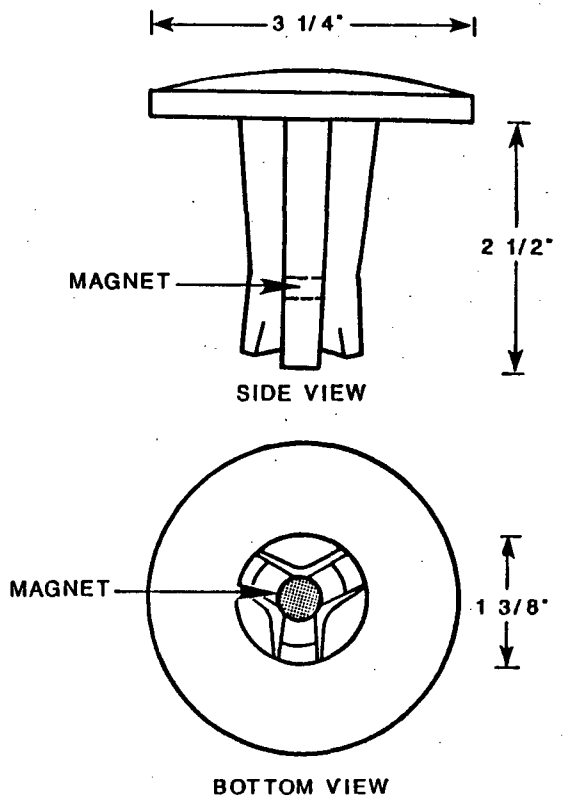
Three survey monuments (Figure 2.4), Bernsten RT-1 metal markers, will be set into the top of a truncated cone of reinforced (precast) concrete that will be set in concrete with the dimensions shown in Figure 2.4. The depth of the hole will be a minimum of 18 inches below frost line (total depth 38 inches). The four reinforcing bars will allow for discovery with a metal detector should the monument become buried over time.

The three survey monuments will establish permanent horizontal control based on the project grid system (Table 2.1) and will define three of the four disposal site corners (Figure 2.2). The monuments will be referenced to the U.S. Geological Survey triangulation station (Station name: Tuba City) on Dynamite Hill, about five miles west of the disposal site (MKF, 1989).



SCHEMATIC - NOT TO SCALE

BERNSTEN RT - 1 MARKER



SCHEMATIC - NOT TO SCALE

FIGURE 2.4
SURVEY MONUMENT
TU . CITY, ARIZONA, DISPOSA SITE

Table 2.1 Survey coordinates for monuments, site markers, and settlement plates, Tuba City, Arizona, disposal site

Symbol	Coordinates[a] North	East
Survey Monuments[b]		
SM-1/BMT-1	N 8,250.00	E 10,150.00
SM-2/BMT-2	N 9,500.00	E 10,150.00
SM-3/BMT-3	N 10,900.00	E 13,400.00
Boundary Monuments[b]		
BMT-4	N 8,250.00	E 13,400.00
Site Markers		
SMK-1	N 10,350.00	E 12,200.00
SMK-2	N 9,300.00	E 12,000.00
Settlement Plates		
SP-1	N 9,800	E 12,420
SP-2	N 8,800	E 12,420
SP-3	N 8,800	E 11,800
SP-4	N 8,800	E 11,500

[a]See Figure 2.2 for locations of the monuments, markers, and settlement plates. The coordinates are based on the project survey control point (N 10,000.00,E 10,000.00) located at the northwest corner of Section 20, T32N, R12E, Gila and Salt River Meridian.

[b]The survey and boundary monuments will be offset inside the disposal site fence. Coordinates will be resourveyed and included in the final SMP.

2.3.2 Permanent boundary monuments

A Bernsten Federal aluminum survey monument, Model A-1, will be used for the one boundary monument (Figures 2.2 and 2.5). The ceramic magnets epoxied in the cap and base are vertically oriented for maximum detection, if they become covered. The total monument length will be four feet and extend at least 10 inches above ground surface to facilitate location (Figure 2.5).

2.3.3 Permanent site markers

The two unpolished granite site markers constructed with the dimensions shown in Figure 2.6 will identify the Tuba City disposal site, the general location of the disposal cell (tailings), the date of closure (March 30, 1989), the tonnage of tailings (2,250,000), and the curies of radioactivity (940 curies of radium-226) (Figure 2.7).

Site marker SMK-1 near the entrance to the site will be set in a bed of reinforced concrete that extends three feet below ground surface (Figure 2.2). Site marker SMK-2 at the crest of the disposal cell will be set in a bed of reinforced concrete that extends to the top of the radon barrier (Figure 2.6). The excavation and setting of SMK-2 will be conducted in such a manner as to keep disturbance of the surrounding riprap and underlying material to a minimum.

2.3.4 Perimeter (warning) signs

The perimeter signs (Figure 2.8) will be mounted on steel posts and placed inside the fence at the intervals shown on Figure 2.2. These signs will display the international symbol indicating the presence of radioactive materials, and will state that the disposal site is government property, that it contains uranium mill tailings, and that trespassing is forbidden. The perimeter sign at the entrance to the site will also display the name of the site and the name and telephone number of the DOE (Figure 2.9). (This sign will require replacement whenever the DOE telephone number changes; see Section 5.0.)

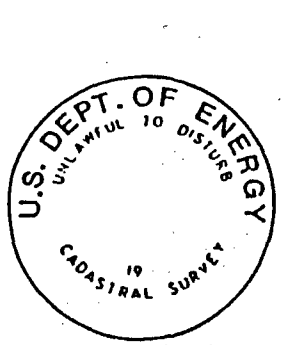
The signs will be constructed according to the dimensions and specifications shown on Figures 2.8 and 2.9. The top of the signs will be 70 inches above ground surface; the posts will be embedded a minimum of 38 inches below ground surface into a concrete footing (minimum one foot diameter).

2.4 DESIGN PERFORMANCE FEATURES

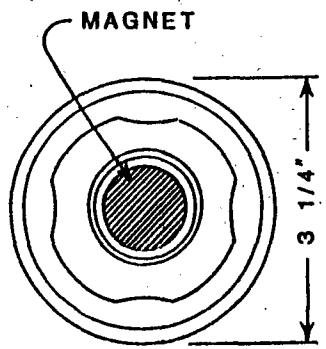
2.4.1 Settlement plates

The disposal cell at the Tuba City site contains both compacted and hydraulically deposited tailings. Therefore, there is a potential for settlement (displacement) to occur during and following completion of the disposal cell. Analysis of the settlement of the tailings during relocation of the tailings and shaping of the disposal cell, indicated that the greatest potential for settlement is along the southern edge of the disposal cell, where the majority of the hydraulically placed tailings are located. Three settlement plates were installed along this portion of the disposal cell.

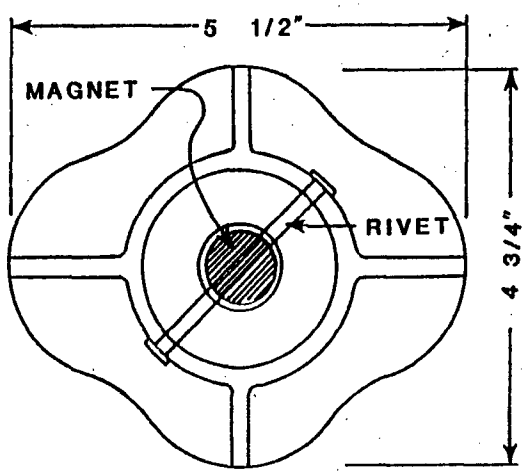
BERNSTEN FEDERAL ALUMINUM SURVEY MONUMENT, MODEL A-1, STANDARD LOGO CAP



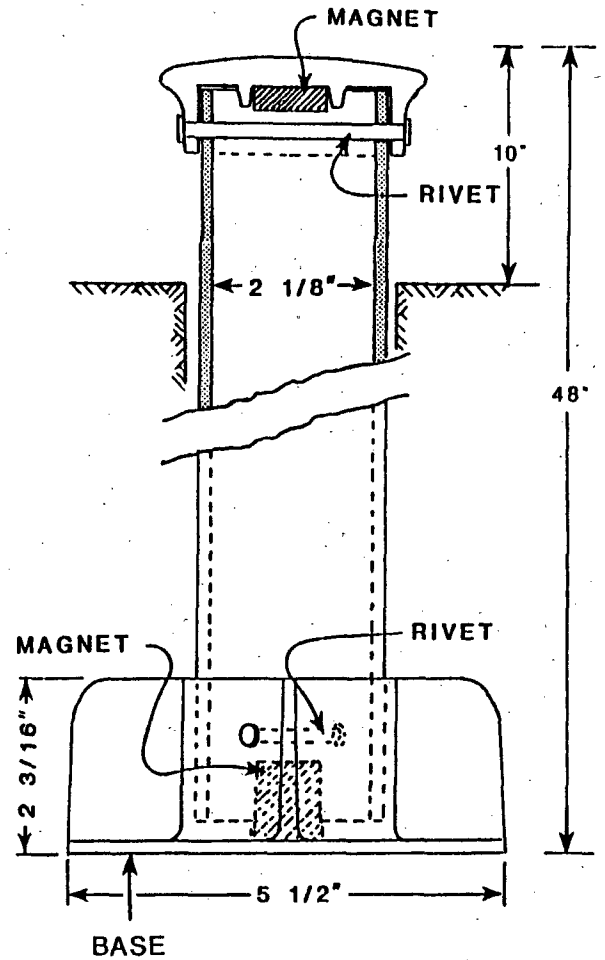
TOP VIEW OF CAP



BOTTOM VIEW OF CAP

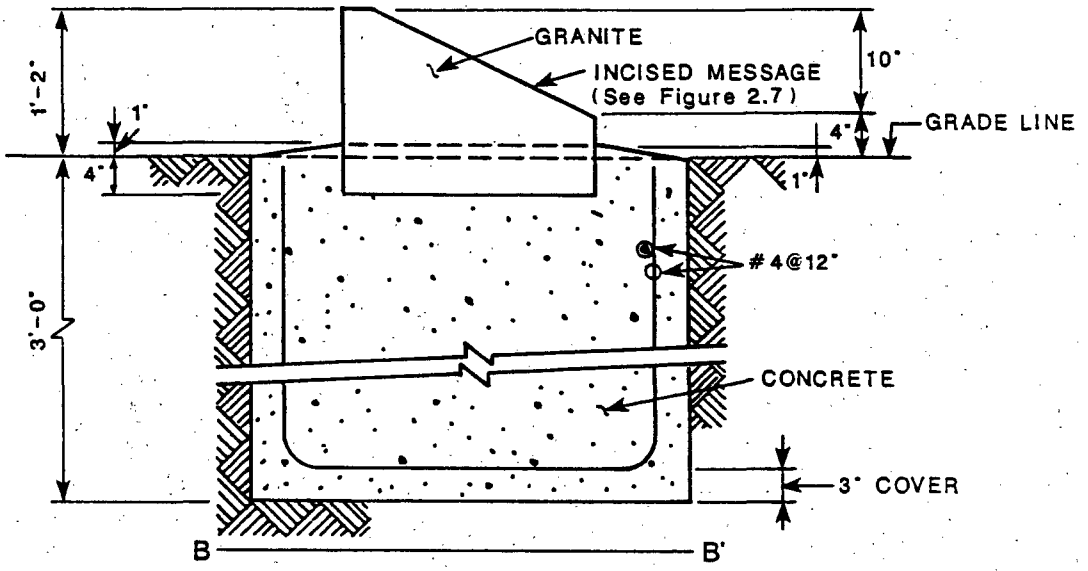


TOP VIEW OF BASE

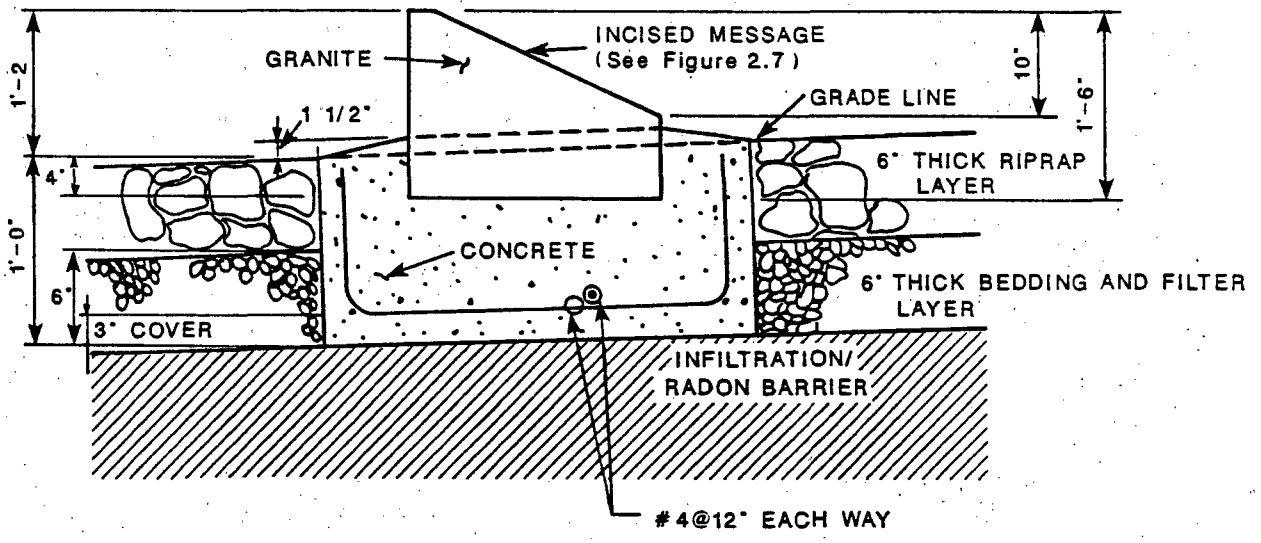


SCHEMATIC - NOT TO SCALE

FIGURE 2.5
BOUNDARY MONUMENT
TUBA CITY, ARIZONA, DISPOSAL SITE



SITE MARKER - SMK 1

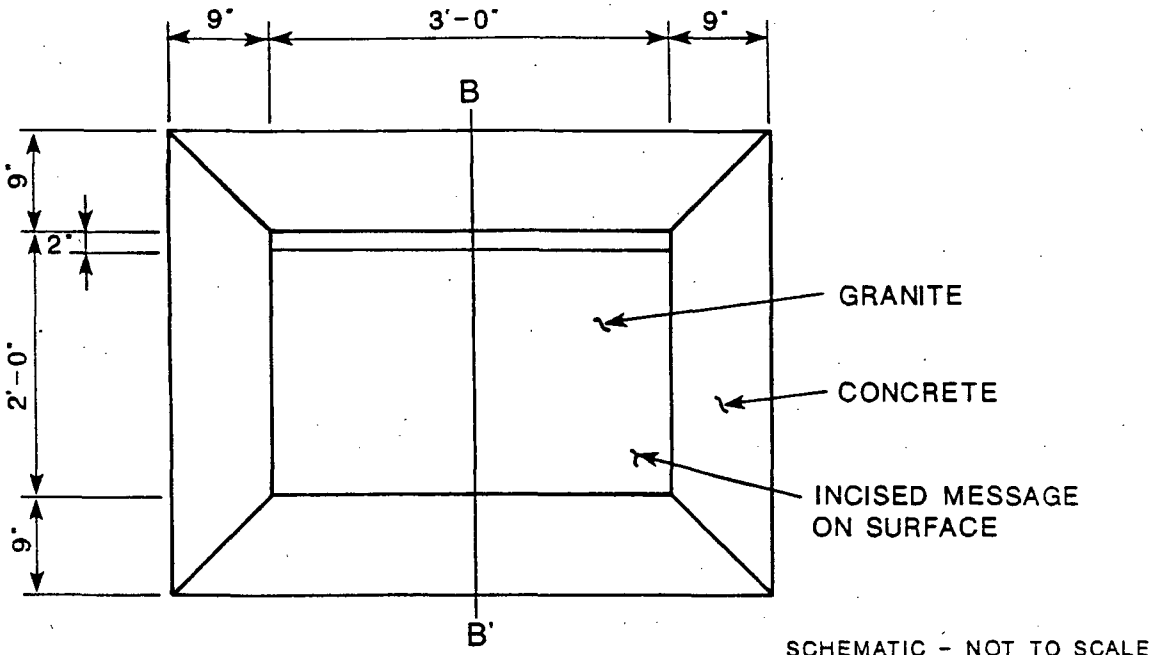


SITE MARKER - SMK 2

SIDE VIEWS

SCHEMATIC - NOT TO SCALE

FIGURE 2.6
SITE MARKERS, TUBA CITY, ARIZONA, DISPOSAL SITE

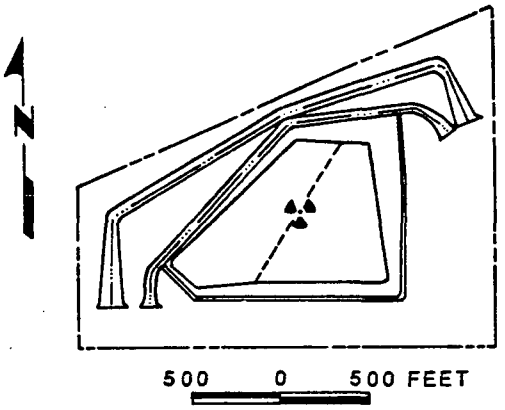


PLAN VIEW (SECTION B-B')

SCHEMATIC - NOT TO SCALE

TUBA CITY, ARIZONA

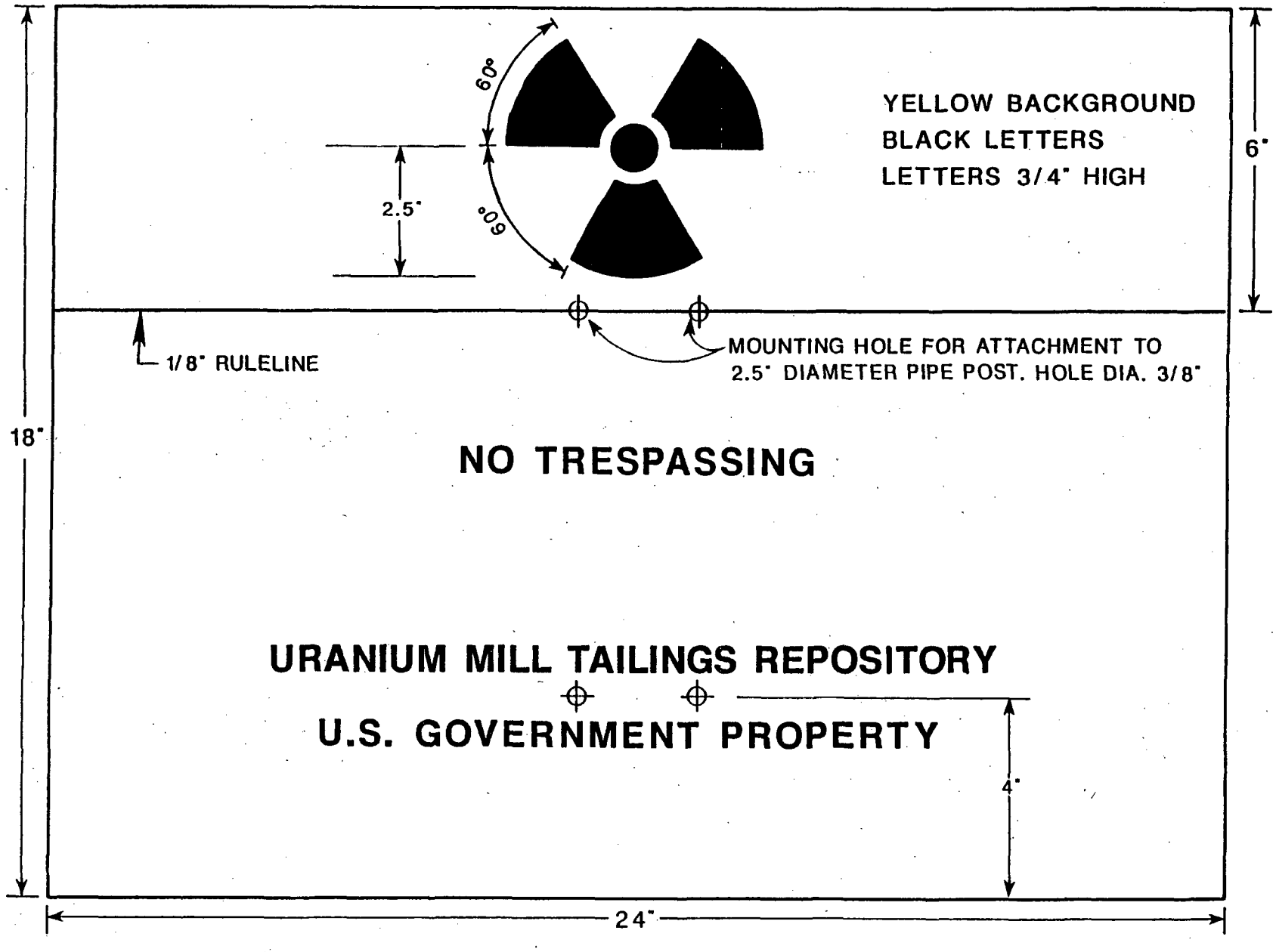
DATE OF CLOSURE: MARCH 30, 1989
DRY TONS OF TAILINGS: 2,250,000
RADIOACTIVITY: 940 CURIES, RA-226



NOTE: MINIMUM DEPTH OF INCISING TO BE 1/4".

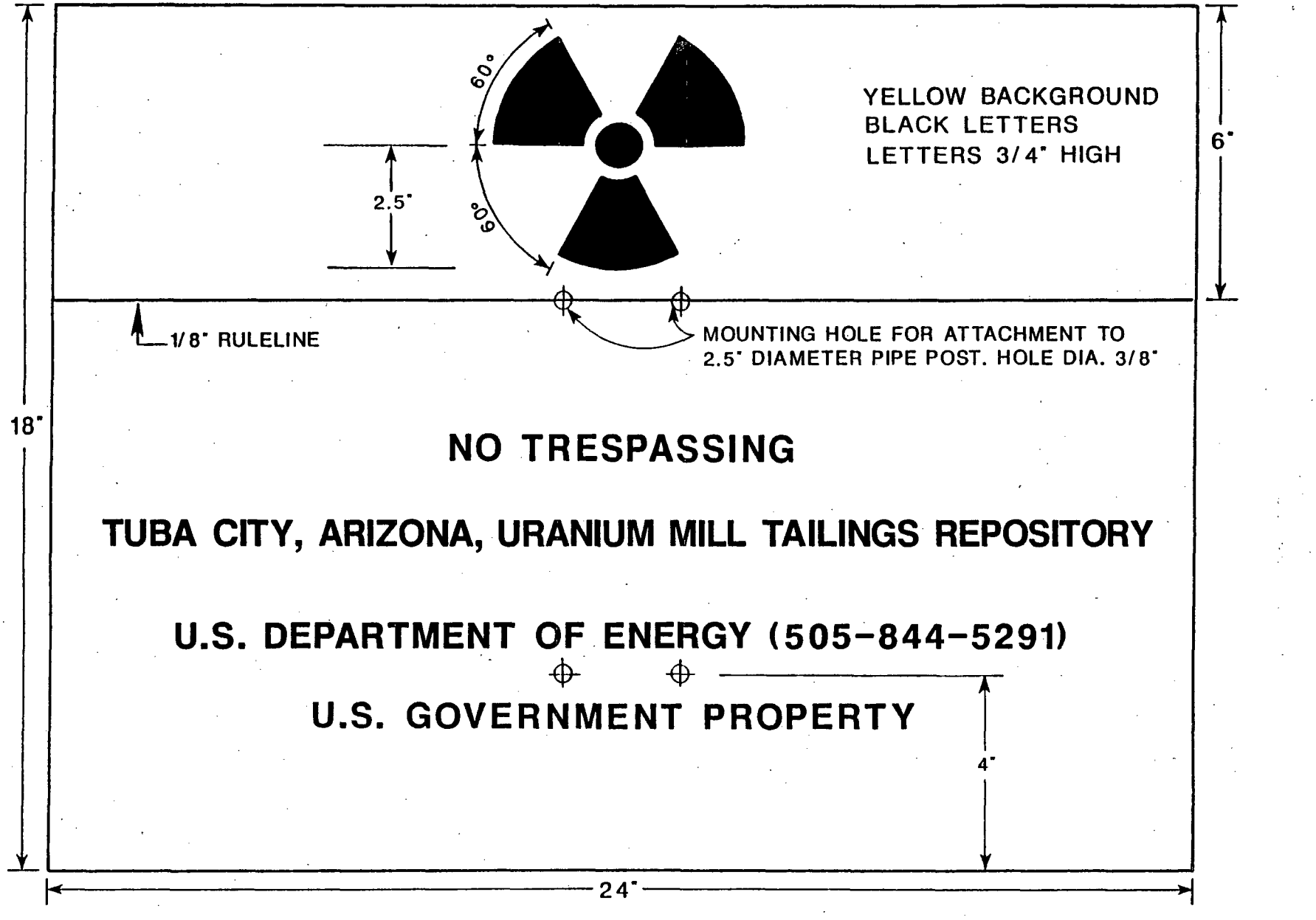
INCISED MESSAGE

FIGURE 2.7
SITE MARKER INCISED MESSAGE
TUBA CITY, ARIZONA, DISPOSAL SITE



SCHEMATIC NOT TO SCALE

FIGURE 2.8
PERIMETER SIGN – TUBA CITY, ARIZONA DISPOSAL SITE



SCHEMATIC - NOT TO SCALE

FIGURE 2.9
ENTRANCE SIGN - TUBA CITY, ARIZONA, DISPOSAL SITE

An additional settlement plate was installed on the northeast slope of the disposal cell. The locations and construction details of the settlement plates are shown in Figures 2.2 and 2.10, respectively. Surveyed coordinates for these features are presented in Table 2.1.

Where possible, the settlement plates were installed prior to placement of the infiltration/radon barrier, and settlement observations were surveyed to second-order standards. Details of the displacement monitoring, including settlement time displacement plots, will be provided in the DOE's completion report which is scheduled for delivery later in 1990.

Analysis has indicated that the maximum allowable settlement should not exceed eight inches over the 1000 year design life of the disposal cell (MK-F, 1986; Table 3.2). The maximum allowable differential settlement between the three settlement plates along the southern margin of the disposal cell is presented in Table 2.2. The four settlement plates will be surveyed annually for five years after completion of construction and once every five years thereafter or until the data indicate that greater than 90 percent of the total settlement, the calculation of which is described in the following paragraph, has occurred. The surveys will be conducted by a qualified surveyor prior to the annual site inspections. During this period, the settlement plates will be resurveyed to first-order levels using the site survey monuments as the reference benchmark.

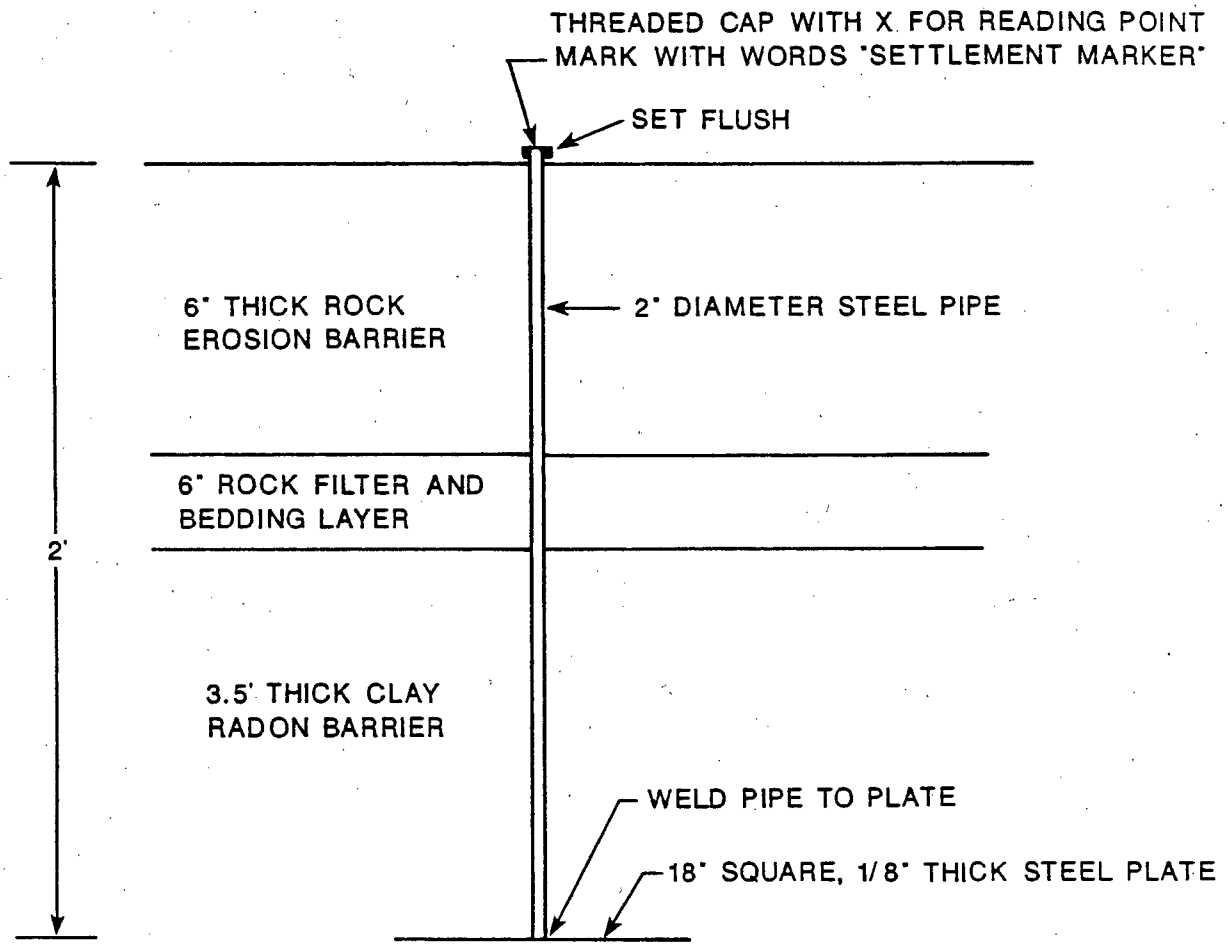
The 90 percent consolidation value will be determined by analysis of the data by a qualified geotechnical engineer. The displacment data will be plotted on time displacement curves and will be compared with the calculated maximum total and differential settlements shown in Table 3.2. If the measured vertical settlements exceed those listed in Table 3.2, the data will be reevaluated. This reevaluation may involve, but is not necessarily limited to, additional field measurements of cover deformation or calculations and analysis of the potential effect of observed deformation on cover integrity and performance. Evidence of significant differential settlement shall be cause for undertaking a Phase II inspection to determine the need for corrective action (see Section 4.3). All field inspections and analyses will be conducted by qualified geotechnical engineering personnel.

2.4.2 Erosion control features

There are no streams, stream channels, gullies, or arroyos in the immediate (0.25 mile) disposal site area, vegetation is sparse, and the annual rate of precipitation is low (about six inches per year). Other than the potential settling of the foundation soils and tailings following the completion of construction, no site-specific erosional problems are anticipated and additional instrumentation is not required. However, all future surveillance and maintenance inspections should survey the area carefully to monitor any potential unexepected erosional activity (see Section 4.0).

2.4.3 Reporting

The displacement analysis data, and any other data collected during the course of analysis or inspection of design performance features, will become part of the site inspection data base to assist the site inspection team in



NOTE: POSITION SETTLEMENT PLATES AS SHOWN ON FIGURE 2.2

SCHEMATIC - NOT TO SCALE

FIGURE 2.10
SETTLEMENT PLATE DETAIL
TUBA CITY, ARIZONA, DISPOSAL SITE

Table 2.2 Maximum acceptable performance values for displacement, Tuba City, Arizona, disposal site

Settlement plate[a]	Maximum allowable settlement (inches)	Maximum differential settlement (inches)
SP-1	3.5	NA[b]
SP-1	8.0	2.0
SP-3	8.0	3.0
SP-4	5.0	3.0

[a]Settlement plate locations and coordinates are provided in Figure 2.2 and Table 2.1.

[b]The distance between SP-1 and the other three settlement plates is too great to specify a meaningful differential settlement criterion.

Ref: MK-F, 1986.

evaluating cover performance at the Tuba City disposal site. Results of the displacement recordings will be included in the annual site inspection reports.

2.5 AERIAL PHOTOGRAPHY

Aerial photographs for the Tuba City disposal site will be taken in the spring of 1990 to provide a permanent record of site conditions after remedial action is complete, will be of use in quantitatively monitoring changes in site conditions (erosion patterns, vegetation changes, land use) over time, and will provide a useful orientation tool prior to inspections of the disposal site. The need for additional aerial photographic coverage will be determined as site conditions warrant (see Section 4.0).

The vertical, color, infrared stereo contact prints (two sets) and positive transparencies (one set), which will be nine-inch by nine-inch at a scale of one inch = 200 feet, will provide stereoscopic coverage for about 285 acres and will include the final disposal site, plus a minimum of 0.25 mile beyond the site limits (Figure 2.11). The areas north and south of the site will be included to provide baseline data around the monitor well network. An index map for these prints will also be provided. The ground control targets will be established to second order, Class I survey standards for horizontal control and to the third order survey standard for vertical control.

The high and low oblique natural color prints (one set of each plus one negative for each print) on eight-inch by 10-inch double-weight glossy paper (or nine-inch by nine-inch glossy contact prints on double-weight paper) will include the final disposal site plus a minimum of 200 feet, but no greater than 400 feet, of view in the foreground and sides of the final site in each frame. The photographs will be taken from a minimum of two different viewpoints with no less than 90 degrees rotation.

A topographic map with a plan scale of one inch = 200 feet and a two-foot contour interval will be prepared using the vertical aerial photographs (MKF, 1989).

Specifications and procedures for flight planning, photography, and interpretation are described in detail in Section 5.0 of the Guidance Document (DOE, 1986b).

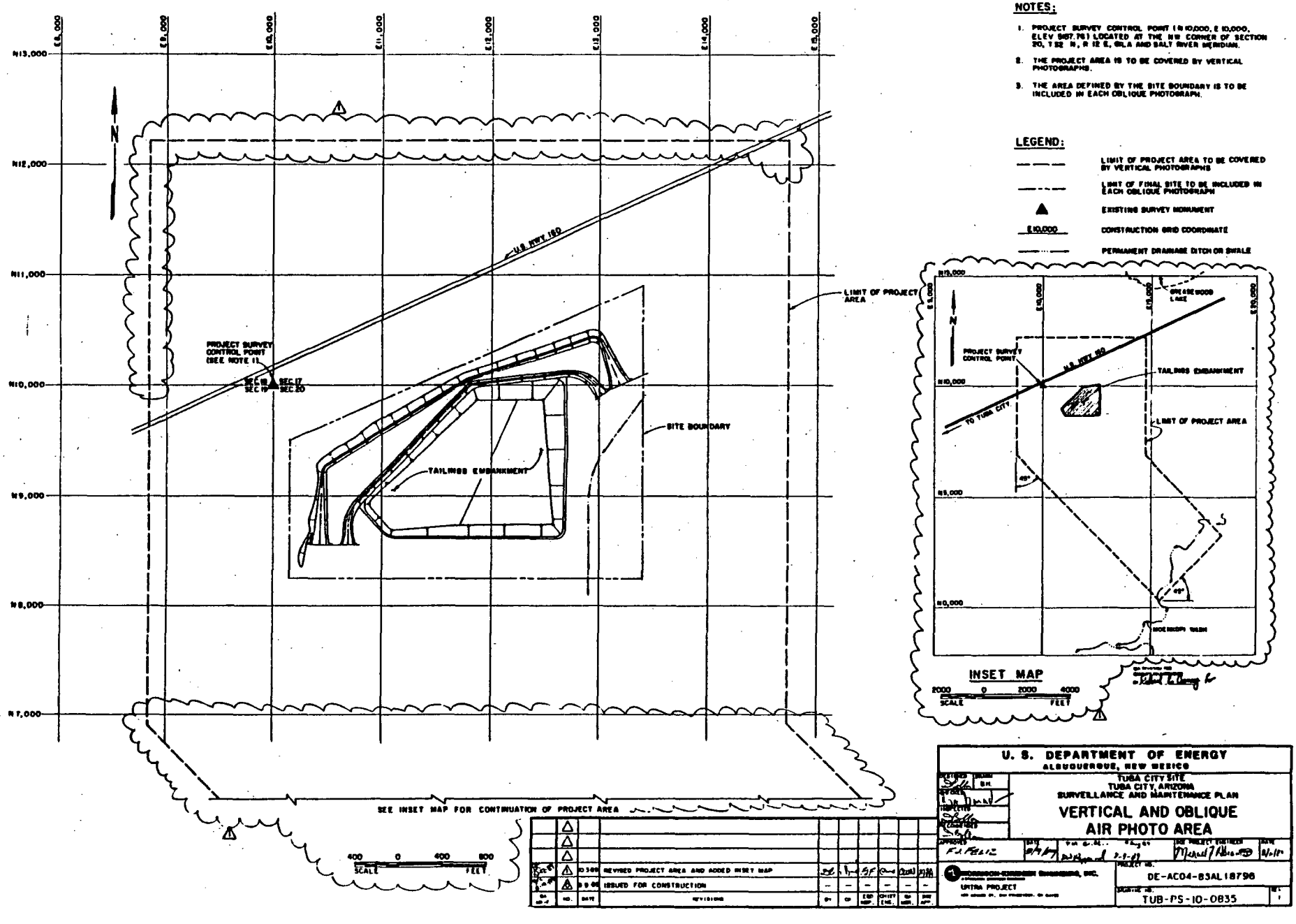


FIGURE 2.11

AERIAL PHOTOGRAPHY : OJECT AREA, TUBA CITY, IZONA, DISPOSAL SITE

3.0 GROUNDWATER MONITORING

3.1 NEED FOR AND EXTENT

The uppermost strata in the vicinity of the Tuba City disposal site is the Navajo Sandstone. The Navajo Sandstone consists of a fine to medium grained sandstone with a matrix of carbonaceous cement. Underlying the Navajo Sandstone is the Kayenta Formation, which is an interbedded, fine-grained sandstone and mudstone sequence, and there is no continuous hydraulic barrier between the Navajo Sandstone and the Kayenta Formation. In the disposal site area, these two formations comprise the N-aquifer of the Navajo and Hopi Reservations.

The recharge area for the N-aquifer is about 40 miles to the northeast of the Tuba City site in the area of Shonto, Arizona (DOE, 1989a). At the Tuba City site, the N-aquifer is unconfined in the Tuba City area, with a potentiometric surface ranging from 20 to 150 feet below the land surface. The groundwater flows towards the southeast, and flow rates range from five feet per year (ft/yr) to 140 ft/yr.

Groundwater quality data (DOE, 1989a) show that the tailings pile has contaminated the N-aquifer to a depth of approximately 100 feet with a plume distance of approximately 1300 feet downgradient of the site (Figure 3.1). The plume has high concentrations of selenium, uranium, total dissolved solids (TDS), sulfates, calcium, cadmium, nitrate, iron, and manganese. Groundwater quality data and water level data are provided in Attachments 1 and 2 of this document.

The N-aquifer is the major water resource in the Tuba City area. No one is currently using contaminated groundwater nor is anyone using groundwater in the projected path of the contaminant plume (see Section 2.1). However, the presently and potentially affected groundwater is a resource that may be used in the future (DOE, 1989a, 1986a).

The hydrogeologic environment and groundwater quality were characterized prior to and during remedial action activities at the Tuba City site. A detailed discussion of the subsurface characterization is provided in the remedial action plan (DOE, 1989a) and the environmental assessment (DOE, 1986a).

3.2 REGULATORY REQUIREMENTS

The DOE must demonstrate compliance with the proposed EPA standards (40 CFR 192) for groundwater protection at the Tuba City disposal site. At Tuba City, the tailings were stabilized in place in accordance with the requirements of Subpart A of the standards, and with the concurrence of the NRC (NRC, 1989). Because the remedial action alternative at Tuba City was stabilization in place, the disposal cell overlies an existing contaminant plume that is the result of surface uranium processing activities at the site prior to the remedial action. Based on the proposed hydraulic properties of the cover design and a field test of the constructability of the cover (DOE, 1988a; see Section 2.2), the NRC has concluded that infiltration through the cover and the stabilized tailings will be minimized to the extent practicable. This, in turn, minimizes the source of any future contamination (NRC, 1989).

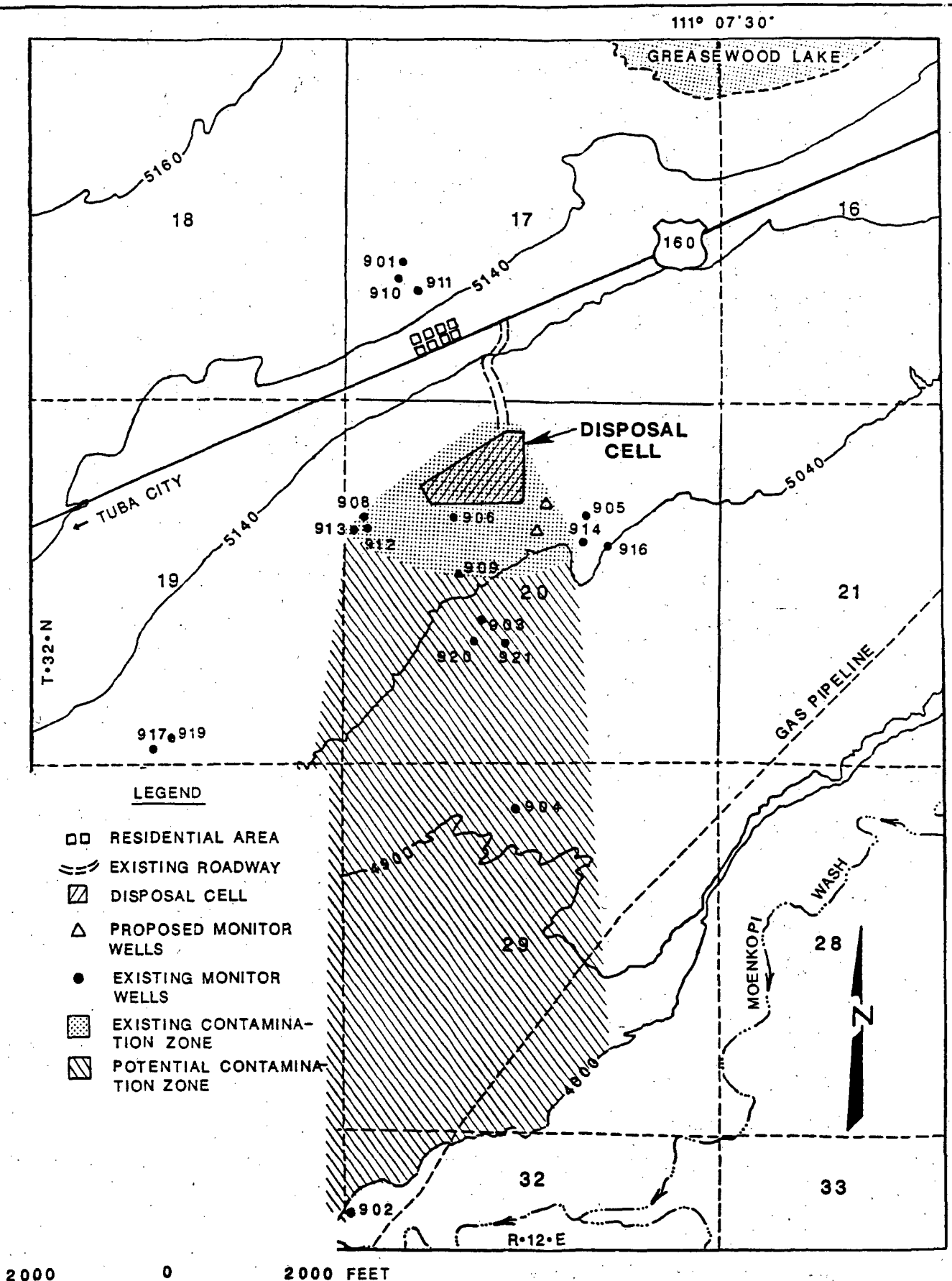


FIGURE 3.1

GROUNDWATER MONITOR WELL LOCATION
TUBA CITY, ARIZONA, DISPOSAL SITE

Based on the results of cover design and test fill studies (DOE, 1988), performance monitoring at the Tuba City disposal site is not required at this time. However, post-remedial action groundwater monitoring will continue without set detection limits or excursion criteria, until issues involving compliance with Subpart B of the proposed EPA standards have been resolved. The DOE UMTRA Project Office will address the need to modify this SMP when issues involving Subpart B compliance are resolved. The post-remedial action monitoring program and reporting requirements are presented in Sections 3.3 through 3.5, below.

3.3 POST REMEDIAL ACTION GROUNDWATER MONITORING PROGRAM

The DOE will conduct a groundwater monitoring program at the Tuba City disposal site during the interim period between the completion of Subpart A remedial action and the beginning of the groundwater restoration phase of the remedial action. The groundwater monitoring program will establish background and baseline water quality in the area of the relic plume and the movement of the plume downgradient from the disposal cell.

3.3.1 Background groundwater quality

Background groundwater quality will be established using data collected from wells 901, 910, 911, which are upgradient from the disposal site (Figure 3.1 and Table 3.1). Groundwater data from wells 902, 904, 917, and 919 will also be used in establishing background groundwater quality. These wells, which are downgradient and cross-gradient from the disposal cell, currently have not been contaminated by the movement of hazardous constituents within the groundwater. No additional wells will be required for establishing background water quality.

3.3.2 Baseline groundwater quality

Baseline water quality in the area of the existing plume and the area further downgradient where the potential for contamination exists will be established with groundwater data collected from wells 903, 906, 908, 909, 912, 913, 914, 915, 916, 920, and 921 and the two new wells (Figure 3.1 and Table 3.1) The data from these wells also will show the distribution and movement of hazardous constituents in the N-aquifer relic plume as it migrates downgradient from the disposal cell. Criteria for establishing baseline water quality are presented in Section 3.5, below.

3.3.3 Monitor well network

The groundwater monitoring network will consist of eighteen existing wells and two new wells to be completed in the spring of 1990. The existing monitor wells include three upgradient wells (well numbers 901, 910, and 911; Figure 3.1) and 15 downgradient wells (well numbers 902, 903, 904, 906, 908, 909, 912, 913, 914, 915, 916, 917, 919, 920, and 921; Figure 3.1). Seven wells are screened in the upper 80 feet of the aquifer (Table 3.1). Six wells are screened at intervals at depths between 97 and 197 feet, and five wells

Table 3.1 Groundwater monitoring well network, Tuba City, Arizona, disposal site[a]

Well No.	Screened Interval (Depth below land surface, in feet)
Upgradient	
901	58-78
910	97-197
911	311-351
Downgradient	
902	63-73
903	24-48
904	32-42
906	45-65
908	52-67
909	62-77
912	123-163
913	331-371
914	139-156
915	172-182
916	348-358
917	130-150
919	340-350
920	116-156
921	315-355

[a]Monitor well locations are plotted on Figure 3.1

are screened at intervals between 300 and 360 feet (Table 3.1). Well location data, monitor well completion records, and well construction logs for these wells are provided in Attachments 3 through 5 of this document.

The two new wells will be located along the downgradient edge of the disposal cell (Figure 3.1) and screened in the upper ten feet of the aquifer to monitor the horizontal and vertical migration of contaminants from the disposal cell (see Section 3.3.6, below).

3.3.4 Monitor well installation and development

The two additional wells to be completed in the spring of 1990 will be drilled and developed in a manner that is consistent with procedures outlined in Section 2.7 of the Guidance Document (DOE, 1986b). All installation and development will be documented in accordance with these same procedures. The completed forms for each well will be included in the final SMP and also will become part of the permanent Tuba City site file.

3.4 SAMPLING FREQUENCY AND ANALYTICAL PROGRAM

Groundwater data will be collected from the 20 monitoring wells on a quarterly basis for the first two years following the completion of Subpart A remedial action. Samples will be analyzed for the constituents listed in Table 3.2.

The DOE analyzed groundwater samples for Appendix I (40 CFR 192) organic hazardous constituents in 1989. The analysis indicated that no organic hazardous constituents were present that were the result of the uranium milling processes at the Tuba City sites (Mukhopadyay, 1989). Therefore, further analysis of these constituents is not required for the Tuba City site.

After sufficient data have been collected to establish background and baseline water quality (see Section 3.5.3, below), the need to analyze for all the constituents listed in Table 3.2 will be reevaluated. It is expected that after four rounds of sampling, the constituent list will be reduced to only those constituent that are of regulatory concern.

At the end of the two year sampling period, the DOE will evaluate the analytical data and determine the sampling frequency required for future monitoring. It is expected, however, that sampling will be performed semi-annually for five years and annually thereafter, or until Subpart B issues are resolved.

All sampling and analytical procedures will be conducted in accordance with standard operating procedures described in the Technical Approach Document (TAD) (DOE, 1989b).

3.5 CRITERIA FOR ESTABLISHING WATER QUALITY

Criteria for establishing background and baseline water quality are described in detail in Section 8.0 of the TAD (DOE, 1989b). This section

Table 3.2 Constituents and detection limits for water analysis[a]

Constituent	Laboratory method detection limit (mg/l)	Constituent	Laboratory method detection limit (mg/l)
Major Anions			
Bicarbonate	1.0	Cyanide	0.01
Carbonate	1.0	Iron	0.03
Chloride	1.0	Lead	0.01
Sulfate	0.1	Manganese	0.01
Fluoride	0.1	Mercury	0.0002
Nitrate	1.0	Molybdenum	0.01
Nitrite	0.1	Nickel	0.04
Nitrate and Nitrite	1.0	Selenium	0.005
Phosphate	0.1 (as P)	Silver	0.01
		Sulfide (as H_2S)	0.1
		Strontium	0.1
Major Cations		Thallium	0.01
Ammonium	0.1	Tin	0.005
Calcium	0.01	Uranium	0.003
Magnesium	0.001	Vanadium	0.01
Potassium	0.01	Zinc	0.005
Sodium	0.002	Total dissolved solids	10.0
Silica	2.0		
		Organic Hazrdous Constituents[b]	
Minor and Trace Constituents[c]		**(mg/l)**	
Aluminum	0.1	Total organic carbon	1.0
Antimony	0.003		
Arsenic	0.01	**Radionuclide (pCi/l)**	
Barium	0.1	Gross alpha[d]	1.0
Beryllium	0.01	Gross beta[d]	0.5
Boron	0.1	Lead-210	1.5
Bromide	0.1	Polonium-210	1.0
Cadmium	0.001	Radium-226	1.0
Chromium	0.01	Radium-228	1.0
Cobalt	0.05	Thorium-230	1.0
Copper	0.02		

[a]Field parameters including temperature, total alkalinity, pH, and specific conductance will be measured. Dissolved oxygen, Eh, and redox couples may be measured at specific work sites for further characterization. mg/l = milligrams per liter; pCi/l = picocuries per liter.

[b]Analysis for organic hazardous constituents (Appendix IX, 40 CFR 264) is not required at the Tuba City disposal site. See text for explanation.

[c]Elemental concentrations will be analyzed to satisfy the requirements of 40 CFR 192. See text for further discussion.

[d]These analyses must be determined on samples with less than 500 mg/l total dissolved solids.

Note: Detection limits above are those specified to laboratories subcontracted to perform analyses for the UMTRA Project. These levels are considered reasonably achievable, and consistent with Project goals and regulatory requirements.

Ref: DOE, 1989b.

provides only a summary of these criteria, including statistical analyses, data validation procedures, and quality control methods that may be used for the Tuba City groundwater data.

Baseline water quality will be established for hazardous constituents specified for each monitor well to establish trends in water quality in the interim between remedial action and the implementation of any groundwater restoration that may be required. A minimum of four sampling rounds are required to establish background or baseline water quality. However, baseline water quality will be continuously updated as it may change with time.

Field parameters and chemical and hazardous constituents to be analyzed in samples are presented in Table 3.2. After water quality has been characterized for the complete list, the list of hazardous constituents may be modified, depending on conditions at the Tuba City site.

3.5.1 Statistical procedures

When there is only a limited number of data points, statistical analyses of water-quality data can support only qualitative or semi-quantita- tive interpretations. Statistical analyses of water-quality data at the Tuba City site will include:

- o Arithmetic means, standard deviations, and coefficients of variation for each constituent for each monitor well.
- o Arithmetic means, standard deviations, and coefficients of variation for each constituent for each quarterly sampling set.

These statistical parameters will allow a semi-quantitative evaluation of the means and spatial and temporal variations of all the background and baseline water-quality constituents. The selection of a method to calculate mean background and the range of background will depend on the statistical distribution of concentrations for each hazardous constituent.

If it can be demonstrated that the statistical distribution of background concentrations of hazardous constituents follows a normal probability distribution, then all of the samples from all of the background wells are from the same population and the arithmetic mean may be calculated. Several methods for determining the statistical distribution of background water quality are presented in EPA, 1989.

In the special case, where the statistical distribution does not follow a normal probability distribution, other statistical analyses may be used to calculate mean and the range of background. These may include a log-normal transformation of the water quality data or a non-parametric procedure (EPA, 1989). However, in some cases the data are insufficient for statistical analysis and it may be more suitable to determine the average concentrations for each well, and to determine the average of the average concentrations of all the wells to calculate a mean background. This method of analysis is particularly applicable when there are a disproportionate number of samples from a few of the total number of background wells.

In determining the mean and range of background, obvious outliers related to cross-contamination or laboratory analytical error should be eliminated from the data set so that the mean and range are realistic for the site. The analysis also should check for seasonal variation. A written explanation will be provided to document the reasons for omitting any suspect data. In cases where there is a relatively small percentage of analyses (15 percent or fewer) with values below the detection limit (DL), a value of DL/2 is substituted into the database and the statistical tests outlined above are conducted (DOE, 1989b; EPA, 1989).

3.5.2 Data validation and quality control

As part of the procedures to validate the background and baseline water quality data, the cation/anion balance will be calculated and recorded for each sample result. An acceptable sample will have an error less than plus or minus five percent. If unacceptable sample results are reported, the samples will be reanalyzed to acceptable limits or additional samples will be collected and analyzed to acceptable limits.

Chemical constituents determined by analysis will be analyzed by approved and established procedures as listed in 40 CFR 136.3 and 40 CFR 261. The definition of chemical background and contamination levels requires reliable water quality data. To ensure the data are reliable, quality control measures will be used at all sites and will include approved and established operating analytical laboratory procedures listed in 40 CFR 136 or their equivalent, and approved and established standard operating procedures contained in the Albuquerque Operations Manual (DOE, 1988b). Inter-laboratory comparison of water analysis studies (e.g., the EPA or other agencies) will be used to determine overall accuracy and precision. Analytical results will be evaluated (see Section 16.2.3, DOE, 1988b) to determine the validity of the data.

In addition to laboratory analyses, field analyses of temperature, pH, specific conductance, and carbonate alkalinity will be performed at each sampling location. Under certain conditions, Eh and specific redox couples may have to be measured in the field and in the laboratory.

3.6 EXCURSION CRITERIA AND CORRECTIVE ACTION

Until all Subpart B issues are resolved, excursion criteria will not be defined for the Tuba City disposal site. Therefore, a corrective action plan is not required for the Tuba City disposal site.

3.7 REPORTING

Biannual groundwater reports that contain the results of the groundwater monitoring program will be submitted to the NRC for review and will become part of the permanent Tuba City site file. Reporting details are provided in Section 7.5 of the Guidance Document (DOE, 1986a).

4.0 SITE INSPECTIONS AND CORRECTIVE ACTION

4.1 INTRODUCTION

The on-site inspection is the best means of ensuring that a disposal cell continues to function as designed. Three types of site surveillance inspections are discussed below:

- o Phase I inspections.
- o Phase II inspections.
- o Contingency (corrective action) inspections.

The procedures for conducting Phase I and Phase II inspections are discussed in Sections 3.3 and 3.4, respectively, of the Guidance Document (DOE, 1986b). The procedures outlined in the sections below are guidelines for conducting these inspections. A detailed, site-specific plan for Phase I inspections will be prepared following completion of remedial action at the Tuba City disposal site. This inspection plan will be developed subsequent to the final site walkover and in conjunction with the Navajo Nation and Hopi Tribe.

A report will be prepared for all scheduled (Phase I) and unscheduled (Phase II, contingency) inspections at the Tuba City disposal site. These reports will be submitted to the NRC and become part of the permanent Tuba City site file (see Section 6.0).

4.2 PHASE I INSPECTIONS

The Phase I inspection report will describe surveillance activities at the disposal site. Inspection report forms, checklists, photo logs, and monitoring data will be included as attachments. All problems, active or potential, will be identified and described in the report, along with recommendations for corrective action, if required.

4.2.1 Site inspection procedures

Initially, Phase I inspections will be conducted annually. At a later date, the DOE may request an amendment to the license to modify the frequency of inspections. In lieu of a Phase I inspection, an interim site inspection will be conducted at the Tuba City disposal site in the fall of 1990. The first annual Phase I inspection is tentatively scheduled for Spring 1991.

4.2.2 Field procedures

The primary objective of the site inspection is to identify potential problems at an early stage prior to the need for significant maintenance or repairs. The inspection team will be guided by a knowledge and understanding of the processes that could adversely modify the site. A fundamental part of the inspection will be the detection of change, and particularly the progressive change, over a number of years due to slow action processes.

These processes and signatures of their activity are discussed in Attachment B, Modifying Processes, of the Guidance Document (DOE, 1986b).

The inspection team will consist of a chief inspector and one or more assistants. The chief inspector will be a geotechnical engineer/geologist or civil engineer. The other team member (or members) will be selected based on specific site inspection needs. The procedures in Section 3.3 of the Guidance Document (DOE, 1986b) have been established to guide the inspectors and to establish standard procedures for Phase I inspections.

Prior to the on-site inspection, the site inspection team will become familiar with the Tuba City disposal site by reviewing the site file. Key elements of the file include the as-built drawings and previous inspection, maintenance, or corrective action reports. The extent of site inspection preparation will be determined on an as-needed basis. The Tuba City site file currently is available at the UMTRA Project Office in Albuquerque. A summary of the documents and data on file at the Project Office is provided in Section 5.0 of this SMP.

Prior to conducting the site inspection, approval to enter the property adjacent to the disposal site must be obtained from tribal authorities. Procedures and any agreements deemed necessary for gaining this authority will be provided in the final SMP.

To assist the inspection team, a site inspection checklist will be developed for the Tuba City disposal site. The checklist will be developed when remedial action is completed and the final site inspection (site walkover) has been conducted. The checklist will be developed in consultation with tribal authorities. The checklist shown in Attachment 5 is taken from the Guidance Document (DOE, 1986b). This checklist will be modified to reflect site-specific conditions at Tuba City and will be included in the final SMP.

The field inspection at Tuba City will include, at a minimum:

- Adjacent off-site features - reconnaissance of adjacent area within 0.25 mile of the site boundary. The primary purpose is to note any change in existing land use that could increase the probability of inadvertent or purposeful human intrusion into the site.

- Access roads, fences, gates, and signs - the condition of these features will be traversed for signs of damage or the need for maintenance (road repair). If human intrusion has occurred, an effort will be made to determine whether it was inadvertent or purposeful. Missing or damaged signs will be noted and replaced (see Section 5.0).

- Monuments and wells - All permanent surveillance and maintenance features (Section 2.3) and groundwater monitor wells will be examined for evidence of disturbance. If disturbance or damage is evident, a recommendation for corrective action will be made.

- Crest - observations will be made in all directions of any features that are anomalous or unexpected, and that may require a closer inspection. A walk around the edge and along diagonal transects of

the crest will be made. Additional transects, at approximate 50-yard intervals, will be walked along the sideslopes. A search will be made for evidence of any differential settling, subsidence, or cracks. The rock cover will be examined for evidence of rapid deterioration. Individual rocks will be examined for excessive fracturing, oxidation, or other signs of deterioration. Any changes in these features will be recorded on the checklist and site map. Recommendations for corrective action, if necessary, will be made.

- Slopes - modifications to the disposal site are most likely to occur on the lower portions of the slopes. Therefore, a careful examination at the toe of the slope will be a key part of the inspection. Settlement or sliding, although highly unlikely, will be apparent by the presence of bulges and depressions, cracks, or scarps. Any localized change in color (e.g., "stained" vegetation) or concentration of vegetation will be described and examined for evidence of seepage. During the inspections, the slopes will be examined for evidence of animal intrusion, burrowing, changes in vegetation, and human activity. Cattle, sheep, or wildlife may inadvertently wander onto the site, but they are not likely to remain.

- Diversion channels - the inspectors will walk along the entire length of each diversion channel to determine whether the channels have been functioning and can be expected to continue to function as designed. The channels and sideslopes will be examined for evidence of erosion or sedimentation, slides, or incipient erosion channels, debris, or growing vegetation. The sideslopes also will be examined for evidence of piping or burrowing by animals, which could lead to sloughing of material into the channel.

As-built site drawings will be used during the site inspection. Upon completion of the inspection, an overlay or revised drawing will be produced that notes any potential problems or other site conditions that may require future attention. The revised drawing will be labeled with the site inspection and year and will become part of the permanent site file.

Ground photographs will be taken as part of the site inspection. The photo overlay to the base map will specify the locations from which a standard set of photographs will be taken. The photo sites will usually be specified in relation to a survey monument, boundary monument, site marker, monitor well, or aerial photo control feature. While gate and fence locations may be used, these structures are not considered permanent enough for long-term historical use. Accompanying the photo overlay will be a listing for each location that gives the desired azimuth and central feature of each photo.

The types of features included in the standard set of photographs will include:

- Monuments, signs, and site markers.

- Fences, gates, access roads, perimeter road, and paths.

- Crest lines - both along the crest and at right angles to the crest.

- o Panoramic (360 degrees) from top (center) of the site.
- o Off-site features that may affect the site in the future.
- o Monitor wells.
- o Diversion ditches or other drainage features.
- o Other features of interest.

Documentary evidence of abnormal, anomalous, new, or unusual conditions or situations (e.g., downhill creep, terracing) will be obtained to provide a record of developing trends and to enable the responsible agency to make reasonable decisions concerning additional inspections, custodial maintenance, and contingency repair. Photographs may be used to provide such evidence and augment the checklist and annotated overlays.

Any site feature or condition that requires the inspectors to make a written comment, explanation, or description will be photographed if possible. The number of photographs, the view angles, and the lenses used will be up to the judgment of the inspectors, keeping in mind site conditions, lighting conditions, and the goal of having sufficient photographs for agency review.

All special photographs will be logged on a Photo Log Form (see Attachment A, Inspection Photo Log, of the Guidance Document (DOE, 1986b)). A separate Photo Log Form will be filled out for every roll of film exposed. A Photo Log entry will be made for each photograph. The completed log forms are to be attached to the inspection checklist and paginated accordingly.

4.3 PHASE II INSPECTIONS

4.3.1 Need for inspection

Phase II inspections are a followup to Phase I inspections. These inspections will be conducted whenever the results of a Phase I investigation indicate that in-depth studies are necessary to assess whether processes currently active on or near the site pose any future threat to the site if left unmodified.

Because of the EPA standards to which the Tuba City disposal site was designed, it is considered extremely unlikely that problems will occur. However, some of the situations that may require Phase II inspections at the Tuba City site include:

- o Unforeseen subsidence of the disposal cell or its foundation.
- o Gullying that has cut through or is threatening to cut through the outer cover.
- o Slides on the slopes of the disposal cell.
- o Rapid deterioration of the rock barrier indicated by Phase I inspections.

- o Cracks that extend deeply into the disposal cell (greater than six inches).
- o The presence of animal burrows or vegetation on the disposal cell.
- o Removal of some of the disposal cell material by humans.
- o Seepage.

4.3.2 Field procedures

Phase II inspections will be made by specialists in the discipline appropriate to the problem that has been recognized. That is, if erosion is the problem, the inspector(s) will be individuals knowledgeable in evaluating erosion, presumably a soils scientist or geomorphologist. If settlement or sliding is the problem, a geotechnical engineer will be required; if changes in an adjacent stream, a hydrologist; if plant invasion, a botanist; and the like.

In this SMP, procedures for a Phase II inspection are not specified but will be defined by the DOE at the time at such an inspection becomes necessary. It is conceivable that a Phase II inspection could be carried out in two or more steps. The first step would be an on-site visit to gather firsthand knowledge for the development of a plan of action to conduct the tests necessary to understand the phenomenon in progress. Follow up visits would then be undertaken to gather the data needed to draw conclusions and recommend mitigative or remedial actions.

Once the Phase I inspection has identified a potential problem, the DOE will notify the NRC and begin a Phase II inspection by submitting a preliminary assessment of the potential problem and a Phase II inspection plan. Upon plan approval by the NRC, the plan will be implemented by the DOE. Once the Phase II inspection has been completed, the DOE will recommend maintenance or other actions to be performed, as needed.

4.4 CONTINGENCY (CORRECTIVE ACTION) INSPECTIONS

4.4.1 Need for inspection

Contingency (corrective action) inspections are unscheduled, situation-unique inspections ordered by the DOE when it receives outside information that indicates site integrity at the Tuba City site has been or may be threatened. The trigger event for a contingency inspection may be a report of continuing intrusion by livestock, a large rainstorm in the watershed, or some other unusual event, such as an earthquake.

The DOE will become aware of unusual events at the Tuba City disposal site through notification by the state, local, and Federal agencies that are presented in Section 4.4.2, below. Once the DOE has been notified, an immediate site inspection will be conducted. The type of contingency inspections to be conducted will be specified by the DOE. These inspections

may be conducted by the DOE or by local or tribal officials, as the specific situation warrants. The NRC shall also be notified in the event a contingency inspection is required.

Procedures for conducting contingency inspections have not been established; however, it is anticipated that these inspections will be carried out in a manner similar to Phase II inspections (Section 4.3, above).

4.4.2 Notification procedures

To become aware of unusual events, the DOE shall establish notification procedures with the agencies listed below:

- o National Weather Service, Tucson, Arizona.
- o Earthquake Information Center, Denver, Colorado.
- o Navajo Tribal Police, Tuba City, Arizona.
- o Hopi Tribal Police, Moenkopi Village, Arizona.
- o Bureau of Indian Affairs Police, Tuba City, Arizona.
- o Arizona Department of Public Safety, Flagstaff, Arizona.

The DOE will execute written agreements with the above agencies regarding notification procedures. As part of these agreements, procedures for maintaining or updating notification requirements will be included in each agreement. These agreements will be included in the final SMP and become part of the permanent site file.

The National Weather Service shall notify the DOE at its 24-hour telephone number within eight hours of a Coconino County, Arizona, notification of a flash flood or tornado warning.

The Earthquake Information Center shall notify the DOE if the following seismic events occur (Richter Scale):

- o 3 to 5 within 5 km.
- o 5 to 6 within 10 km.
- o 6 to 7 within 20 km.
- o 7+ within 65 km.

The local police shall notify the DOE should human intrusion (e.g., fence destroyed/removal), fire, or other unusual events occur.

5.0 CUSTODIAL MAINTENANCE

Regularly scheduled custodial maintenance is not considered necessary and is not scheduled for the Tuba City disposal site at this time. However, it is anticipated that over the lifetime of the site some custodial maintenance will be required. For example, replacement of signs, repair to the site fence, removal of tumbleweeds or other debris from the diversion channels, or regularly scheduled removal of vegetation from the disposal cell may be required. In addition, replacement of the entry sign (Section 2.3.4) will be required whenever the DOE 24-hour telephone number is changed.

It is anticipated that activities described above could be conducted without the need for an annual inspection. A final determination will be made following completion of the final site inspection and will be included in the final SMP.

6.0 REPORTING AND RECORD KEEPING

A permanent site file maintained by the DOE or other responsible agency will contain all the information necessary to prepare for, and conduct, site surveillance and maintenance. Carefully compiled, complete, accurate reports of site surveillance and maintenance activities will be maintained in a manner to ensure their long-term survival. Reports and records will:

- Provide the DOE and the NRC with the information necessary to forecast future site surveillance and maintenance.
- Provide information, which will be available to the public, that will demonstrate site integrity has been maintained.
- Demonstrate to the NRC that license provisions continue to be met.

Archival procedures for records will be those set forth in the Code of Federal Regulations; Title 41, Public Contractors and Property Management; Chapter 101, Federal Property Management Regulations; Subchapter B, Archives and Records; Section 101-11, Records Management (41 CFR 101-11). This information can also be made available to the public. Section 7.0 of the Guidance Document (DOE, 1986b) provides a complete description (including archival procedures) of the following components in the site file:

- Site characterization documents and site certification report.
- Final site conditions, including all as-built drawings, maps, photographs (site and aerial), and locations of all site surveillance and maintenance features and monitor wells.
- Site inspections including all Phase I, II, and contingency inspection reports.
- Groundwater monitoring records and reports (submitted to the NRC every two years).
- Maintenance and corrective action or repair records and reports.

All records and reports will be retained in an active site file for a period of time not yet specified. At the end of the specified retention period, this information will be microfiched (or equivalent) and stored in the archives of the responsible agency.

The DOE will provide an annual report to the NRC that summarizes, describes, and evaluates all surveillance and maintenance actions, including information necessary to forecast future site surveillance and maintenance, at the Tuba City disposal site, and certifies that site license requirements continue to be met. A copy of all inspection, monitoring, maintenance, and contingency repair reports for the reporting period will be appended to the annual report. This information will be available to the public to demonstrate that site integrity has been maintained.

REFERENCES

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EPA (U.S. Environmental Protection Agency), 1989. "Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities-Interim Final Guidance," EPA/530-SW-89-026, Office of Solid Waste, Waste Management Division, Washington, D.C.

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Mukhopadhyay, B., 1989. Updates on Screening of the Hazardous Organic Constituents at UMTRA Title I Sites, memo dated October 16, 1989.

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ATTACHMENT 1

GROUNDWATER QUALITY BY LOCATION

TUBA CITY, ARIZONA, DISPOSAL SITE

GROUND WATER QUALITY DATA BY LOCATION
SITE: TUBA CITY
12/18/84 TO 12/12/88
REPORT DATE: 02/02/90

FORMATION OF COMPLETION: NAVAJO SANDSTONE
HYDRAULIC FLOW RELATIONSHIP: UP GRADIENT

		LOCATION ID - SAMPLE ID AND LOG DATE							
		901-01 12/18/84		901-01 03/26/85		901-02 03/26/85		901-03 03/26/85	
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE	+/- UNCERTAINTY	PARAMETER VALUE	+/- UNCERTAINTY	PARAMETER VALUE	+/- UNCERTAINTY	PARAMETER VALUE	+/- UNCERTAINTY
ALKALINITY	MG/L CACO3	110.00		107.00		107.00		107.00	
ALUMINUM	MG/L	< 0.10		< 0.10		< 0.10		< 0.10	
AMMONIUM	MG/L	0.10		0.10		0.20		< 0.10	
ANTIMONY	MG/L	< 0.003		< 0.003		< 0.003		< 0.003	
ARSENIC	MG/L	< 0.01		< 0.01		< 0.01		< 0.01	
BARIUM	MG/L	< 0.10		0.10		< 0.10		< 0.10	
BERYLLIUM	MG/L	-		-		-		-	
BORON	MG/L	0.01		-		0.10		0.10	
CADMIUM	MG/L	< 0.001		< 0.001		< 0.001		0.002	
CALCIUM	MG/L	32.20		30.00		30.00		30.00	
CHLORIDE	MG/L	12.00		-		10.00		10.00	
CHROMIUM	MG/L	< 0.01		< 0.01		< 0.01		< 0.01	
COBALT	MG/L	< 0.05		< 0.05		< 0.05		< 0.05	
COND.IN-SITU	UMHO/CM	-		195.00		195.00		195.00	
CONDUCTANCE	UMHO/CM	438.00		-		-		-	
COPPER	MG/L	< 0.02		< 0.02		< 0.02		< 0.02	
CYANIDE	MG/L	-		< 0.01		< 0.01		< 0.01	
FLUORIDE	MG/L	0.24		-		0.20		0.20	
GROSS ALPHA	PCI/L	-		< 2.00	0.50000	-		-	
GROSS BETA	PCI/L	-		2.00	0.20000	-		-	
IRON	MG/L	< 0.03		< 0.03		< 0.03		< 0.03	
LEAD	MG/L	< 0.01		< 0.01		< 0.01		< 0.01	
MAGNESIUM	MG/L	7.14		5.20		5.20		5.30	
MANGANESE	MG/L	0.10		0.01		0.01		0.01	
MERCURY	MG/L	< 0.0002		< 0.0002		< 0.0002		< 0.0002	
MOLYBDENUM	MG/L	< 0.01		< 0.01		< 0.01		< 0.01	
NICKEL	MG/L	< 0.04		< 0.04		< 0.04		< 0.04	
NITRATE	MG/L	10.00		-		12.00		12.00	
NITRITE	MG/L	-		-		-		-	
NO2 & NO3	MG/L	-		-		< 0.10		< 0.10	
ORG. CARBON	MG/L	3.20		1.00		1.00		5.00	
PB-210	PCI/L	< 1.50		0.90	0.80000	0.50	0.80000	0.40	0.80000
PH	SU	7.94		7.86		7.86		7.86	
PHOSPHATE	MG/L	< 0.15		-		< 0.10		< 0.10	
PO-210	PCI/L	< 1.00		0.10	0.50000	0.00	0.40000	-0.10	0.40000
POTASSIUM	MG/L	1.20		1.20		1.30		1.20	
RA-226	PCI/L	< 1.00		-0.10	0.30000	0.40	0.30000	0.10	0.30000
RA-228	PCI/L	< 1.00		0.30	0.80000	0.00	1.40000	0.10	0.60000
SELENIUM	MG/L	< 0.005		< 0.005		0.005		< 0.005	
SILCON	MG/L	6.40		-		-		-	
SILICA	MG/L	-		-		12.00		12.00	
SILVER	MG/L	< 0.01		< 0.01		< 0.01		< 0.01	
SODIUM	MG/L	15.00		16.00		16.00		16.00	
STRONTIUM	MG/L	0.59		0.40		0.30		0.40	
SULFATE	MG/L	70.00		-		17.00		16.00	
SULFIDE	MG/L	-		< 0.10		< 0.10		< 0.10	
TEMP.IN-SITU	C-DEGREE	-		15.00		15.00		15.00	
TEMPERATURE	C - DEGREE	15.00		-		-		-	
TH-230	PCI/L	< 1.00		0.00	0.20000	0.00	0.20000	0.10	0.20000
THALLIUM	MG/L	-		-		-		-	
TIN	MG/L	< 0.005		0.007		0.008		0.008	
TOTAL SOLIDS	MG/L	260.00		-		160.00		160.00	
TOX	MG/L	-		< 0.10		-		-	
U-234	PCI/L	2.00		-		-		-	
U-238	PCI/L	1.00		-		-		-	
URANIUM	MG/L	-		0.01		0.005		0.005	
VANADIUM	MG/L	0.02		0.01		0.01		0.01	

GROUND WATER QUALITY DATA BY LOCATION
SITE: TUBA CITY
12/18/84 TO 12/12/88
REPORT DATE: 02/02/90

FORMATION OF COMPLETION: NAVAJO SANDSTONE
HYDRAULIC FLOW RELATIONSHIP: UP GRADIENT

		LOCATION ID - SAMPLE ID AND LOG DATE							
		901-04 03/26/85		901-01 07/24/85		901-01 03/20/86		901-02 03/20/86	
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE +/-	UNCERTAINTY	PARAMETER VALUE +/-	UNCERTAINTY	PARAMETER VALUE +/-	UNCERTAINTY	PARAMETER VALUE +/-	UNCERTAINTY
ALKALINITY	MG/L CACO3	107.00		93.00		104.		104.	
ALUMINUM	MG/L	< 0.10		-		-		-	
AMMONIUM	MG/L	0.10		< 0.10		< 0.1		< 0.1	
ANTIMONY	MG/L	< 0.003		-		-		-	
ARSENIC	MG/L	< 0.01		< 0.01		-		-	
BARIUM	MG/L	< 0.10		0.10		-		-	
BERYLLIUM	MG/L	-		-		-		-	
BORON	MG/L	0.10		0.20		-		-	
CADMIUM	MG/L	0.001		0.001		< 0.001		< 0.001	
CALCIUM	MG/L	30.00		31.00		31.4		31.	
CHLORIDE	MG/L	11.00		11.00		11.		11.	
CHROMIUM	MG/L	< 0.01		< 0.01		0.02		0.02	
COBALT	MG/L	< 0.05		< 0.05		-		-	
COND,IN-SITU	UMHO/CM	195.00		-		-		-	
CONDUCTANCE	UMHO/CM	-		210.00		210.		210.	
COPPER	MG/L	< 0.02		< 0.02		-		-	
CYANIDE	MG/L	< 0.01		-		-		-	
FLUORIDE	MG/L	0.20		0.20		-		-	
GROSS ALPHA	PCI/L	-		1.00	2.00000	-		-	
GROSS BETA	PCI/L	-		-1.00	2.00000	-		-	
IRON	MG/L	0.04		< 0.03		-		-	
LEAD	MG/L	< 0.01		< 0.01		-		-	
MAGNESIUM	MG/L	5.30		5.90		5.		5.05	
MANGANESE	MG/L	0.02		< 0.01		-		-	
MERCURY	MG/L	< 0.0002		0.0002		-		-	
MOLYBDENUM	MG/L	< 0.01		< 0.01		0.2		0.19	
NICKEL	MG/L	< 0.04		< 0.04		-		-	
NITRATE	MG/L	13.00		34.00		3.		3.	
NITRITE	MG/L	-		-		< 0.1		< 0.1	
NO2 & NO3	MG/L	< 0.10		7.60		-		-	
ORG. CARBON	MG/L	< 1.00		< 1.00		-		-	
PB-210	PCI/L	0.40	0.80000	0.20	0.70000	-		-	
PH	SU	7.86		7.30		7.95		7.95	
PHOSPHATE	MG/L	< 0.10		-		-		-	
PO-210	PCI/L	0.00	0.40000	-0.10	0.30000	-		-	
POTASSIUM	MG/L	1.30		1.10		1.2		1.19	
RA-226	PCI/L	0.20	0.30000	-0.10	0.20000	-		-	
RA-228	PCI/L	0.10	0.80000	0.00	0.80000	-		-	
SELENIUM	MG/L	< 0.005		< 0.005		< 0.005		< 0.005	
SILCON	MG/L	-		-		-		-	
SILICA	MG/L	11.00		-		-		-	
SILVER	MG/L	< 0.01		< 0.01		-		-	
SULFATE	MG/L	15.00		15.00		17.		17.	
SULFIDE	MG/L	< 0.10		< 0.10		-		-	
TEMP,IN-SITU	C-DEGREE	15.00		-		-		-	
TEMPERATURE	C - DEGREE	-		16.00		15.		15.	
TH-230	PCI/L	0.00	0.20000	0.00	0.10000	-		-	
THALLIUM	MG/L	-		-		-		-	
TIN	MG/L	0.008		< 0.50		-		-	
TOTAL SOLIDS	MG/L	160.00		80.00		160.		160.	
TOX	MG/L	-		-		-		-	
U-234	PCI/L	-		-		-		-	
U-238	PCI/L	-		-		-		-	
URANIUM	MG/L	0.004		0.006		0.0057		0.006	
VANADIUM	MG/L	0.01		< 0.01		-		-	
ZINC	MG/L	0.008		0.008		-		-	

GROUND WATER QUALITY DATA BY LOCATION
SITE: TUBA CITY
12/18/84 TO 12/12/88
REPORT DATE: 02/02/90

FORMATION OF COMPLETION: NAVAJO SANDSTONE
HYDRAULIC FLOW RELATIONSHIP: UP GRADIENT

PARAMETER	UNIT OF MEASURE	LOCATION ID - SAMPLE ID AND LOG DATE: 901-03 03/20/86	901-04 03/20/86	901-05 03/20/86	901-01 05/12/88
		PARAMETER VALUE +/- UNCERTAINTY	PARAMETER VALUE +/- UNCERTAINTY	PARAMETER VALUE +/- UNCERTAINTY	PARAMETER VALUE +/- UNCERTAINTY
ALKALINITY	MG/L CACO3	104.	104.	104.	75.
ALUMINUM	MG/L	-	-	-	< 0.01
AMMONIUM	MG/L	< 0.1	< 0.1	< 0.1	< 0.1
ANTIMONY	MG/L	-	-	-	-
ARSENIC	MG/L	-	-	-	< 0.001
BARIUM	MG/L	-	-	-	-
BERYLLIUM	MG/L	-	-	-	-
BORON	MG/L	-	-	-	-
CADMIUM	MG/L	< 0.001	< 0.001	< 0.001	< 0.001
CALCIUM	MG/L	34.2	34.	34.3	34.9
CHLORIDE	MG/L	11.	10.	11.	11.
CHROMIUM	MG/L	0.02	0.02	0.02	< 0.01
COBALT	MG/L	-	-	-	-
COND.IN-SITU	UMHO/CM	-	-	-	-
CONDUCTANCE	UMHO/CM	240.	240.	240.	225.
COPPER	MG/L	-	-	-	-
CYANIDE	MG/L	-	-	-	-
FLUORIDE	MG/L	-	-	-	-
GROSS ALPHA	PCI/L	-	-	-	3.3 2.2
GROSS BETA	PCI/L	-	-	-	3.3 1.3
IRON	MG/L	-	-	-	< 0.01
LEAD	MG/L	-	-	-	< 0.01
MAGNESIUM	MG/L	4.99	4.95	4.99	6.28
MANGANESE	MG/L	-	-	-	< 0.01
MERCURY	MG/L	-	-	-	-
MOLYBDENUM	MG/L	0.2	0.2	0.18	< 0.01
NICKEL	MG/L	-	-	-	-
NITRATE	MG/L	3.	3.	3.	14.
NITRITE	MG/L	< 0.1	< 0.1	< 0.1	-
NO2 & NO3	MG/L	-	-	-	-
ORG. CARBON	MG/L	-	-	-	-
PB-210	PCI/L	-	-	-	-
PH	SU	7.95	7.95	7.95	7.96
PHOSPHATE	MG/L	-	-	-	-
PO-210	PCI/L	-	-	-	-
POTASSIUM	MG/L	1.21	1.22	1.2	1.34
RA-226	PCI/L	-	-	-	0.4 0.3
RA-228	PCI/L	-	-	-	0.2 0.9
SELENIUM	MG/L	< 0.005	< 0.005	< 0.005	< 0.005
SILCON	MG/L	-	-	-	-
SILICA	MG/L	-	-	-	11.6
SILVER	MG/L	-	-	-	-
SODIUM	MG/L	16.4	16.5	16.6	16.9
STRONTIUM	MG/L	-	-	-	-
SULFATE	MG/L	17.1	17.	16.9	16.
SULFIDE	MG/L	-	-	-	-
TEMP.IN-SITU	C-DEGREE	-	-	-	-
TEMPERATURE	C - DEGREE	15.	15.	15.	15.
TH-230	PCI/L	-	-	-	-
THALLIUM	MG/L	-	-	-	-
TIN	MG/L	-	-	-	-
TOTAL SOLIDS	MG/L	160.	162.	167.	173.
TOX	MG/L	-	-	-	-
U-234	PCI/L	-	-	-	-
U-238	PCI/L	-	-	-	-
URANIUM	MG/L	0.0049	0.0053	0.0044	0.0048
VANADIUM	MG/L	-	-	-	0.01
					< 0.005

GROUND WATER QUALITY DATA BY LOCATIC
SITE: TUBA CITY
12/18/84 TO 12/12/88
REPORT DATE: 02/02/90

FORMATION OF COMPLETION: NAVAJO SANDSTONE
HYDRAULIC FLOW RELATIONSHIP: BACKGROUND

PARAMETER	UNIT OF MEASURE	LOCATION ID - SAMPLE ID AND LOG DATE: 901-01 09/02/88 — PARAMETER VALUE +/- UNCERTAINTY		LOCATION ID - SAMPLE ID AND LOG DATE: 901-01 12/12/88 — PARAMETER VALUE +/- UNCERTAINTY		LOCATION ID - SAMPLE ID AND LOG DATE: 902-01 12/18/84 — PARAMETER VALUE +/- UNCERTAINTY		LOCATION ID - SAMPLE ID AND LOG DATE: 902-01 03/26/85 — PARAMETER VALUE +/- UNCERTAINTY	
ALKALINITY	MG/L CACO3	125.		104.		129.00		138.00	
ALUMINUM	MG/L	< 0.1		< 0.1		< 0.10		0.60	
AMMONIUM	MG/L	< 0.1		< 0.1		0.10		0.10	
ANTIMONY	MG/L	-		-		< 0.003		< 0.003	
ARSENIC	MG/L	< 0.01		< 0.01		0.02		0.01	
BARIUM	MG/L	-		-		< 0.10		< 0.10	
BERYLLIUM	MG/L	-		-		-		-	
BORON	MG/L	-		-		0.01		0.10	
CADMIUM	MG/L	< 0.001		< 0.001		< 0.001		< 0.001	
CALCIUM	MG/L	36.		36.		0.76		0.62	
CHLORIDE	MG/L	11.6		12.0		10.00		8.00	
CHROMIUM	MG/L	< 0.01		< 0.01		< 0.01		< 0.01	
COBALT	MG/L	-		-		< 0.05		< 0.05	
COND.IN-SITU	UMHO/CM	-		-		-		250.00	
CONDUCTANCE	UMHO/CM	220.		195.		366.00		-	
COPPER	MG/L	-		-		< 0.02		< 0.02	
CYANIDE	MG/L	-		-		-		< 0.01	
FLUORIDE	MG/L	-		-		0.21		0.20	
GROSS ALPHA	PCI/L	3.7	1.7	0.0	1.2	-		< 3.00	0.60000
GROSS BETA	PCI/L	1.3	1.5	1.2	1.5	-		2.00	0.20000
IRON	MG/L	< 0.03		< 0.03		< 0.03		0.17	
LEAD	MG/L	< 0.01		< 0.01		< 0.01		< 0.01	
MAGNESIUM	MG/L	6.3		6.77		0.08		0.11	
MANGANESE	MG/L	< 0.01		< 0.01		< 0.01		< 0.01	
MERCURY	MG/L	-		-		< 0.0002		< 0.0002	
MOLYBDENUM	MG/L	< 0.01		< 0.01		< 0.01		< 0.01	
NICKEL	MG/L	-		-		< 0.04		< 0.04	
NITRATE	MG/L	10.9		13.9		2.00		< 1.00	
NITRITE	MG/L	-		-		-		-	
NO2 & NO3	MG/L	-		-		-		< 0.10	
ORG. CARBON	MG/L	-		-		2.30		11.00	
PB-210	PCI/L	-		-		< 1.50		0.50	0.80000
PH	SU	7.6		7.67		9.75		9.57	
PHOSPHATE	MG/L	-		-		< 0.15		< 0.10	
PO-210	PCI/L	-		-		< 1.00		0.00	0.50000
POTASSIUM	MG/L	1.09		1.17		1.28		1.00	
RA-226	PCI/L	0.0	0.1	0.0	0.1	< 1.00		0.20	0.30000
RA-228	PCI/L	1.9	1.0	0.4	1.2	< 1.00		-0.30	0.70000
SELENIUM	MG/L	< 0.005		< 0.005		< 0.005		0.005	
SILCON	MG/L	-		-		8.10		-	
SILICA	MG/L	11.6		12.		-		16.00	
SILVER	MG/L	-		-		< 0.01		< 0.01	
SODIUM	MG/L	20.		15.3		72.20		68.00	
STRONTIUM	MG/L	-		-		0.02		< 0.10	
SULFATE	MG/L	20.		17.		70.00		12.00	
SULFIDE	MG/L	-		-		-		< 0.10	
TEMP.IN-SITU	C-DEGREE	-		-		-		17.00	
TEMPERATURE	C - DEGREE	17.0		14.0		15.00		-	
TH-230	PCI/L	-		-		< 1.00		-0.10	0.20000
THALLIUM	MG/L	-		-		-		-	
TIN	MG/L	-		-		< 0.005		0.008	
TOTAL SOLIDS	MG/L	161.		161.		220.00		190.00	
TOX	MG/L	-		-		-		< 0.10	
U-234	PCI/L	-		-		1.00		-	
U-238	PCI/L	-		-		< 1.00		-	
URANIUM	MG/L	< 0.003		0.004		-		0.01	
VANADIUM	MG/L	0.03		0.02		0.03		0.03	
ZINC	MG/L	< 0.005		< 0.005		0.019		0.008	

GROUND WATER QUALITY DATA BY LOCATION
SITE: TUBA CITY
12/18/84 TO 12/12/88
REPORT DATE: 02/02/90

FORMATION OF COMPLETION: NAVAJO SANDSTONE
HYDRAULIC FLOW RELATIONSHIP: BACKGROUND

		LOCATION ID - SAMPLE ID AND LOG DATE							
		902-01 07/23/85		904-01 01/03/85		904-01 03/27/85		904-01 07/24/85	
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE +/- UNCERTAINTY		PARAMETER VALUE +/- UNCERTAINTY		PARAMETER VALUE +/- UNCERTAINTY		PARAMETER VALUE +/- UNCERTAINTY	
ALKALINITY	MG/L CACO3	132.00		127.00		114.00		115.00	
ALUMINUM	MG/L	-		< 0.10		< 0.10		-	
AMMONIUM	MG/L	< 0.10		0.10		< 0.10		< 0.10	
ANTIMONY	MG/L	-		< 0.003		< 0.003		-	
ARSENIC	MG/L	0.02		< 0.01		< 0.01		< 0.01	
BARIUM	MG/L	0.10		< 0.10		< 0.10		0.20	
BERYLLIUM	MG/L	-		-		-		-	
BORON	MG/L	0.30		0.02		0.10		0.20	
CADMIUM	MG/L	0.002		< 0.001		0.001		0.002	
CALCIUM	MG/L	0.70		51.20		35.00		38.00	
CHLORIDE	MG/L	8.00		79.00		87.00		84.00	
CHROMIUM	MG/L	< 0.01		< 0.01		< 0.01		< 0.01	
COBALT	MG/L	-		< 0.05		< 0.05		-	
COND.IN-SITU	UMHO/CM	-		-		445.00		-	
CONDUCTANCE	UMHO/CM	250.00		647.00		-		240.00	
COPPER	MG/L	< 0.02		< 0.02		< 0.02		< 0.02	
CYANIDE	MG/L	-		-		< 0.01		-	
FLUORIDE	MG/L	0.20		0.47		0.30		0.40	
GROSS ALPHA	PCI/L	8.00	3.00000	-		< 7.00	2.00000	4.00	2.00000
GROSS BETA	PCI/L	2.00	3.00000	-		5.00	0.50000	0.00	3.00000
IRON	MG/L	0.04		< 0.03		< 0.03		< 0.03	
LEAD	MG/L	< 0.01		< 0.01		< 0.01		0.02	
MAGNESIUM	MG/L	0.15		5.87		10.00		12.00	
MANGANESE	MG/L	< 0.01		< 0.01		0.02		< 0.01	
MERCURY	MG/L	0.0002		< 0.0002		< 0.0002		0.0002	
MOLYBDENUM	MG/L	-		< 0.01		< 0.01		-	
NICKEL	MG/L	-		< 0.04		< 0.04		-	
NITRATE	MG/L	11.00		5.00		5.00		12.00	
NITRITE	MG/L	-		-		-		-	
NO2 & NO3	MG/L	2.50		-		< 0.10		2.80	
ORG. CARBON	MG/L	3.		4.80		2.00		3.00	
PB-210	PCI/L	-		< 1.50		0.40	0.80000	-	
PH	SU	9.15		9.70		8.72		7.62	
PHOSPHATE	MG/L	-		< 0.15		< 0.01		-	
PO-210	PCI/L	-		< 1.00		0.10	0.30000	-	
POTASSIUM	MG/L	1.10		2.98		2.20		1.20	
RA-226	PCI/L	0.00	0.20000	< 1.00		0.00	0.30000	0.00	0.20000
RA-228	PCI/L	-0.10	1.90000	< 1.00		0.00	0.70000	0.10	4.00000
SELENIUM	MG/L	< 0.005		< 0.005		< 0.005		0.018	
SILCON	MG/L	-		10.90		-		-	
SILICA	MG/L	-		-		23.00		-	
SILVER	MG/L	< 0.01		< 0.01		< 0.01		< 0.01	
SODIUM	MG/L	71.00		82.20		68.00		64.00	
STRONTIUM	MG/L	< 0.10		0.68		0.90		0.80	
SULFATE	MG/L	6.00		62.00		53.00		48.00	
SULFIDE	MG/L	< 0.10		-		< 0.10		< 0.10	
TEMP.IN-SITU	C-DEGREE	-		-		15.50		-	
TEMPERATURE	C - DEGREE	19.00		11.00		-		17.00	
TH-230	PCI/L	-		< 1.00		0.10	0.10000	-	
THALLIUM	MG/L	-		-		-		-	
TIN	MG/L	-		< 0.005		< 0.05		-	
TOTAL SOLIDS	MG/L	200.00		370.00		340.00		370.00	
TOX	MG/L	-		-		< 0.10		-	
U-234	PCI/L	-		2.00		-		-	
U-238	PCI/L	-		< 1.00		-		-	
URANIUM	MG/L	0.006		-		0.005		0.007	
VANADIUM	MG/L	-		< 0.01		< 0.01		-	
ZINC	MG/L	0.19		0.013		< 0.005		0.18	

GROUND WATER QUALITY DATA BY LOCATION
SITE: TUBA CITY
12/10/84 TO 12/12/88
REPORT DATE: 02/02/90

FORMATION OF COMPLETION: NAVAJO SANDSTONE
HYDRAULIC FLOW RELATIONSHIP: BACKGROUND

		LOCATION ID - SAMPLE ID AND LOG DATE							
		904-01 05/16/88		904-01 09/02/88		904-01 12/13/88		904-01 06/28/89	
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE	+/- UNCERTAINTY	PARAMETER VALUE	+/- UNCERTAINTY	PARAMETER VALUE	+/- UNCERTAINTY	PARAMETER VALUE	+/- UNCERTAINTY
ALKALINITY	MG/L CACO3	134.		142.		137.		140.	
ALUMINUM	MG/L	0.01		< 0.1		< 0.1		-	
AMMONIUM	MG/L	< 0.1		< 0.1		< 0.1		-	
ANTIMONY	MG/L	-		-		-		-	
ARSENIC	MG/L	< 0.001		< 0.01		< 0.01		< 0.01	
BARIUM	MG/L	-		-		-		0.1	
BERYLLIUM	MG/L	-		-		-		< 0.005	
BORON	MG/L	-		-		-		-	
CADMIUM	MG/L	< 0.001		< 0.001		< 0.001		< 0.001	
CALCIUM	MG/L	72.0		68.		69.		-	
CHLORIDE	MG/L	100.		111.		100.		-	
CHROMIUM	MG/L	0.01		0.01		0.01		< 0.01	
COBALT	MG/L	-		-		-		< 0.03	
COND.IN-SITU	UMHO/CM	-		-		-		-	
CONDUCTANCE	UMHO/CM	600.		550.		495.		450.	
COPPER	MG/L	-		-		-		< 0.01	
CYANIDE	MG/L	-		-		-		< 0.01	
FLUORIDE	MG/L	-		-		-		0.4	
GROSS ALPHA	PCI/L	7.6	4.6	5.0	1.8	3.3	2.8	3.6	3.1
GROSS BETA	PCI/L	3.9	1.9	5.6	2.0	0.5	2.1	2.1	1.6
IRON	MG/L	< 0.01		< 0.03		< 0.03		-	
LEAD	MG/L	< 0.01		< 0.01		< 0.01		< 0.01	
MAGNESIUM	MG/L	18.6		18.2		18.7		-	
MANGANESE	MG/L	< 0.01		< 0.01		< 0.01		-	
MERCURY	MG/L	-		-		-		< 0.0002	
MOLYBDENUM	MG/L	< 0.01		< 0.01		< 0.01		< 0.01	
NICKEL	MG/L	-		-		-		< 0.04	
NITRATE	MG/L	7.8		9.3		7.8		12.4	
NITRITE	MG/L	-		-		-		-	
NO2 & NO3	MG/L	-		-		-		-	
ORG. CARBON	MG/L	-		-		-		-	
PB-210	PCI/L	-		-		-		-	
PH	SU	7.59		7.31		7.61		7.82	
PHOSPHATE	MG/L	-		-		-		-	
PO-210	PCI/L	-		-		-		-	
POTASSIUM	MG/L	0.36		0.84		1.01		-	
RA-226	PCI/L	0.2	0.2	0.2	0.1	0.5	0.2	0.1	0.2
RA-228	PCI/L	0.1	0.8	1.5	1.1	1.3	1.4	1.4	1.1
SELENIUM	MG/L	0.013		0.008		0.016		0.006	
SILCON	MG/L	-		-		-		-	
SILICA	MG/L	20.0		21.3		21.		-	
SILVER	MG/L	-		-		-		< 0.01	
SODIUM	MG/L	57.9		63.		52.		-	
STRONTIUM	MG/L	-		-		-		-	
SULFATE	MG/L	75.		71.		65.		67.	
SULFIDE	MG/L	-		-		-		< 0.1	
TEMP.IN-SITU	C-DEGREE	-		-		-		-	
TEMPERATURE	C - DEGREE	15.0		16.0		16.0		16.5	
TH-230	PCI/L	-		-		-		-	
THALLIUM	MG/L	-		-		-		< 0.1	
TIN	MG/L	-		-		-		< 0.005	
TOTAL SOLIDS	MG/L	441.		429.		413.		408.	
TOX	MG/L	-		-		-		-	
U-234	PCI/L	-		-		-		-	
U-238	PCI/L	-		-		-		-	
URANIUM	MG/L	0.0038		< 0.003		0.012		0.008	
VANADIUM	MG/L	0.01		< 0.01		< 0.01		0.02	
ZINC	MG/L	< 0.005		< 0.005		< 0.005		< 0.005	

GROUND WATER QUALITY DATA BY LOCATION
SITE: TUBA CITY
12/18/84 TO 12/12/88
REPORT DATE: 02/02/90

FORMATION OF COMPLETION: NAVAJO SANDSTONE
HYDRAULIC FLOW RELATIONSHIP: BACKGROUND

		LOCATION ID - SAMPLE ID AND LOG DATE							
		910-01 10/07/85		910-01 04/08/86		910-01 05/16/88		910-01 09/02/88	
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE +/- UNCERTAINTY		PARAMETER VALUE +/- UNCERTAINTY		PARAMETER VALUE +/- UNCERTAINTY		PARAMETER VALUE +/- UNCERTAINTY	
ALKALINITY	MG/L CACO3	105.		93.		100.		95.	
ALUMINUM	MG/L	0.1		-		< 0.01		< 0.1	
AMMONIUM	MG/L	0.1		< 0.1		< 0.1		< 0.1	
ANTIMONY	MG/L	-		-		-		-	
ARSENIC	MG/L	-		-		< 0.001		< 0.01	
BARIUM	MG/L	-		-		-		-	
BERYLLIUM	MG/L	-		-		-		-	
BORON	MG/L	0.4		-		-		-	
CADMIUM	MG/L	< 0.001		< 0.001		< 0.001		< 0.001	
CALCIUM	MG/L	30.9		31.		33.8		33.	
CHLORIDE	MG/L	9.4		11.		9.7		10.6	
CHROMIUM	MG/L	< 0.01		0.02		< 0.01		< 0.01	
COBALT	MG/L	< 0.05		-		-		-	
COND.IN-SITU	UMHO/CM	-		-		-		-	
CONDUCTANCE	UMHO/CM	200.		140.		200.		195.	
COPPER	MG/L	< 0.02		-		-		-	
CYANIDE	MG/L	< 0.001		-		-		-	
FLUORIDE	MG/L	-		-		-		-	
GROSS ALPHA	PCI/L	-		-		5.0	2.1	3.9	1.7
GROSS BETA	PCI/L	-		-		2.1	1.2	3.9	1.7
IRON	MG/L	< 0.03		-		< 0.01		< 0.03	
LEAD	MG/L	-		-		< 0.01		< 0.01	
MAGNESIUM	MG/L	6.03		5.04		5.88		6.1	
MANGANESE	MG/L	< 0.01		-		< 0.01		< 0.01	
MERCURY	MG/L	-		-		-		-	
MOLYBDENUM	MG/L	0.2		0.21		< 0.01		< 0.01	
NICKEL	MG/L	< 0.04		-		-		-	
NITRATE	MG/L	12.		3.		13.		14.0	
NITRITE	MG/L	< 0.1		< 0.1		-		-	
NO2 & NO3	MG/L	-		-		-		-	
ORG. CARBON	MG/L	-		-		-		-	
PB-210	PCI/L	-		-		-		-	
PH	SU	8.38		7.62		8.11		7.6	
PHOSPHATE	MG/L	-		-		-		-	
PO-210	PCI/L	-		-		-		-	
POTASSIUM	MG/L	2.11		1.2		0.83		1.40	
RA-226	PCI/L	-		-		0.1	0.1	0.0	0.1
RA-228	PCI/L	-		-		0.0	0.8	1.4	1.0
SELENIUM	MG/L	< 0.005		< 0.005		< 0.005		< 0.005	
SILCON	MG/L	-		-		-		-	
SILICA	MG/L	10.		-		11.7		11.7	
SILVER	MG/L	< 0.1		-		-		-	
SODIUM	MG/L	16.2		16.6		13.7		14.0	
STRONTIUM	MG/L	0.2		-		-		-	
SULFATE	MG/L	20.1		17.1		14.		15.	
SULFIDE	MG/L	-		-		-		-	
TEMP.IN-SITU	C-DEGREE	-		-		-		-	
TEMPERATURE	C - DEGREE	16.		16.		16.		16.0	
TH-230	PCI/L	-		-		-		-	
THALLIUM	MG/L	-		-		-		-	
TIN	MG/L	-		-		-		-	
TOTAL SOLIDS	MG/L	185.		158.		157.		146.	
TOX	MG/L	-		-		-		-	
U-234	PCI/L	-		-		-		-	
U-238	PCI/L	-		-		-		-	
URANIUM	MG/L	0.0034		0.0028		0.0043		< 0.003	
VANADIUM	MG/L	-		-		0.01		0.03	

GROUND WATER QUALITY DATA BY LOCATION
SITE: TUBA CITY
12/18/84 TO 12/12/88
REPORT DATE: 02/02/90

FORMATION OF COMPLETION: NAVAJO SANDSTONE
HYDRAULIC FLOW RELATIONSHIP: BACKGROUND

PARAMETER	UNIT OF MEASURE	LOCATION ID - SAMPLE ID AND LOG DATE: 910-01 12/12/88 PARAMETER VALUE +/- UNCERTAINTY	910-01 06/27/89 PARAMETER VALUE +/- UNCERTAINTY	911-01 10/07/85 PARAMETER VALUE +/- UNCERTAINTY	911-01 04/08/86 PARAMETER VALUE +/- UNCERTAINTY
ALKALINITY	MG/L CACO3	91.	101.	81.	74.
ALUMINUM	MG/L	< 0.1	-	0.2	-
AMMONIUM	MG/L	< 0.1	-	< 0.1	< 0.1
ANTIMONY	MG/L	-	-	-	-
ARSENIC	MG/L	< 0.01	< 0.01	-	-
BARIUM	MG/L	-	< 0.1	-	-
BERYLLIUM	MG/L	-	< 0.005	-	-
BORON	MG/L	-	-	0.6	-
CADMIUM	MG/L	< 0.001	< 0.001	< 0.001	< 0.001
CALCIUM	MG/L	36.	-	5.03	16.9
CHLORIDE	MG/L	11.5	-	5.4	9.
CHROMIUM	MG/L	< 0.01	< 0.01	0.02	0.02
COBALT	MG/L	-	< 0.03	< 0.05	-
COND.IN-SITU	UMHO/CM	-	-	-	-
CONDUCTANCE	UMHO/CM	205.	199.	210.	150.
COPPER	MG/L	-	< 0.01	< 0.02	-
CYANIDE	MG/L	-	< 0.01	< 0.001	-
FLUORIDE	MG/L	-	0.2	-	-
GROSS ALPHA	PCI/L	0.0 1.1	0.5 1.8	-	-
GROSS BETA	PCI/L	1.3 1.5	0.8 0.8	-	-
IRON	MG/L	< 0.03	-	< 0.03	-
LEAD	MG/L	< 0.01	< 0.01	-	-
MAGNESIUM	MG/L	5.7	-	1.07	2.55
MANGANESE	MG/L	< 0.01	-	< 0.01	-
MERCURY	MG/L	-	< 0.0002	-	-
MOLYBDENUM	MG/L	< 0.01	< 0.01	0.09	0.18
NICKEL	MG/L	-	< 0.04	< 0.04	-
NITRATE	MG/L	16.4	21.7	16.	3.
NITRITE	MG/L	-	-	< 0.1	< 0.1
NO2 & NO3	MG/L	-	-	-	-
ORG. CARBON	MG/L	-	-	-	-
PB-210	PCI/L	-	-	-	-
PH	SU	7.91	8.05	10.1	9.46
PHOSPHATE	MG/L	-	-	-	-
PO-210	PCI/L	-	-	-	-
POTASSIUM	MG/L	1.41	-	9.87	7.57
RA-226	PCI/L	0.1 0.2	0.0 0.1	-	-
RA-228	PCI/L	0.1 1.4	0.4 1.2	-	-
SELENIUM	MG/L	< 0.005	< 0.005	< 0.005	< 0.005
SILCON	MG/L	-	-	-	-
SILICA	MG/L	10.	-	14.	-
SILVER	MG/L	-	< 0.01	< 0.01	-
SODIUM	MG/L	12.4	-	38.6	30.
STRONTIUM	MG/L	-	-	< 0.1	-
SULFATE	MG/L	16.	17.	8.2	84.9
SULFIDE	MG/L	-	< 0.1	-	-
TEMP.IN-SITU	C-DEGREE	-	-	-	-
TEMPERATURE	C - DEGREE	16.0	17.0	16.	16.
TH-230	PCI/L	-	-	-	-
THALLIUM	MG/L	-	< 0.1	-	-
TIN	MG/L	-	< 0.005	-	-
TOTAL SOLIDS	MG/L	152.	159.	209.	161.
TOX	MG/L	-	-	-	-
U-234	PCI/L	-	-	-	-
U-238	PCI/L	-	-	-	-
URANIUM	MG/L	< 0.003	0.012	0.0062	0.0018
VANADIUM	MG/L	0.02	0.01	-	-
ZINC	MG/L	0.023	< 0.005	0.099	-

GROUND WATER QUALITY DATA BY LOCATION
SITE: TUBA CITY
12/18/84 TO 12/12/88
REPORT DATE: 02/02/90

FORMATION OF COMPLETION: NAVAJO SANDSTONE
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

		LOCATION ID - SAMPLE ID AND LOG DATE							
		903-01 01/03/85		903-01 03/27/85		903-01 07/24/85		903-02 07/24/85	
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE +/- UNCERTAINTY		PARAMETER VALUE +/- UNCERTAINTY		PARAMETER VALUE +/- UNCERTAINTY		PARAMETER VALUE +/- UNCERTAINTY	
ALKALINITY	MG/L CACO3	88.00		93.00		88.00		88.00	
ALUMINUM	MG/L	< 0.10		< 0.10		-		-	
AMMONIUM	MG/L	< 0.10		< 0.10		< 0.10		< 0.10	
ANTIMONY	MG/L	< 0.003		< 0.003		-		-	
ARSENIC	MG/L	< 0.01		< 0.01		< 0.01		< 0.01	
BARIUM	MG/L	< 0.10		< 0.10		0.10		0.20	
BERYLLIUM	MG/L	-		-		-		-	
BORON	MG/L	< 0.01		0.10		0.20		0.10	
CADMIUM	MG/L	< 0.001		< 0.001		< 0.001		0.003	
CALCIUM	MG/L	37.40		38.00		37.00		39.00	
CHLORIDE	MG/L	13.00		16.00		16.00		16.00	
CHROMIUM	MG/L	< 0.01		< 0.01		< 0.01		< 0.01	
COBALT	MG/L	< 0.05		< 0.05		< 0.05		< 0.02	
COND,IN-SITU	UMHO/CM	-		230.00		-		-	
CONDUCTANCE	UMHO/CM	328.00		-		160.00		160.00	
COPPER	MG/L	< 0.06		< 0.02		< 0.02		< 0.02	
CYANIDE	MG/L	-		< 0.01		-		-	
FLUORIDE	MG/L	0.16		0.20		0.20		0.20	
GROSS ALPHA	PCI/L	-		< 3.00	0.70000	2.00	2.00000	2.00	2.00000
GROSS BETA	PCI/L	-		2.00	0.20000	2.00	3.00000	3.00	3.00000
IRON	MG/L	< 0.03		< 0.03		< 0.03		< 0.03	
LEAD	MG/L	< 0.01		< 0.01		< 0.01		< 0.01	
MAGNESIUM	MG/L	8.22		7.30		8.20		8.10	
MANGANESE	MG/L	< 0.01		< 0.01		< 0.01		< 0.01	
MERCURY	MG/L	< 0.0002		< 0.0002		< 0.0002		0.0029	
MOLYBDENUM	MG/L	< 0.01		< 0.01		< 0.01		< 0.01	
NICKEL	MG/L	< 0.04		< 0.04		< 0.04		< 0.04	
NITRATE	MG/L	28.00		10.00		24.00		24.00	
NITRITE	MG/L	-		-		-		-	
NO2 & NO3	MG/L	-		< 0.10		5.50		5.40	
ORG. CARBON	MG/L	1.50		1.00		< 1.00		5.00	
PB-210	PCI/L	< 1.50		0.20	0.70000	0.80	0.80000	0.30	0.70000
PH	SU	7.83		7.20		7.86		7.86	
PHOSPHATE	MG/L	< 0.15		< 0.10		-		-	
PO-210	PCI/L	< 1.00		0.60	0.60000	0.10	0.50000	-0.10	0.30000
POTASSIUM	MG/L	1.78		1.60		1.50		1.60	
RA-226	PCI/L	< 1.00		1.40	0.40000	1.00	0.30000	0.90	0.20000
RA-228	PCI/L	1.50		-0.70	0.70000	-0.20	0.80000	0.60	0.80000
SELENIUM	MG/L	< 0.005		< 0.005		< 0.005		0.007	
SILCON	MG/L	5.60		-		-		-	
SILICA	MG/L	-		12.00		-		-	
SILVER	MG/L	< 0.01		< 0.01		< 0.01		< 0.01	
SODIUM	MG/L	10.40		11.00		9.00		11.00	
STRONTIUM	MG/L	0.65		0.60		0.60		0.70	
SULFATE	MG/L	44.00		20.00		18.00		18.00	
SULFIDE	MG/L	-		< 0.10		< 0.10		< 0.10	
TEMP,IN-SITU	C-DEGREE	-		15.00		-		-	
TEMPERATURE	C - DEGREE	12.00		-		19.00		19.00	
TH-230	PCI/L	< 1.00		0.00	0.20000	0.00	0.10000	-0.10	0.10000
THALLIUM	MG/L	-		-		-		-	
TIN	MG/L	< 0.005		0.007		< 0.50		< 0.50	
TOTAL SOLIDS	MG/L	190.00		180.00		120.00		180.00	
TOX	MG/L	-		< 0.10		-		-	
U-234	PCI/L	2.00		-		-		-	
U-238	PCI/L	< 1.00		-		-		-	
URANIUM	MG/L	-		0.004		0.004		0.005	
VANADIUM	MG/L	< 0.01		0.01		< 0.01		0.01	
						0.008		0.009	

GROUND WATER QUALITY DATA BY LOCATION
SITE: TUBA CITY
12/18/84 TO 12/12/88
REPORT DATE: 02/02/90

FORMATION OF COMPLETION: NAVAJO SANDSTONE
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

		LOCATION ID - SAMPLE ID AND LOG DATE							
		903-03 07/24/85		903-04 07/24/85		903-05 07/24/85		903-01 04/03/86	
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE +/-	UNCERTAINTY	PARAMETER VALUE +/-	UNCERTAINTY	PARAMETER VALUE +/-	UNCERTAINTY	PARAMETER VALUE +/-	UNCERTAINTY
ALKALINITY	MG/L CACO3	88.00		88.00		88.00		98.	
ALUMINUM	MG/L	-		-		-		-	
AMMONIUM	MG/L	< 0.10		< 0.10		< 0.10		0.3	
ANTIMONY	MG/L	-		-		-		-	
ARSENIC	MG/L	< 0.01		< 0.01		< 0.01		-	
BARIUM	MG/L	0.10		0.20		0.20		-	
BERYLLIUM	MG/L	-		-		-		-	
BORON	MG/L	0.20		0.20		0.20		-	
CADMIUM	MG/L	< 0.001		0.003		0.003		< 0.001	
CALCIUM	MG/L	38.00		39.00		39.00		38.6	
CHLORIDE	MG/L	16.00		16.00		15.00		16.	
CHROMIUM	MG/L	< 0.01		< 0.01		< 0.01		0.02	
COBALT	MG/L	< 0.05		< 0.05		< 0.05		-	
COND.IN-SITU	UMHO/CM	-		-		-		-	
CONDUCTANCE	UMHO/CM	160.00		160.00		160.00		240.	
COPPER	MG/L	< 0.02		< 0.02		< 0.02		-	
CYANIDE	MG/L	-		-		-		-	
FLUORIDE	MG/L	0.20		0.20		0.20		-	
GROSS ALPHA	PCI/L	2.00	2.00000	3.00	2.00000	3.00	2.00000	-	
GROSS BETA	PCI/L	4.00	3.00000	3.00	3.00000	4.00	3.00000	-	
IRON	MG/L	< 0.03		0.09		< 0.03		-	
LEAD	MG/L	< 0.01		< 0.01		< 0.01		-	
MAGNESIUM	MG/L	8.00		8.10		8.20		7.79	
MANGANESE	MG/L	0.01		< 0.01		< 0.01		-	
MERCURY	MG/L	0.0004		0.0002		< 0.0002		-	
MOLYBDENUM	MG/L	< 0.01		< 0.01		< 0.01		0.1	
NICKEL	MG/L	< 0.04		< 0.04		< 0.04		-	
NITRATE	MG/L	24.00		25.00		25.00		5.	
NITRITE	MG/L	-		-		-		< 0.1	
NO2 & NO3	MG/L	5.50		5.70		5.70		-	
ORG. CARBON	MG/L	3.00		2.00		3.00		-	
PB-210	PCI/L	0.20	0.70000	0.20	0.70000	0.00	0.70000	-	
PH	SU	7.86		7.86		7.86		7.84	
PHOSPHATE	MG/L	-		-		-		-	
PO-210	PCI/L	-0.10	0.30000	-0.20	0.30000	0.00	0.30000	-	
POTASSIUM	MG/L	1.60		1.60		1.60		1.67	
RA-226	PCI/L	1.30	0.20000	1.10	0.30000	1.10	0.20000	-	
RA-228	PCI/L	0.00	0.90000	-0.50	0.70000	-0.40	1.00000	-	
SELENIUM	MG/L	< 0.005		< 0.005		< 0.005		< 0.005	
SILCON	MG/L	-		-		-		-	
SILICA	MG/L	-		-		-		-	
SILVER	MG/L	< 0.01		< 0.01		< 0.01		-	
SODIUM	MG/L	11.00		11.00		11.00		12.1	
STRONTIUM	MG/L	0.70		0.70		0.70		-	
SULFATE	MG/L	19.00		15.00		18.00		38.6	
SULFIDE	MG/L	< 0.10		< 0.10		< 0.10		-	
TEMP.IN-SITU	C-DEGREE	-		-		-		-	
TEMPERATURE	C - DEGREE	19.00		19.00		19.00		16.	
TH-230	PCI/L	0.00	0.10000	0.00	0.10000	0.00	0.10000	-	
THALLIUM	MG/L	-		-		-		-	
TIN	MG/L	< 0.50		< 0.50		< 0.50		-	
TOTAL SOLIDS	MG/L	180.00		190.00		180.00		190.	
TOX	MG/L	-		-		-		-	
U-234	PCI/L	-		-		-		-	
U-238	PCI/L	-		-		-		-	
URANIUM	MG/L	0.004		0.004		0.005		0.0047	
VANADIUM	MG/L	< 0.01		< 0.01		< 0.01		-	
ZINC	MG/L	0.007		0.006		0.018		-	

GROUND WATER QUALITY DATA BY LOCATION
SITE: TUBA CITY
12/18/84 TO 12/12/88
REPORT DATE: 02/02/90

FORMATION OF COMPLETION: NAVAJO SANDSTONE
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

PARAMETER	UNIT OF MEASURE	LOCATION ID - SAMPLE ID AND LOG DATE: 903-01 05/16/88 PARAMETER VALUE	+/- UNCERTAINTY	903-01 09/02/88 PARAMETER VALUE	+/- UNCERTAINTY	903-01 12/13/88 PARAMETER VALUE	+/- UNCERTAINTY	903-01 06/26/89 PARAMETER VALUE	+/- UNCERTAINTY
ALKALINITY	MG/L CACO3	82.		88.		102.		95.	
ALUMINUM	MG/L	0.01		< 0.1		< 0.1		-	
AMMONIUM	MG/L	< 0.1		< 0.1		< 0.1		-	
ANTIMONY	MG/L	-		-		-		-	
ARSENIC	MG/L	< 0.001		< 0.01		< 0.01		< 0.01	
BARIUM	MG/L	-		-		-		0.1	
BERYLLIUM	MG/L	-		-		-		< 0.005	
BORON	MG/L	-		-		-		-	
CADMIUM	MG/L	< 0.001		< 0.001		< 0.001		< 0.001	
CALCIUM	MG/L	44.2		44.		46.		-	
CHLORIDE	MG/L	16.		15.7		16.2		-	
CHROMIUM	MG/L	< 0.01		< 0.01		< 0.01		< 0.01	
COBALT	MG/L	-		-		-		< 0.03	
COND.IN-SITU	UMHO/CM	-		-		-		-	
CONDUCTANCE	UMHO/CM	260.		255.		255.		246.	
COPPER	MG/L	-		-		-		< 0.01	
CYANIDE	MG/L	-		-		-		< 0.01	
FLUORIDE	MG/L	-		-		-		0.2	
GROSS ALPHA	PCI/L	4.3	2.5	21.	3.2	5.8	2.3	2.5	2.6
GROSS BETA	PCI/L	3.0	1.3	12.	2.2	2.7	1.7	1.2	1.4
IRON	MG/L	< 0.01		< 0.03		< 0.03		-	
LEAD	MG/L	< 0.01		< 0.01		< 0.01		< 0.01	
MAGNESIUM	MG/L	9.03		9.3		10.0		-	
MANGANESE	MG/L	< 0.01		< 0.01		< 0.01		-	
MERCURY	MG/L	-		-		-		< 0.0002	
MOLYBDENUM	MG/L	< 0.01		< 0.01		< 0.01		< 0.01	
NICKEL	MG/L	-		-		-		< 0.04	
NITRATE	MG/L	31.		26.2		35.7		37.	
NITRITE	MG/L	-		-		-		-	
NO2 & NO3	MG/L	-		-		-		-	
ORG. CARBON	MG/L	-		-		-		-	
PB-210	PCI/L	-		-		-		-	
PH	SU	7.58		7.27		7.56		7.83	
PHOSPHATE	MG/L	-		-		-		-	
PO-210	PCI/L	-		-		-		-	
POTASSIUM	MG/L	1.22		1.48		1.57		-	
RA-226	PCI/L	0.4	0.2	0.4	0.2	0.2	0.1	0.4	0.3
RA-228	PCI/L	0.0	0.8	0.9	1.0	1.3	1.3	1.9	1.1
SELENIUM	MG/L	< 0.005		< 0.005		< 0.005		< 0.005	
SILCON	MG/L	-		-		-		-	
SILICA	MG/L	11.9		12.1		12.		-	
SILVER	MG/L	-		-		-		< 0.01	
SODIUM	MG/L	11.0		11.3		9.5		-	
STRONTIUM	MG/L	-		-		-		-	
SULFATE	MG/L	26.		27.		27.		34.	
SULFIDE	MG/L	-		-		-		< 0.1	
TEMP.IN-SITU	C-DEGREE	-		-		-		-	
TEMPERATURE	C - DEGREE	15.0		16.0		16.5		16.0	
TH-230	PCI/L	-		-		-		-	
THALLIUM	MG/L	-		-		-		< 0.1	
TIN	MG/L	-		-		-		< 0.005	
TOTAL SOLIDS	MG/L	202.		188.		203.		212.	
TOX	MG/L	-		-		-		-	
U-234	PCI/L	-		-		-		-	
U-238	PCI/L	-		-		-		-	
URANIUM	MG/L	0.0045		< 0.003		< 0.003		0.007	
VANADIUM	MG/L	0.01		0.02		0.02		0.02	
ZINC	MG/L	< 0.005		-		-		-	

GROUND WATER QUALITY DATA BY LOCATION
SITE: TUBA CITY
12/18/84 TO 12/12/88
REPORT DATE: 02/02/90

FORMATION OF COMPLETION: NAVAJO SANDSTONE
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

		LOCATION ID - SAMPLE ID AND LOG DATE							
		908-01 04/29/85		908-01 03/29/85		908-02 03/29/85		908-03 03/29/85	
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE	+/- UNCERTAINTY	PARAMETER VALUE	+/- UNCERTAINTY	PARAMETER VALUE	+/- UNCERTAINTY	PARAMETER VALUE	+/- UNCERTAINTY
ALKALINITY	MG/L CACO3	1105.00		1243.00		1243.00		1243.00	
ALUMINUM	MG/L	< 0.10		< 0.10		< 0.10		< 0.10	
AMMONIUM	MG/L	89.00		110.00		110.00		110.00	
ANTIMONY	MG/L	< 0.003		< 0.003		< 0.003		< 0.003	
ARSENIC	MG/L	< 0.01		< 0.01		< 0.01		< 0.01	
BARIUM	MG/L	< 0.10		< 0.10		< 0.10		< 0.10	
BERYLLIUM	MG/L	-		-		-		-	
BORON	MG/L	0.15		0.30		0.30		0.30	
CADMIUM	MG/L	< 0.001		0.036		0.033		0.039	
CALCIUM	MG/L	537.00		540.00		520.00		550.00	
CHLORIDE	MG/L	120.00		120.00		100.00		96.00	
CHROMIUM	MG/L	< 0.01		0.04		0.04		0.04	
COBALT	MG/L	< 0.05		0.08		0.06		0.06	
COND, IN-SITU	UMHO/CM	-		6000.00		6000.00		6000.00	
CONDUCTANCE	UMHO/CM	8590.00		-		-		-	
COPPER	MG/L	< 0.02		0.02		0.03		0.02	
CYANIDE	MG/L	-		< 0.01		< 0.01		< 0.01	
FLUORIDE	MG/L	0.16		< 0.10		< 0.10		< 0.10	
GROSS ALPHA	PCI/L	-		< 120.00	25.00000	-		-	
GROSS BETA	PCI/L	-		76.00	7.00000	-		-	
IRON	MG/L	< 0.03		0.05		0.05		0.05	
LEAD	MG/L	< 0.01		< 0.01		< 0.01		< 0.01	
MAGNESIUM	MG/L	817.00		740.00		670.00		700.00	
MANGANESE	MG/L	0.29		0.33		0.32		0.33	
MERCURY	MG/L	< 0.0002		< 0.0002		< 0.0002		< 0.0002	
MOLYBDENUM	MG/L	< 0.01		< 0.01		< 0.01		< 0.01	
NICKEL	MG/L	< 0.04		0.19		0.17		0.21	
NITRATE	MG/L	1300.00		1300.00		1300.00		1300.00	
NITRITE	MG/L	-		-		-		-	
NO2 & NO3	MG/L	-		0.70		0.70		0.70	
ORG. CARBON	MG/L	-		4.00		4.00		2.00	
PB-210	PCI/L	< 1.50		0.90	0.90000	0.70	0.80000	0.90	0.80000
PH	SU	6.94		6.37		6.37		6.37	
PHOSPHATE	MG/L	< 0.15		< 0.10		< 0.10		< 0.10	
PO-210	PCI/L	< 1.00		0.00	0.20000	0.10	0.30000	0.00	0.20000
POTASSIUM	MG/L	21.10		21.00		20.00		21.00	
RA-226	PCI/L	< 1.00		2.00	0.50000	0.20	0.30000	0.10	0.30000
RA-228	PCI/L	< 1.00		0.10	0.80000	0.20	0.80000	1.20	0.80000
SELENIUM	MG/L	0.04		0.058		0.06		0.053	
SILCON	MG/L	12.40		-		-		-	
SILICA	MG/L	-		26.00		26.00		25.00	
SILVER	MG/L	< 0.01		0.02		0.03		0.03	
SODIUM	MG/L	585.00		580.00		550.00		560.00	
STRONTIUM	MG/L	5.60		5.50		5.30		5.30	
SULFATE	MG/L	3900.00		3900.00		3900.00		3700.00	
SULFIDE	MG/L	-		< 0.10		< 0.10		< 0.10	
TEMP, IN-SITU	C-DEGREE	-		12.50		12.50		12.50	
TEMPERATURE	C - DEGREE	10.90		-		-		-	
TH-230	PCI/L	< 1.00		0.00	0.10000	0.10	0.20000	0.10	0.20000
THALLIUM	MG/L	-		-		-		-	
TIN	MG/L	< 0.005		< 0.05		< 0.05		< 0.05	
TOTAL SOLIDS	MG/L	8550.00		8200.00		8400.00		7900.00	
TOX	MG/L	-		< 0.10		-		-	
U-234	PCI/L	70.00		-		-		-	
U-238	PCI/L	37.00		-		-		-	
URANIUM	MG/L	-		0.19		0.18		0.20	
VANADIUM	MG/L	0.02		< 0.01		0.01		0.01	
ZINC	MG/L	0.111		0.066		0.068		0.06	

GROUND WATER QUALITY DATA BY LOCATION
SITE: TUBA CITY
12/10/84 TO 12/12/88
REPORT DATE: 02/02/90

FORMATION OF COMPLETION: NAVAJO SANDSTONE
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

		LOCATION ID - SAMPLE ID AND LOG DATE							
		908-04 03/29/85		908-01 07/25/85		908-01 04/03/86		908-01 05/12/88	
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE +/- UNCERTAINTY		PARAMETER VALUE +/- UNCERTAINTY		PARAMETER VALUE +/- UNCERTAINTY		PARAMETER VALUE +/- UNCERTAINTY	
ALKALINITY	MG/L CACO3	1243.00		1059.00		1025.		924.	
ALUMINUM	MG/L	< 0.10		-		-		0.78	
AMMONIUM	MG/L	120.00		98.00		96.		146.	
ANTIMONY	MG/L	< 0.003		-		-		-	
ARSENIC	MG/L	< 0.01		< 0.01		-		0.017	
BARIUM	MG/L	< 0.10		< 0.10		-		-	
BERYLLIUM	MG/L	-		-		-		-	
BORON	MG/L	0.30		0.20		-		-	
CADMIUM	MG/L	0.035		0.014		< 0.001		0.004	
CALCIUM	MG/L	550.00		530.00		545.		599.	
CHLORIDE	MG/L	100.00		130.00		53.		97.	
CHROMIUM	MG/L	0.04		0.04		0.06		0.17	
COBALT	MG/L	0.06		< 0.05		-		-	
COND,IN-SITU	UMHO/CM	6000.00		-		-		-	
CONDUCTANCE	UMHO/CM	-		6500.00		5500.		6000.	
COPPER	MG/L	0.03		0.02		-		-	
CYANIDE	MG/L	< 0.01		-		-		-	
FLUORIDE	MG/L	< 0.10		0.10		-		-	
GROSS ALPHA	PCI/L	-		170.00	100.00000	-		140.	60.
GROSS BETA	PCI/L	-		-18.00	94.00000	-		68.	24.
IRON	MG/L	0.05		0.04		-		0.13	
LEAD	MG/L	< 0.01		< 0.01		-		0.02	
MAGNESIUM	MG/L	690.00		790.00		723.		753.	
MANGANESE	MG/L	0.35		0.30		-		0.40	
MERCURY	MG/L	< 0.0002		0.0002		-		-	
MOLYBDENUM	MG/L	< 0.01		< 0.01		0.14		0.12	
NICKEL	MG/L	0.21		0.18		-		-	
NITRATE	MG/L	1500.00		1300.00		290.		1100.	
NITRITE	MG/L	-		-		< 0.1		-	
NO2 & NO3	MG/L	0.60		300.00		-		-	
ORG. CARBON	MG/L	4.00		3.00		-		-	
PB-210	PCI/L	0.60	0.80000	0.60	0.90000	-		-	
PH	SU	6.37		6.33		6.41		6.77	
PHOSPHATE	MG/L	< 0.10		-		-		-	
PO-210	PCI/L	0.30	0.60000	-0.10	0.40000	-		-	
POTASSIUM	MG/L	21.00		19.00		26.1		35.7	
RA-226	PCI/L	0.60	0.40000	0.10	0.20000	-		0.1	0.2
RA-228	PCI/L	-0.30	0.70000	0.80	0.80000	-		1.0	0.9
SELENIUM	MG/L	0.053		0.066		< 0.005		0.039	
SILCON	MG/L	-		-		-		-	
SILICA	MG/L	26.00		-		-		24.6	
SILVER	MG/L	0.02		0.01		-		-	
SODIUM	MG/L	560.00		500.00		440.		606.	
STRONTIUM	MG/L	4.80		5.60		-		-	
SULFATE	MG/L	3900.00		3600.00		4010.		3820.	
SULFIDE	MG/L	< 0.10		< 0.10		-		-	
TEMP,IN-SITU	C-DEGREE	12.50		-		-		-	
TEMPERATURE	C - DEGREE	-		17.00		16.		16.	
TH-230	PCI/L	0.00	0.10000	0.00	0.10000	-		-	
THALLIUM	MG/L	-		-		-		-	
TIN	MG/L	< 0.05		< 0.50		-		-	
TOTAL SOLIDS	MG/L	8400.00		8000.00		8350.		7640.	
TOX	MG/L	-		-		-		-	
U-234	PCI/L	-		-		-		-	
U-238	PCI/L	-		-		-		-	
URANIUM	MG/L	0.18		0.24		0.127		0.0820	
VANADIUM	MG/L	0.01		< 0.01		-		0.09	
								0.073	

GROUND WATER QUALITY DATA BY LOCATION
SITE: TUBA CITY
12/10/84 TO 12/12/88
REPORT DATE: 02/02/90

FORMATION OF COMPLETION: NAVAJO SANDSTONE
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

		LOCATION ID - SAMPLE ID AND LOG DATE							
		908-01 09/14/88		908-01 12/13/88		908-01 06/27/89		909-01 01/04/85	
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE	+/- UNCERTAINTY	PARAMETER VALUE	+/- UNCERTAINTY	PARAMETER VALUE	+/- UNCERTAINTY	PARAMETER VALUE	+/- UNCERTAINTY
ALKALINITY	MG/L CACO3	940.		916.		907.		331.00	
ALUMINUM	MG/L	< 0.1		< 0.1		-		< 0.10	
AMMONIUM	MG/L	143.		156.		-		0.20	
ANTIMONY	MG/L	-		-		-		< 0.003	
ARSENIC	MG/L	< 0.01		< 0.01		< 0.01		< 0.01	
BARIUM	MG/L	-		-		< 0.1		< 0.10	
BERYLLIUM	MG/L	-		-		< 0.005		-	
BORON	MG/L	-		-		-		0.09	
CADMIUM	MG/L	< 0.001		< 0.001		< 0.001		< 0.001	
CALCIUM	MG/L	560.		570.		-		840.00	
CHLORIDE	MG/L	104.		100.		-		216.00	
CHROMIUM	MG/L	< 0.01		< 0.01		< 0.01		< 0.01	
COBALT	MG/L	-		-		< 0.03		< 0.05	
COND.IN-SITU	UMHO/CM	-		-		-		-	
CONDUCTANCE	UMHO/CM	6100.		5000.		4900.		4890.00	
COPPER	MG/L	-		-		< 0.01		< 0.02	
CYANIDE	MG/L	-		-		< 0.01		-	
FLUORIDE	MG/L	-		-		< 0.1		< 0.01	
GROSS ALPHA	PCI/L	159.	48.	106.	50.	40.	56.	-	
GROSS BETA	PCI/L	85.	34.	27.	33.	34.	29.	-	
IRON	MG/L	< 0.03		0.03		-		1.96	
LEAD	MG/L	< 0.01		< 0.01		< 0.01		< 0.01	
MAGNESIUM	MG/L	690.		710.		-		169.00	
MANGANESE	MG/L	0.08		0.08		-		0.09	
MERCURY	MG/L	-		-		< 0.0002		< 0.0002	
MOLYBDENUM	MG/L	< 0.01		< 0.01		< 0.01		< 0.01	
NICKEL	MG/L	-		-		< 0.04		< 0.04	
NITRATE	MG/L	620.		880.		840.		1100.00	
NITRITE	MG/L	-		-		-		-	
NO2 & NO3	MG/L	-		-		-		-	
ORG. CARBON	MG/L	-		-		-		1.40	
PB-210	PCI/L	-		-		-		< 1.50	
PH	SU	6.46		6.48		6.67		6.67	
PHOSPHATE	MG/L	-		-		-		< 0.15	
PO-210	PCI/L	-		-		-		< 1.00	
POTASSIUM	MG/L	12.4		22.4		-		6.04	
RA-226	PCI/L	0.1	0.1	0.2	0.1	0.2	0.2	< 1.00	
RA-228	PCI/L	0.8	1.2	0.4	1.4	0.9	1.2	< 1.00	
SELENIUM	MG/L	0.010		0.022		0.005		0.006	
SILCON	MG/L	-		-		-		9.70	
SILICA	MG/L	23.2		21.		-		-	
SILVER	MG/L	-		-		< 0.01		< 0.01	
SODIUM	MG/L	490.		540.		-		164.00	
STRONTIUM	MG/L	-		-		-		6.96	
SULFATE	MG/L	3700.		3640.		3770.		1400.00	
SULFIDE	MG/L	-		-		< 0.1		-	
TEMP.IN-SITU	C-DEGREE	-		-		-		-	
TEMPERATURE	C - DEGREE	18.		15.5		16.8		13.00	
TH-230	PCI/L	-		-		-		< 1.00	
THALLIUM	MG/L	-		-		0.1		-	
TIN	MG/L	-		-		< 0.01		0.007	
TOTAL SOLIDS	MG/L	7300.		7290.		7220.		4470.00	
TOX	MG/L	-		-		-		-	
U-234	PCI/L	-		-		-		48.00	
U-238	PCI/L	-		-		-		22.00	
URANIUM	MG/L	0.137		0.144		0.167		-	
VANADIUM	MG/L	0.03		0.01		0.01		0.02	
ZINC	MG/L	0.005		0.033		< 0.005		0.05	

GROUND WATER QUALITY DATA BY LOCATION
SITE: TUBA CITY
12/18/84 TO 12/12/88
REPORT DATE: 02/02/90

FORMATION OF COMPLETION: NAVAJO SANDSTONE
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

PARAMETER	UNIT OF MEASURE	LOCATION ID - SAMPLE ID AND LOG DATE: 909-01 03/29/85 PARAMETER VALUE +/- UNCERTAINTY	909-01 07/24/85 PARAMETER VALUE +/- UNCERTAINTY	909-02 07/24/85 PARAMETER VALUE +/- UNCERTAINTY	909-03 07/24/85 PARAMETER VALUE +/- UNCERTAINTY
ALKALINITY	MG/L CACO3	347.00	315.00	315.00	315.00
ALUMINUM	MG/L	0.20	-	-	-
AMMONIUM	MG/L	0.20	0.40	< 0.10	< 0.10
ANTIMONY	MG/L	< 0.003	-	-	-
ARSENIC	MG/L	< 0.01	< 0.01	< 0.01	< 0.01
BARIUM	MG/L	< 0.10	0.10	< 0.10	< 0.10
BERYLLIUM	MG/L	-	-	-	-
BORON	MG/L	0.40	0.20	0.20	0.20
CADMIUM	MG/L	0.033	0.01	0.012	0.017
CALCIUM	MG/L	800.00	790.00	830.00	830.00
CHLORIDE	MG/L	200.00	240.00	240.00	240.00
CHROMIUM	MG/L	0.03	0.02	0.04	0.04
COBALT	MG/L	0.06	0.05	< 0.05	< 0.05
COND, IN-SITU	UMHO/CM	3500.00	-	-	-
CONDUCTANCE	UMHO/CM	-	3800.00	3800.00	3800.00
COPPER	MG/L	0.03	< 0.02	0.02	0.02
CYANIDE	MG/L	< 0.01	-	-	-
FLUORIDE	MG/L	< 0.10	0.10	0.10	0.10
GROSS ALPHA	PCI/L	< 70.00 ± 22.00000	43.00 ± 28.00000	35.00 ± 26.00000	32.00 ± 26.00000
GROSS BETA	PCI/L	26.00 ± 3.00000	18.00 ± 27.00000	15.00 ± 26.00000	21.00 ± 27.00000
IRON	MG/L	0.06	0.04	0.03	0.03
LEAD	MG/L	< 0.01	< 0.01	0.06	< 0.01
MAGNESIUM	MG/L	160.00	160.00	160.00	160.00
MANGANESE	MG/L	0.07	0.05	0.03	0.03
MERCURY	MG/L	< 0.0002	0.0002	< 0.0002	0.0002
MOLYBDENUM	MG/L	< 0.01	< 0.01	< 0.01	< 0.01
NICKEL	MG/L	0.18	0.16	0.15	0.14
NITRATE	MG/L	1400.00	970.00	1100.00	1000.00
NITRITE	MG/L	-	-	-	-
NO2 & NO3	MG/L	< 0.10	220.00	240.00	230.00
ORG. CARBON	MG/L	1.00	2.00	4.00	4.00
PB-210	PCI/L	0.90 ± 0.80000	0.10 ± 0.80000	0.20 ± 0.90000	-0.10 ± 0.60000
PH	SU	6.66	6.34	6.34	6.34
PHOSPHATE	MG/L	< 0.10	-	-	-
PO-210	PCI/L	0.00 ± 0.30000	-0.10 ± 0.30000	-0.10 ± 0.30000	0.00 ± 0.40000
POTASSIUM	MG/L	5.50	4.70	5.40	5.20
RA-226	PCI/L	0.10 ± 0.40000	0.50 ± 0.20000	0.70 ± 0.20000	0.10 ± 0.20000
RA-228	PCI/L	0.90 ± 0.80000	0.30 ± 0.80000	0.00 ± 0.80000	0.00 ± 0.80000
SELENIUM	MG/L	0.005	0.013	0.017	0.009
SILCON	MG/L	-	-	-	-
SILICA	MG/L	18.00	-	-	-
SILVER	MG/L	0.01	0.01	0.01	0.01
SODIUM	MG/L	160.00	170.00	170.00	170.00
STRONTIUM	MG/L	7.90	8.60	8.70	8.80
SULFATE	MG/L	1600.00	1400.00	1400.00	1400.00
SULFIDE	MG/L	< 0.10	< 0.10	< 0.10	< 0.10
TEMP, IN-SITU	C-DEGREE	14.50	-	-	-
TEMPERATURE	C - DEGREE	-	17.00	17.00	17.00
TH-230	PCI/L	0.00 ± 0.10000	0.00 ± 0.10000	-0.10 ± 0.10000	0.00 ± 0.10000
THALLIUM	MG/L	-	-	-	-
TIN	MG/L	< 0.05	< 0.50	< 0.50	< 0.50
TOTAL SOLIDS	MG/L	4600.00	4000.00	4400.00	4400.00
TOX	MG/L	0.90	-	-	-
U-234	PCI/L	-	-	-	-
U-238	PCI/L	-	-	-	-
URANIUM	MG/L	0.088	0.072	0.08	0.08
VANADIUM	MG/L	< 0.01	< 0.01	< 0.01	< 0.01
ZINC	MG/L	0.054	0.027	0.024	0.02

GROUND WATER QUALITY DATA BY LOCATIOI
SITE: TUBA CITY
12/18/84 TO 12/12/88
REPORT DATE: 02/02/90

FORMATION OF COMPLETION: NAVAJO SANDSTONE
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

		LOCATION ID - SAMPLE ID AND LOG DATE							
		909-04 07/24/85		909-05 07/24/85		909-01 05/16/88		909-01 09/14/88	
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE	+/- UNCERTAINTY	PARAMETER VALUE	+/- UNCERTAINTY	PARAMETER VALUE	+/- UNCERTAINTY	PARAMETER VALUE	+/- UNCERTAINTY
ALKALINITY	MG/L CACO3	315.00		315.00		328.		310.	
ALUMINUM	MG/L	-		-		0.28		< 0.1	
AMMONIUM	MG/L	< 0.10		< 0.10		< 0.1		< 0.1	
ANTIMONY	MG/L	-		-		-		-	
ARSENIC	MG/L	< 0.01		< 0.01		0.009		< 0.01	
BARIUM	MG/L	< 0.10		< 0.10		-		-	
BERYLLIUM	MG/L	-		-		-		-	
BORON	MG/L	0.20		0.30		-		-	
CADMIUM	MG/L	0.016		0.014		0.002		< 0.001	
CALCIUM	MG/L	790.00		830.00		811.		720.	
CHLORIDE	MG/L	240.00		240.00		220.		203.	
CHROMIUM	MG/L	0.02		0.01		0.12		< 0.01	
COBALT	MG/L	0.05		0.06		-		-	
COND, IN-SITU	UMHO/CM	-		-		-		-	
CONDUCTANCE	UMHO/CM	3800.00		3800.00		3600.		3650.	
COPPER	MG/L	0.02		0.02		-		-	
CYANIDE	MG/L	-		-		-		-	
FLUORIDE	MG/L	0.40		0.40		-		-	
GROSS ALPHA	PCI/L	65.00	43.00000	43.00	28.00000	50.	37.	72.	25.
GROSS BETA	PCI/L	8.00	49.00000	18.00	27.00000	39.	16.	59.	21.
IRON	MG/L	0.06		0.05		0.09		< 0.03	
LEAD	MG/L	< 0.01		< 0.01		0.01		< 0.01	
MAGNESIUM	MG/L	130.00		150.00		153.		141.	
MANGANESE	MG/L	0.02		0.02		0.02		< 0.01	
MERCURY	MG/L	0.0002		0.0003		-		-	
MOLYBDENUM	MG/L	< 0.01		< 0.01		0.01		< 0.01	
NICKEL	MG/L	0.17		0.15		-		-	
NITRATE	MG/L	1100.00		1000.00		1070.		730.	
NITRITE	MG/L	-		-		-		-	
NO2 & NO3	MG/L	240.00		230.00		-		-	
ORG. CARBON	MG/L	4.00		4.00		-		-	
PB-210	PCI/L	0.50	0.60000	-0.20	0.60000	-		-	
PH	SU	6.34		6.34		6.81		6.65	
PHOSPHATE	MG/L	-		-		-		-	
PO-210	PCI/L	-0.10	0.30000	0.00	0.40000	-		-	
POTASSIUM	MG/L	5.30		5.20		4.90		5.2	
RA-226	PCI/L	-0.10	0.20000	0.10	0.20000	0.1	0.2	0.2	0.2
RA-228	PCI/L	0.30	0.70000	0.20	0.90000	0.7	0.8	1.8	2.0
SELENIUM	MG/L	0.013		0.017		0.013		< 0.005	
SILCON	MG/L	-		-		-		-	
SILICA	MG/L	-		-		18.8		17.7	
SILVER	MG/L	0.01		< 0.01		-		-	
SODIUM	MG/L	120.00		170.00		178.		171.	
STRONTIUM	MG/L	5.30		8.40		-		-	
SULFATE	MG/L	1400.00		1400.00		1660.		1680.	
SULFIDE	MG/L	< 0.10		< 0.10		-		-	
TEMP, IN-SITU	C-DEGREE	-		-		-		-	
TEMPERATURE	C - DEGREE	17.00		17.00		16.5		19.0	
TH-230	PCI/L	0.00	0.10000	0.10	0.20000	-		-	
THALLIUM	MG/L	-		-		-		-	
TIN	MG/L	< 0.50		< 0.50		-		-	
TOTAL SOLIDS	MG/L	4500.00		4500.00		4610.		4270.	
TOX	MG/L	-		-		-		-	
U-234	PCI/L	-		-		-		-	
U-238	PCI/L	-		-		-		-	
URANIUM	MG/L	0.092		0.075		0.0560		0.066	
VANADIUM	MG/L	< 0.01		< 0.01		0.05		< 0.01	
ZINC	MG/L	0.037		0.034		0.026		< 0.005	

GROUND WATER QUALITY DATA BY LOCATION
SITE: TUBA CITY
12/18/84 TO 12/12/88
REPORT DATE: 02/02/90

FORMATION OF COMPLETION: NAVAJO SANDSTONE
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

		LOCATION ID - SAMPLE ID AND LOG DATE			
		909-01 12/13/88	909-01 06/28/89	912-01 08/29/85	912-01 04/11/86
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE +/- UNCERTAINTY	PARAMETER VALUE +/- UNCERTAINTY	PARAMETER VALUE +/- UNCERTAINTY	PARAMETER VALUE +/- UNCERTAINTY
ALKALINITY	MG/L CACO3	316.	316.	250.	238.
ALUMINUM	MG/L	< 0.1	-	0.4	-
AMMONIUM	MG/L	< 0.1	-	< 0.1	0.3
ANTIMONY	MG/L	-	-	-	-
ARSENIC	MG/L	< 0.01	< 0.01	-	-
BARIUM	MG/L	-	< 0.1	-	-
BERYLLIUM	MG/L	-	< 0.005	-	-
BORON	MG/L	-	-	0.4	-
CADMIUM	MG/L	< 0.001	0.001	< 0.001	0.003
CALCIUM	MG/L	890.	-	224.	217.
CHLORIDE	MG/L	210.	-	27.	30.
CHROMIUM	MG/L	< 0.01	< 0.01	< 0.01	0.03
COBALT	MG/L	-	< 0.03	< 0.05	-
COND.IN-SITU	UMHO/CM	-	-	-	-
CONDUCTANCE	UMHO/CM	3200.	3500.	1200.	700.
COPPER	MG/L	-	< 0.01	0.04	-
CYANIDE	MG/L	-	< 0.01	< 0.01	-
FLUORIDE	MG/L	-	< 0.1	-	-
GROSS ALPHA	PCI/L	29. 22.	60. 42.	-	-
GROSS BETA	PCI/L	49.0 18.0	27. 19.	-	-
IRON	MG/L	< 0.03	-	0.05	-
LEAD	MG/L	< 0.01	< 0.01	-	-
MAGNESIUM	MG/L	156.	-	45.1	48.2
MANGANESE	MG/L	< 0.01	-	0.11	-
MERCURY	MG/L	-	< 0.0002	-	-
MOLYBDENUM	MG/L	< 0.01	< 0.01	0.08	0.23
NICKEL	MG/L	-	< 0.04	0.09	-
NITRATE	MG/L	960.	890.	170.	64.
NITRITE	MG/L	-	-	< 0.01	< 0.1
NO2 & NO3	MG/L	-	-	-	-
ORG. CARBON	MG/L	-	-	-	-
PB-210	PCI/L	-	-	-	-
PH	SU	6.50	6.83	7.01	6.76
PHOSPHATE	MG/L	-	-	-	-
PO-210	PCI/L	-	-	-	-
POTASSIUM	MG/L	4.9	-	3.64	4.16
RA-226	PCI/L	0.1 0.1	0.0 0.1	-	-
RA-228	PCI/L	0.6 1.4	0.0 1.1	-	-
SELENIUM	MG/L	< 0.005	< 0.005	< 0.005	< 0.005
SILCON	MG/L	-	-	-	-
SILICA	MG/L	16.	-	12.	-
SILVER	MG/L	-	< 0.01	< 0.01	-
SODIUM	MG/L	180.	-	48.	39.3
STRONTIUM	MG/L	-	-	< 0.1	-
SULFATE	MG/L	1580.	1690.	407.	439.
SULFIDE	MG/L	-	< 0.1	-	-
TEMP.IN-SITU	C-DEGREE	-	-	-	-
TEMPERATURE	C - DEGREE	15.5	17.0	18.	17.
TH-230	PCI/L	-	-	-	-
THALLIUM	MG/L	-	< 0.1	-	-
TIN	MG/L	-	< 0.01	-	-
TOTAL SOLIDS	MG/L	4220.	4200.	1360.	1340.
TOX	MG/L	-	-	-	-
U-234	PCI/L	-	-	-	-
U-238	PCI/L	-	-	-	-
URANIUM	MG/L	0.072	0.085	0.018	0.0212
VANADIUM	MG/L	< 0.01	0.02	-	-

GROUND WATER QUALITY DATA BY LOCATION
SITE: TUBA CITY
12/18/84 TO 12/12/88
REPORT DATE: 02/02/90

FORMATION OF COMPLETION: NAVAJO SANDSTONE
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

		LOCATION ID - SAMPLE ID AND LOG DATE			
		912-02 04/11/86	912-03 04/11/86	912-04 04/11/86	912-05 04/11/86
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE +/- UNCERTAINTY	PARAMETER VALUE +/- UNCERTAINTY	PARAMETER VALUE +/- UNCERTAINTY	PARAMETER VALUE +/- UNCERTAINTY
ALKALINITY	MG/L CACO3	238.	238.	238.	238.
ALUMINUM	MG/L	-	-	-	-
AMMONIUM	MG/L	0.2	0.2	0.2	0.3
ANTIMONY	MG/L	-	-	-	-
ARSENIC	MG/L	-	-	-	-
BARIUM	MG/L	-	-	-	-
BERYLLIUM	MG/L	-	-	-	-
BORON	MG/L	-	-	-	-
CADMIUM	MG/L	0.003	0.003	0.003	0.003
CALCIUM	MG/L	247.	247.	247.	247.
CHLORIDE	MG/L	30.	30.	30.	29.
CHROMIUM	MG/L	0.03	0.03	0.03	0.03
COBALT	MG/L	-	-	-	-
COND.IN-SITU	UMHO/CM	-	-	-	-
CONDUCTANCE	UMHO/CM	700.	700.	700.	700.
COPPER	MG/L	-	-	-	-
CYANIDE	MG/L	-	-	-	-
FLUORIDE	MG/L	-	-	-	-
GROSS ALPHA	PCI/L	-	-	-	-
GROSS BETA	PCI/L	-	-	-	-
IRON	MG/L	-	-	-	-
LEAD	MG/L	-	-	-	-
MAGNESIUM	MG/L	48.3	48.1	48.2	48.2
MANGANESE	MG/L	-	-	-	-
MERCURY	MG/L	-	-	-	-
MOLYBDENUM	MG/L	0.2	0.22	0.21	0.2
NICKEL	MG/L	-	-	-	-
NITRATE	MG/L	66.	65.	65.	65.
NITRITE	MG/L	< 0.1	< 0.1	< 0.1	< 0.1
NO2 & NO3	MG/L	-	-	-	-
ORG. CARBON	MG/L	-	-	-	-
PB-210	PCI/L	-	-	-	-
PH	SU	6.76	6.76	6.76	6.76
PHOSPHATE	MG/L	-	-	-	-
PO-210	PCI/L	-	-	-	-
POTASSIUM	MG/L	4.22	4.17	4.22	4.22
RA-226	PCI/L	-	-	-	-
RA-228	PCI/L	-	-	-	-
SELENIUM	MG/L	< 0.005	< 0.005	< 0.005	< 0.005
SILCON	MG/L	-	-	-	-
SILICA	MG/L	-	-	-	-
SILVER	MG/L	-	-	-	-
SODIUM	MG/L	39.4	39.4	39.3	39.3
STRONTIUM	MG/L	-	-	-	-
SULFATE	MG/L	439.	442.	442.	438.
SULFIDE	MG/L	-	-	-	-
TEMP.IN-SITU	C-DEGREE	-	-	-	-
TEMPERATURE	C - DEGREE	17.	17.	17.	17.
TH-230	PCI/L	-	-	-	-
THALLIUM	MG/L	-	-	-	-
TIN	MG/L	-	-	-	-
TOTAL SOLIDS	MG/L	1420.	1400.	1390.	1380.
TOX	MG/L	-	-	-	-
U-234	PCI/L	-	-	-	-
U-238	PCI/L	-	-	-	-
URANIUM	MG/L	0.0204	0.0185	0.0182	0.0198
VANADIUM	MG/L	-	-	-	-
ZINC	MG/L	-	-	-	-

GROUND WATER QUALITY DATA BY LOCATION
SITE: TUBA CITY
12/10/84 TO 12/12/88
REPORT DATE: 02/02/90

FORMATION OF COMPLETION: NAVAJO SANDSTONE
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

		LOCATION ID - SAMPLE ID AND LOG DATE							
		912-01 04/28/88		912-01 09/14/88		912-02 09/14/88		912-03 09/14/88	
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE	+/- UNCERTAINTY	PARAMETER VALUE	+/- UNCERTAINTY	PARAMETER VALUE	+/- UNCERTAINTY	PARAMETER VALUE	+/- UNCERTAINTY
ALKALINITY	MG/L CACO3	305.		319.		319.		319.	
ALUMINUM	MG/L	0.11		< 0.1		< 0.1		< 0.1	
AMMONIUM	MG/L	< 0.1		< 0.1		< 0.1		< 0.1	
ANTIMONY	MG/L	-		-		-		-	
ARSENIC	MG/L	0.006		< 0.01		< 0.01		< 0.01	
BARIUM	MG/L	-		-		-		-	
BERYLLIUM	MG/L	-		-		-		-	
BORON	MG/L	-		-		-		-	
CADMIUM	MG/L	< 0.001		< 0.001		< 0.001		< 0.001	
CALCIUM	MG/L	339.		322.		323.		333.	
CHLORIDE	MG/L	35.		35.		35.		36.	
CHROMIUM	MG/L	0.07		< 0.01		< 0.01		< 0.01	
COBALT	MG/L	-		-		-		-	
COND.IN-SITU	UMHO/CM	-		-		-		-	
CONDUCTANCE	UMHO/CM	1525.		1550.		1550.		1550.	
COPPER	MG/L	-		-		-		-	
CYANIDE	MG/L	-		-		-		-	
FLUORIDE	MG/L	-		-		-		-	
GROSS ALPHA	PCI/L	79.	28.	23.	10.	28.	11.	30.	11.
GROSS BETA	PCI/L	26.	9.	7.0	7.4	11.	7.7	1.5	6.9
IRON	MG/L	0.05		< 0.03		< 0.03		< 0.03	
LEAD	MG/L	< 0.01		< 0.01		< 0.01		< 0.01	
MAGNESIUM	MG/L	65.7		63.		64.		66.	
MANGANESE	MG/L	0.01		< 0.01		< 0.01		< 0.01	
MERCURY	MG/L	-		-		-		-	
MOLYBDENUM	MG/L	0.01		< 0.01		< 0.01		< 0.01	
NICKEL	MG/L	-		-		-		-	
NITRATE	MG/L	330.		189.		221.		246.	
NITRITE	MG/L	-		-		-		-	
NO2 & NO3	MG/L	-		-		-		-	
ORG. CARBON	MG/L	-		-		-		-	
PB-210	PCI/L	-		-		-		-	
PH	SU	6.93		6.71		6.71		6.71	
PHOSPHATE	MG/L	-		-		-		-	
PO-210	PCI/L	-		-		-		-	
POTASSIUM	MG/L	3.23		4.2		4.3		4.3	
RA-226	PCI/L	0.2	0.2	0.1	0.1	0.2	0.2	0.4	0.2
RA-228	PCI/L	0.3	0.8	0.4	1.3	2.1	1.5	0.9	1.0
SELENIUM	MG/L	0.008		< 0.005		< 0.005		< 0.005	
SILCON	MG/L	-		-		-		-	
SILICA	MG/L	16.9		17.2		17.5		17.5	
SILVER	MG/L	-		-		-		-	
SODIUM	MG/L	54.0		54.		54.		56.	
STRONTIUM	MG/L	-		-		-		-	
SULFATE	MG/L	606.		630.		630.		640.	
SULFIDE	MG/L	-		-		-		-	
TEMP.IN-SITU	C-DEGREE	-		-		-		-	
TEMPERATURE	C - DEGREE	16.5		16.0		16.0		16.0	
TH-230	PCI/L	-		-		-		-	
THALLIUM	MG/L	-		-		-		-	
TIN	MG/L	-		-		-		-	
TOTAL SOLIDS	MG/L	1750.		1650.		1630.		1670.	
TOX	MG/L	-		-		-		-	
U-234	PCI/L	-		-		-		-	
U-238	PCI/L	-		-		-		-	
URANIUM	MG/L	0.0251		0.024		0.039		0.026	
VANADIUM	MG/L	0.04		0.01		0.01		0.01	

GROUND WATER QUALITY DATA BY LOCATION
SITE: TUBA CITY
12/18/84 TO 12/12/88
REPORT DATE: 02/02/90

FORMATION OF COMPLETION: NAVAJO SANDSTONE
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

		LOCATION ID - SAMPLE ID AND LOG DATE							
		942-04 09/14/88		942-05 09/14/88		942-01 12/12/88		942-01 06/27/89	
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE +/- UNCERTAINTY		PARAMETER VALUE +/- UNCERTAINTY		PARAMETER VALUE +/- UNCERTAINTY		PARAMETER VALUE +/- UNCERTAINTY	
ALKALINITY	MG/L CACO3	319.		319.		316.		339.	
ALUMINUM	MG/L	< 0.1		< 0.1		< 0.1		-	
AMMONIUM	MG/L	< 0.1		< 0.1		< 0.1		-	
ANTIMONY	MG/L	-		-		-		-	
ARSENIC	MG/L	< 0.01		< 0.01		< 0.01		< 0.01	
BARIUM	MG/L	-		-		-		< 0.1	
BERYLLIUM	MG/L	-		-		-		< 0.005	
BORON	MG/L	-		-		-		-	
CADMIUM	MG/L	< 0.001		< 0.001		0.001		< 0.001	
CALCIUM	MG/L	327.		330.		320.		-	
CHLORIDE	MG/L	37.		35.		35.		-	
CHROMIUM	MG/L	< 0.01		< 0.01		< 0.01		< 0.01	
COBALT	MG/L	-		-		-		< 0.03	
COND,IN-SITU	UMHO/CM	-		-		-		-	
CONDUCTANCE	UMHO/CM	1550.		1550.		1550.		1600.	
COPPER	MG/L	-		-		-		0.01	
CYANIDE	MG/L	-		-		-		< 0.01	
FLUORIDE	MG/L	-		-		-		< 0.1	
GROSS ALPHA	PCI/L	30.	11.	32.	11.	22.	10.0	51.	17.
GROSS BETA	PCI/L	10.	7.5	6.5	7.3	1.4	6.7	33.	8.5
IRON	MG/L	< 0.03		< 0.03		0.07		-	
LEAD	MG/L	< 0.01		< 0.01		< 0.01		< 0.01	
MAGNESIUM	MG/L	64.		65.		71.		-	
MANGANESE	MG/L	< 0.01		< 0.01		< 0.01		-	
MERCURY	MG/L	-		-		-		< 0.0002	
MOLYBDENUM	MG/L	< 0.01		< 0.01		< 0.01		< 0.01	
NICKEL	MG/L	-		-		-		< 0.04	
NITRATE	MG/L	297.		242.		274.		275.	
NITRITE	MG/L	-		-		-		-	
NO2 & NO3	MG/L	-		-		-		-	
ORG. CARBON	MG/L	-		-		-		-	
PB-210	PCI/L	-		-		-		-	
PH	SU	6.71		6.71		6.77		6.75	
PHOSPHATE	MG/L	-		-		-		-	
PO-210	PCI/L	-		-		-		-	
POTASSIUM	MG/L	4.4		4.3		4.1		-	
RA-226	PCI/L	0.2	0.1	0.2	0.1	0.7	0.1	0.1	0.2
RA-228	PCI/L	0.4	0.9	0.4	1.0	0.6	1.5	0.3	1.2
SELENIUM	MG/L	< 0.005		< 0.005		< 0.005		< 0.005	
SILCON	MG/L	-		-		-		-	
SILICA	MG/L	17.4		17.2		16.		-	
SILVER	MG/L	-		-		-		< 0.01	
SODIUM	MG/L	55.		54.		50.		-	
STRONTIUM	MG/L	-		-		-		-	
SULFATE	MG/L	630.		620.		600.		584.	
SULFIDE	MG/L	-		-		-		< 0.1	
TEMP,IN-SITU	C-DEGREE	-		-		-		-	
TEMPERATURE	C - DEGREE	16.0		16.0		17.0		20.	
TH-230	PCI/L	-		-		-		-	
THALLIUM	MG/L	-		-		-		< 0.1	
TIN	MG/L	-		-		-		< 0.005	
TOTAL SOLIDS	MG/L	1670.		1660.		1580.		1740.	
TOX	MG/L	-		-		-		-	
U-234	PCI/L	-		-		-		-	
U-238	PCI/L	-		-		-		-	
URANIUM	MG/L	0.024		0.023		0.035		0.046	
VANADIUM	MG/L	0.01		0.01		0.01		0.01	
ZINC	MG/L	< 0.005		< 0.005		< 0.005		0.006	

GROUND WATER QUALITY DATA BY LOCATION
SITE: TUBA CITY
12/18/84 TO 12/12/88
REPORT DATE: 02/02/90

FORMATION OF COMPLETION: NAVAJO SANDSTONE
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

		LOCATION ID - SAMPLE ID AND LOG DATE			
		943-01 10/09/85	943-02 10/09/85	943-03 10/09/85	943-04 10/09/85
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE +/- UNCERTAINTY	PARAMETER VALUE +/- UNCERTAINTY	PARAMETER VALUE +/- UNCERTAINTY	PARAMETER VALUE +/- UNCERTAINTY
ALKALINITY	MG/L CACO3	500.	500.	500.	500.
ALUMINUM	MG/L	0.1	0.4	0.3	0.5
AMMONIUM	MG/L	1.1	1.1	1.1	0.9
ANTIMONY	MG/L	-	-	-	-
ARSENIC	MG/L	-	-	-	-
BARIUM	MG/L	-	-	-	-
BERYLLIUM	MG/L	-	-	-	-
BORON	MG/L	0.5	0.4	0.4	0.6
CADMIUM	MG/L	< 0.001	< 0.001	< 0.001	< 0.001
CALCIUM	MG/L	48.5	39.	41.5	40.6
CHLORIDE	MG/L	0.8	4.	5.	6.
CHROMIUM	MG/L	0.05	0.06	0.06	0.05
COBALT	MG/L	< 0.05	< 0.05	< 0.05	< 0.05
COND, IN-SITU	UMHO/CM	-	-	-	-
CONDUCTANCE	UMHO/CM	2000.	2000.	2000.	2000.
COPPER	MG/L	< 0.02	< 0.02	< 0.02	< 0.02
CYANIDE	MG/L	< 0.001	< 0.001	< 0.001	< 0.001
FLUORIDE	MG/L	-	-	-	-
GROSS ALPHA	PCI/L	-	-	-	-
GROSS BETA	PCI/L	-	-	-	-
IRON	MG/L	< 0.03	0.037	< 0.03	0.039
LEAD	MG/L	-	-	-	-
MAGNESIUM	MG/L	0.021	0.024	0.036	0.028
MANGANESE	MG/L	< 0.01	< 0.01	< 0.01	< 0.01
MERCURY	MG/L	-	-	-	-
MOLYBDENUM	MG/L	0.12	0.21	0.15	0.15
NICKEL	MG/L	< 0.04	< 0.04	< 0.04	< 0.04
NITRATE	MG/L	16.	70.	66.	70.
NITRITE	MG/L	< 0.1	< 0.1	< 0.1	< 0.1
NO2 & NO3	MG/L	-	-	-	-
ORG. CARBON	MG/L	-	-	-	-
PB-210	PCI/L	-	-	-	-
PH	SU	12.17	12.17	12.17	12.17
PHOSPHATE	MG/L	-	-	-	-
PO-210	PCI/L	-	-	-	-
POTASSIUM	MG/L	119.	110.	132.	121.
RA-226	PCI/L	-	-	-	-
RA-228	PCI/L	-	-	-	-
SELENIUM	MG/L	< 0.005	< 0.005	< 0.005	< 0.005
SILCON	MG/L	-	-	-	-
SILICA	MG/L	6.	6.	6.	6.
SILVER	MG/L	< 0.01	< 0.01	< 0.01	< 0.01
SODIUM	MG/L	170.	200.	206.	154.
STRONTIUM	MG/L	2.6	2.6	2.6	2.6
SULFATE	MG/L	38.3	36.6	35.4	36.2
SULFIDE	MG/L	-	-	-	-
TEMP, IN-SITU	C-DEGREE	-	-	-	-
TEMPERATURE	C - DEGREE	17.	17.	17.	17.
TH-230	PCI/L	-	-	-	-
THALLIUM	MG/L	-	-	-	-
TIN	MG/L	-	-	-	-
TOTAL SOLIDS	MG/L	899.	918.	878.	874.
TOX	MG/L	-	-	-	-
U-234	PCI/L	-	-	-	-
U-238	PCI/L	-	-	-	-
URANIUM	MG/L	0.0072	0.0049	0.0055	0.0062
VANADIUM	MG/L	-	-	-	-

GROUND WATER QUALITY DATA BY LOCATION
SITE: TUBA CITY
12/18/84 TO 12/12/88
REPORT DATE: 02/02/90

FORMATION OF COMPLETION: NAVAJO SANDSTONE
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

		LOCATION ID - SAMPLE ID AND LOG DATE			
		913-05 10/09/85	913-01 04/10/86	914-01 08/31/85	914-01 04/09/86
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE +/- UNCERTAINTY	PARAMETER VALUE +/- UNCERTAINTY	PARAMETER VALUE +/- UNCERTAINTY	PARAMETER VALUE +/- UNCERTAINTY
ALKALINITY	MG/L CACO3	500.	65.	93.	93.
ALUMINUM	MG/L	0.4	-	0.5	-
AMMONIUM	MG/L	1.1	0.8	< 0.1	< 0.1
ANTIMONY	MG/L	-	-	-	-
ARSENIC	MG/L	-	-	-	-
BARIUM	MG/L	-	-	-	-
BERYLLIUM	MG/L	-	-	-	-
BORON	MG/L	0.5	-	0.4	-
CADMIUM	MG/L	< 0.001	< 0.001	< 0.001	< 0.001
CALCIUM	MG/L	38.7	8.52	16.2	31.9
CHLORIDE	MG/L	7.	6.	12.	14.
CHROMIUM	MG/L	0.05	0.05	< 0.01	0.02
COBALT	MG/L	< 0.05	-	< 0.05	-
COND.IN-SITU	UMHO/CM	-	-	-	-
CONDUCTANCE	UMHO/CM	2000.	140.	285.	215.
COPPER	MG/L	< 0.02	-	0.02	-
CYANIDE	MG/L	< 0.001	-	< 0.1	-
FLUORIDE	MG/L	-	-	-	-
GROSS ALPHA	PCI/L	-	-	-	-
GROSS BETA	PCI/L	-	-	-	-
IRON	MG/L	0.038	-	0.15	-
LEAD	MG/L	-	-	-	-
MAGNESIUM	MG/L	0.021	1.54	3.78	6.83
MANGANESE	MG/L	< 0.01	-	0.07	-
MERCURY	MG/L	-	-	-	-
MOLYBDENUM	MG/L	0.17	0.16	0.15	0.18
NICKEL	MG/L	< 0.04	-	< 0.04	-
NITRATE	MG/L	71.	3.	10.	3.
NITRITE	MG/L	< 0.1	< 0.1	< 0.01	< 0.1
NO2 & NO3	MG/L	-	-	-	-
ORG. CARBON	MG/L	-	-	-	-
PB-210	PCI/L	-	-	-	-
PH	SU	12.17	9.69	7.96	8.22
PHOSPHATE	MG/L	-	-	-	-
PO-210	PCI/L	-	-	-	-
POTASSIUM	MG/L	157.	10.7	1.94	2.18
RA-226	PCI/L	-	-	-	-
RA-228	PCI/L	-	-	-	-
SELENIUM	MG/L	< 0.005	< 0.005	< 0.005	< 0.005
SILCON	MG/L	-	-	-	-
SILICA	MG/L	6.	-	16.	-
SILVER	MG/L	< 0.01	-	< 0.01	-
SODIUM	MG/L	176.	20.1	48.1	14.4
STRONTIUM	MG/L	2.6	-	< 0.1	-
SULFATE	MG/L	37.	10.2	37.4	19.
SULFIDE	MG/L	-	-	-	-
TEMP.IN-SITU	C-DEGREE	-	-	-	-
TEMPERATURE	C - DEGREE	17.	17.	23.	17.
TH-230	PCI/L	-	-	-	-
THALLIUM	MG/L	-	-	-	-
TIN	MG/L	-	-	-	-
TOTAL SOLIDS	MG/L	881.	142.	231.	174.
TOX	MG/L	-	-	-	-
U-234	PCI/L	-	-	-	-
U-238	PCI/L	-	-	-	-
URANIUM	MG/L	0.0133	0.0011	0.0186	0.0023
VANADIUM	MG/L	-	-	-	-
ZINC	MG/L	0.035	-	0.02	-

GROUND WATER QUALITY DATA BY LOCATION
SITE: TUBA CITY
12/18/84 TO 12/12/88
REPORT DATE: 02/02/90

FORMATION OF COMPLETION: NAVAJO SANDSTONE
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

		LOCATION ID - SAMPLE ID AND LOG DATE							
		914-01 05/12/88		914-02 05/12/88		914-03 05/12/88		914-04 05/12/88	
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE +/- UNCERTAINTY		PARAMETER VALUE +/- UNCERTAINTY		PARAMETER VALUE +/- UNCERTAINTY		PARAMETER VALUE +/- UNCERTAINTY	
ALKALINITY	MG/L CACO3	98.		98.		98.		98.	
ALUMINUM	MG/L	0.11		0.05		0.05		0.04	
AMMONIUM	MG/L	< 0.1		< 0.1		< 0.1		< 0.1	
ANTIMONY	MG/L	-		-		-		-	
ARSENIC	MG/L	< 0.001		< 0.001		0.001		0.002	
BARIUM	MG/L	-		-		-		-	
BERYLLIUM	MG/L	-		-		-		-	
BORON	MG/L	-		-		-		-	
CADMIUM	MG/L	< 0.001		< 0.001		< 0.001		< 0.001	
CALCIUM	MG/L	33.8		33.3		33.4		33.5	
CHLORIDE	MG/L	12.		12.		12.		12.	
CHROMIUM	MG/L	0.03		0.02		0.02		0.02	
COBALT	MG/L	-		-		-		-	
COND,IN-SITU	UMHO/CM	-		-		-		-	
CONDUCTANCE	UMHO/CM	215.		215.		215.		215.	
COPPER	MG/L	-		-		-		-	
CYANIDE	MG/L	-		-		-		-	
FLUORIDE	MG/L	-		-		-		-	
GROSS ALPHA	PCI/L	2.4	2.4	3.1	2.5	3.1	2.5	2.4	2.4
GROSS BETA	PCI/L	3.4	1.3	3.6	1.3	2.2	1.3	3.2	1.3
IRON	MG/L	0.03		< 0.01		< 0.01		< 0.01	
LEAD	MG/L	< 0.01		< 0.01		< 0.01		< 0.01	
MAGNESIUM	MG/L	7.98		7.36		7.43		7.43	
MANGANESE	MG/L	< 0.01		< 0.01		< 0.01		< 0.01	
MERCURY	MG/L	-		-		-		-	
MOLYBDENUM	MG/L	< 0.01		0.01		< 0.01		< 0.01	
NICKEL	MG/L	-		-		-		-	
NITRATE	MG/L	14.		14.		14.		16.	
NITRITE	MG/L	-		-		-		-	
NO2 & NO3	MG/L	-		-		-		-	
ORG. CARBON	MG/L	-		-		-		-	
PB-210	PCI/L	-		-		-		-	
PH	SU	8.12		8.12		8.12		8.12	
PHOSPHATE	MG/L	-		-		-		-	
PO-210	PCI/L	-		-		-		-	
POTASSIUM	MG/L	1.40		1.59		1.30		1.70	
RA-226	PCI/L	0.0	0.2	0.2	0.2	0.3	0.2	0.1	0.2
RA-228	PCI/L	0.0	0.7	0.0	0.7	0.0	0.9	0.0	0.8
SELENIUM	MG/L	< 0.005		< 0.005		< 0.005		< 0.005	
SILCON	MG/L	-		-		-		-	
SILICA	MG/L	13.7		14.6		15.2		14.8	
SILVER	MG/L	-		-		-		-	
SODIUM	MG/L	13.1		13.0		13.3		13.0	
STRONTIUM	MG/L	-		-		-		-	
SULFATE	MG/L	19.		19.		19.		18.	
SULFIDE	MG/L	-		-		-		-	
TEMP,IN-SITU	C-DEGREE	-		-		-		-	
TEMPERATURE	C - DEGREE	16.5		16.5		16.5		16.5	
TH-230	PCI/L	-		-		-		-	
THALLIUM	MG/L	-		-		-		-	
TIN	MG/L	-		-		-		-	
TOTAL SOLIDS	MG/L	177.		177.		183.		187.	
TOX	MG/L	-		-		-		-	
U-234	PCI/L	-		-		-		-	
U-238	PCI/L	-		-		-		-	
URANIUM	MG/L	0.0012		0.0009		0.0013		0.0015	
VANADIUM	MG/L	0.03		0.03		0.03		0.03	

GROUND WATER QUALITY DATA BY LOCATION
SITE: TUBA CITY
12/18/84 TO 12/12/88
REPORT DATE: 02/02/90

FORMATION OF COMPLETION: NAVAJO SANDSTONE
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

		LOCATION ID - SAMPLE ID AND LOG DATE							
		914-05 05/12/88		914-01 09/14/88		914-01 12/13/88		914-01 06/28/89	
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE	+/- UNCERTAINTY	PARAMETER VALUE	+/- UNCERTAINTY	PARAMETER VALUE	+/- UNCERTAINTY	PARAMETER VALUE	+/- UNCERTAINTY
ALKALINITY	MG/L CACO3	98.		91.		94.		91.	
ALUMINUM	MG/L	0.04		< 0.1		< 0.1		-	
AMMONIUM	MG/L	< 0.1		< 0.1		< 0.1		-	
ANTIMONY	MG/L	-		-		-		-	
ARSENIC	MG/L	0.001		< 0.01		< 0.01		< 0.01	
BARIUM	MG/L	-		-		-		0.1	
BERYLLIUM	MG/L	-		-		-		< 0.005	
BORON	MG/L	-		-		-		-	
CADMIUM	MG/L	< 0.001		< 0.001		< 0.001		< 0.001	
CALCIUM	MG/L	33.3		28.		36.		-	
CHLORIDE	MG/L	12.		13.4		13.9		-	
CHROMIUM	MG/L	0.02		< 0.01		< 0.01		< 0.01	
COBALT	MG/L	-		-		-		< 0.03	
COND,IN-SITU	UMHO/CM	-		-		-		-	
CONDUCTANCE	UMHO/CM	215.		210.		200.		212.	
COPPER	MG/L	-		-		-		0.01	
CYANIDE	MG/L	-		-		-		< 0.01	
FLUORIDE	MG/L	-		-		-		0.3	
GROSS ALPHA	PCI/L	0.7	2.2	1.9	1.5	0.0	1.2	3.2	2.1
GROSS BETA	PCI/L	2.6	1.3	0.3	1.4	0.3	1.4	6.2	2.6
IRON	MG/L	< 0.01		< 0.03		< 0.03		-	
LEAD	MG/L	< 0.01		< 0.01		< 0.01		< 0.01	
MAGNESIUM	MG/L	7.36		7.0		7.1		-	
MANGANESE	MG/L	< 0.01		< 0.01		< 0.01		-	
MERCURY	MG/L	-		-		-		0.0018	
MOLYBDENUM	MG/L	0.01		< 0.01		< 0.01		< 0.01	
NICKEL	MG/L	-		-		-		< 0.04	
NITRATE	MG/L	17.		13.5		14.5		10.2	
NITRITE	MG/L	-		-		-		-	
NO2 & NO3	MG/L	-		-		-		-	
ORG. CARBON	MG/L	-		-		-		-	
PB-210	PCI/L	-		-		-		-	
PH	SU	8.12		7.64		7.77		7.99	
PHOSPHATE	MG/L	-		-		-		-	
PO-210	PCI/L	-		-		-		-	
POTASSIUM	MG/L	1.80		1.64		1.66		-	
RA-226	PCI/L	0.1	0.2	0.0	0.1	0.2	0.1	0.0	0.1
RA-228	PCI/L	0.3	0.9	1.0	1.4	0.1	1.5	0.0	1.2
SELENIUM	MG/L	< 0.005		< 0.005		< 0.005		< 0.005	
SILCON	MG/L	-		-		-		-	
SILICA	MG/L	14.8		15.7		14.		-	
SILVER	MG/L	-		-		-		< 0.01	
SODIUM	MG/L	12.9		13.8		12.9		-	
STRONTIUM	MG/L	-		-		-		-	
SULFATE	MG/L	18.		21.		17.		23.	
SULFIDE	MG/L	-		-		-		< 0.1	
TEMP,IN-SITU	C-DEGREE	-		-		-		-	
TEMPERATURE	C - DEGREE	16.5		16.		15.5		18.0	
TH-230	PCI/L	-		-		-		-	
THALLIUM	MG/L	-		-		-		< 0.1	
TIN	MG/L	-		-		-		< 0.005	
TOTAL SOLIDS	MG/L	182.		164.		172.		174.	
TOX	MG/L	-		-		-		-	
U-234	PCI/L	-		-		-		-	
U-238	PCI/L	-		-		-		-	
URANIUM	MG/L	0.0016		< 0.003		0.003		0.011	
VANADIUM	MG/L	0.03		0.03		0.02		0.01	
ZINC	MG/L	0.005		0.013		< 0.005		< 0.005	

GROUND WATER QUALITY DATA BY LOCATION
SITE: TUBA CITY
12/18/84 TO 12/12/88
REPORT DATE: 02/02/90

FORMATION OF COMPLETION: NAVAJO SANDSTONE
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

		LOCATION ID - SAMPLE ID AND LOG DATE			
		945-01 09/04/85	945-01 04/09/86	946-01 10/11/85	946-01 04/09/86
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE +/- UNCERTAINTY	PARAMETER VALUE +/- UNCERTAINTY	PARAMETER VALUE +/- UNCERTAINTY	PARAMETER VALUE +/- UNCERTAINTY
ALKALINITY	MG/L CACO3	138.	293.	1164.	811.
ALUMINUM	MG/L	0.3	-	0.3	-
AMMONIUM	MG/L	< 0.1	0.2	0.4	0.4
ANTIMONY	MG/L	-	-	-	-
ARSENIC	MG/L	-	-	-	-
BARIUM	MG/L	-	-	-	-
BERYLLIUM	MG/L	-	-	-	-
BORON	MG/L	0.4	-	0.4	-
CADMIUM	MG/L	< 0.001	< 0.001	< 0.001	< 0.001
CALCIUM	MG/L	10.2	25.5	148.	119.
CHLORIDE	MG/L	14.	9.	5.	3.
CHROMIUM	MG/L	< 0.04	0.03	0.07	0.06
COBALT	MG/L	< 0.05	-	< 0.05	-
COND, IN-SITU	UMHO/CM	-	-	-	-
CONDUCTANCE	UMHO/CM	500.	1000.	4500.	2500.
COPPER	MG/L	0.06	-	< 0.02	-
CYANIDE	MG/L	< 0.01	-	< 0.001	-
FLUORIDE	MG/L	-	-	-	-
GROSS ALPHA	PCI/L	-	-	-	-
GROSS BETA	PCI/L	-	-	-	-
IRON	MG/L	0.06	-	< 0.03	-
LEAD	MG/L	-	-	-	-
MAGNESIUM	MG/L	13.5	1.06	0.028	0.135
MANGANESE	MG/L	0.06	-	< 0.01	-
MERCURY	MG/L	-	-	-	-
MOLYBDENUM	MG/L	0.18	0.18	0.11	0.17
NICKEL	MG/L	< 0.04	-	0.04	-
NITRATE	MG/L	19.	4.	6.	3.
NITRITE	MG/L	< 0.01	< 0.1	< 0.1	< 0.1
NO2 & NO3	MG/L	-	-	-	-
ORG. CARBON	MG/L	-	-	-	-
PB-210	PCI/L	-	-	-	-
PH	SU	11.13	11.13	12.75	11.66
PHOSPHATE	MG/L	-	-	-	-
PO-210	PCI/L	-	-	-	-
POTASSIUM	MG/L	15.3	18.1	63.3	63.
RA-226	PCI/L	-	-	-	-
RA-228	PCI/L	-	-	-	-
SELENIUM	MG/L	< 0.005	< 0.005	< 0.005	< 0.005
SILCON	MG/L	-	-	-	-
SILICA	MG/L	51.	-	4.	-
SILVER	MG/L	< 0.01	-	< 0.01	-
SODIUM	MG/L	48.2	132.	239.	171.
STRONTIUM	MG/L	< 0.1	-	8.2	-
SULFATE	MG/L	78.4	69.7	32.1	38.1
SULFIDE	MG/L	-	-	-	-
TEMP, IN-SITU	C-DEGREE	-	-	-	-
TEMPERATURE	C - DEGREE	18.	17.	17.	16.
TH-230	PCI/L	-	-	-	-
THALLIUM	MG/L	-	-	-	-
TIN	MG/L	-	-	-	-
TOTAL SOLIDS	MG/L	253.	275.	1330.	856.
TOX	MG/L	-	-	-	-
U-234	PCI/L	-	-	-	-
U-238	PCI/L	-	-	-	-
URANIUM	MG/L	< 0.0003	0.0017	0.0059	0.0009
VANADIUM	MG/L	-	-	-	-

GROUND WATER QUALITY DATA BY LOCATION
SITE: TUBA CITY
12/18/84 TO 12/12/88
REPORT DATE: 02/02/90

FORMATION OF COMPLETION: NAVAJO SANDSTONE
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

		LOCATION ID - SAMPLE ID AND LOG DATE			
		917-01 10/08/85	917-01 04/10/86	919-01 10/08/85	919-01 04/10/86
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE +/- UNCERTAINTY	PARAMETER VALUE +/- UNCERTAINTY	PARAMETER VALUE +/- UNCERTAINTY	PARAMETER VALUE +/- UNCERTAINTY
ALKALINITY	MG/L CACO3	103.	88.	1218.	620.
ALUMINUM	MG/L	0.2	-	0.5	-
AMMONIUM	MG/L	< 0.1	0.4	0.2	0.2
ANTIMONY	MG/L	-	-	-	-
ARSENIC	MG/L	-	-	-	-
BARIUM	MG/L	-	-	-	-
BERYLLIUM	MG/L	-	-	-	-
BORON	MG/L	0.4	-	0.1	-
CADMIUM	MG/L	< 0.001	< 0.001	< 0.001	< 0.001
CALCIUM	MG/L	24.9	31.2	193.	158.
CHLORIDE	MG/L	9.2	10.	7.	2.
CHROMIUM	MG/L	0.01	0.04	0.08	0.06
COBALT	MG/L	< 0.05	-	< 0.05	-
COND.IN-SITU	UMHO/CM	-	-	-	-
CONDUCTANCE	UMHO/CM	210.	190.	4500.	2100.
COPPER	MG/L	< 0.02	-	< 0.02	-
CYANIDE	MG/L	< 0.001	-	< 0.001	-
FLUORIDE	MG/L	-	-	-	-
GROSS ALPHA	PCI/L	-	-	-	-
GROSS BETA	PCI/L	-	-	-	-
IRON	MG/L	< 0.03	-	< 0.03	-
LEAD	MG/L	-	-	-	-
MAGNESIUM	MG/L	4.53	6.12	0.013	0.102
MANGANESE	MG/L	< 0.01	-	< 0.01	-
MERCURY	MG/L	-	-	-	-
MOLYBDENUM	MG/L	0.09	0.24	0.15	0.23
NICKEL	MG/L	< 0.04	-	0.05	-
NITRATE	MG/L	17.	5.	9.	3.
NITRITE	MG/L	< 0.1	< 0.1	< 0.1	< 0.1
NO2 & NO3	MG/L	-	-	-	-
ORG. CARBON	MG/L	-	-	-	-
PB-210	PCI/L	-	-	-	-
PH	SU	8.04	8.08	12.57	11.19
PHOSPHATE	MG/L	-	-	-	-
PO-210	PCI/L	-	-	-	-
POTASSIUM	MG/L	2.28	1.86	189.	72.5
RA-226	PCI/L	-	-	-	-
RA-228	PCI/L	-	-	-	-
SELENIUM	MG/L	< 0.005	< 0.005	< 0.005	< 0.005
SILCON	MG/L	-	-	-	-
SILICA	MG/L	11.	-	2.	-
SILVER	MG/L	< 0.01	-	< 0.01	-
SODIUM	MG/L	26.6	9.31	153.	66.
STRONTIUM	MG/L	0.2	-	6.6	-
SULFATE	MG/L	17.3	15.1	28.4	8.6
SULFIDE	MG/L	-	-	-	-
TEMP.IN-SITU	C-DEGREE	-	-	-	-
TEMPERATURE	C - DEGREE	16.	17.	17.	16.
TH-230	PCI/L	-	-	-	-
THALLIUM	MG/L	-	-	-	-
TIN	MG/L	-	-	-	-
TOTAL SOLIDS	MG/L	176.	182.	1400.	696.
TOX	MG/L	-	-	-	-
U-234	PCI/L	-	-	-	-
U-238	PCI/L	-	-	-	-
URANIUM	MG/L	0.0015	0.0024	0.0014	0.0012
VANADIUM	MG/L	-	-	-	-
ZINC	MG/L	0.042	-	0.497	-

GROUND WATER QUALITY DATA BY LOCATION
SITE: TUBA CITY
12/10/84 TO 12/12/88
REPORT DATE: 02/02/90

FORMATION OF COMPLETION: NAVAJO SANDSTONE
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

		LOCATION ID - SAMPLE ID AND LOG DATE			
		920-01 09/08/85	920-01 04/09/86	920-01 05/16/88	920-01 09/02/88
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE +/- UNCERTAINTY	PARAMETER VALUE +/- UNCERTAINTY	PARAMETER VALUE +/- UNCERTAINTY	PARAMETER VALUE +/- UNCERTAINTY
ALKALINITY	MG/L CACO3	94.	93.	78.	92.
ALUMINUM	MG/L	0.2	-	0.04	< 0.1
AMMONIUM	MG/L	< 0.1	< 0.1	< 0.1	0.2
ANTIMONY	MG/L	-	-	-	-
ARSENIC	MG/L	-	-	0.001	< 0.01
BARIUM	MG/L	-	-	-	-
BERYLLIUM	MG/L	-	-	-	-
BORON	MG/L	0.4	-	-	-
CADMIUM	MG/L	< 0.001	< 0.001	< 0.001	< 0.001
CALCIUM	MG/L	28.4	30.7	33.7	33.
CHLORIDE	MG/L	9.	10.	8.4	10.4
CHROMIUM	MG/L	0.02	< 0.01	< 0.01	< 0.01
COBALT	MG/L	< 0.05	-	-	-
COND.IN-SITU	UMHO/CM	-	-	-	-
CONDUCTANCE	UMHO/CM	215.	185.	200.	200.
COPPER	MG/L	< 0.02	-	-	-
CYANIDE	MG/L	< 0.01	-	-	-
FLUORIDE	MG/L	-	-	-	-
GROSS ALPHA	PCI/L	-	-	1.9 1.8	3.9 1.7
GROSS BETA	PCI/L	-	-	3.0 1.3	2.5 1.6
IRON	MG/L	0.05	-	< 0.01	< 0.03
LEAD	MG/L	-	-	< 0.01	< 0.01
MAGNESIUM	MG/L	6.49	6.74	7.24	7.7
MANGANESE	MG/L	0.04	-	< 0.01	< 0.01
MERCURY	MG/L	-	-	-	-
MOLYBDENUM	MG/L	0.12	0.18	< 0.01	< 0.01
NICKEL	MG/L	0.06	-	-	-
NITRATE	MG/L	10.	3.	13.	15.6
NITRITE	MG/L	< 0.01	< 0.1	-	-
NO2 & NO3	MG/L	-	-	-	-
ORG. CARBON	MG/L	-	-	-	-
PB-210	PCI/L	-	-	-	-
PH	SU	8.01	8.08	8.03	7.64
PHOSPHATE	MG/L	-	-	-	-
PO-210	PCI/L	-	-	-	-
POTASSIUM	MG/L	1.9	2.36	1.78	1.84
RA-226	PCI/L	-	-	0.0 0.1	0.1 0.1
RA-228	PCI/L	-	-	0.6 0.7	1.5 1.6
SELENIUM	MG/L	< 0.005	< 0.005	< 0.005	< 0.005
SILCON	MG/L	-	-	-	-
SILICA	MG/L	22.	-	11.1	11.6
SILVER	MG/L	< 0.01	-	-	-
SODIUM	MG/L	9.46	7.3	7.71	8.7
STRONTIUM	MG/L	< 0.1	-	-	-
SULFATE	MG/L	13.9	13.1	26.	13.
SULFIDE	MG/L	-	-	-	-
TEMP.IN-SITU	C-DEGREE	-	-	-	-
TEMPERATURE	C - DEGREE	17.	17.	17.0	16.5
TH-230	PCI/L	-	-	-	-
THALLIUM	MG/L	-	-	-	-
TIN	MG/L	-	-	-	-
TOTAL SOLIDS	MG/L	147.	163.	154.	138.
TOX	MG/L	-	-	-	-
U-234	PCI/L	-	-	-	-
U-238	PCI/L	-	-	-	-
URANIUM	MG/L	0.001	0.0031	0.0046	< 0.003
VANADIUM	MG/L	-	-	0.01	0.02

GROUND WATER QUALITY DATA BY LOCATION
SITE: TUBA CITY
12/18/84 TO 12/12/88
REPORT DATE: 02/02/90

FORMATION OF COMPLETION: NAVAJO SANDSTONE
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

		LOCATION ID - SAMPLE ID AND LOG DATE			
		920-01 12/13/88	921-01 10/10/85	921-01 04/10/86	921-01 05/16/88
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE +/- UNCERTAINTY	PARAMETER VALUE +/- UNCERTAINTY	PARAMETER VALUE +/- UNCERTAINTY	PARAMETER VALUE +/- UNCERTAINTY
ALKALINITY	MG/L CACO3	92.	75.	73.	67.
ALUMINUM	MG/L	< 0.1	0.3	-	0.02
AMMONIUM	MG/L	< 0.1	< 0.1	< 0.1	< 0.1
ANTIMONY	MG/L	-	-	-	-
ARSENIC	MG/L	< 0.01	-	-	< 0.001
BARIUM	MG/L	-	-	-	-
BERYLLIUM	MG/L	-	-	-	-
BORON	MG/L	-	0.5	-	-
CADMIUM	MG/L	< 0.001	< 0.001	< 0.001	< 0.001
CALCIUM	MG/L	37.	7.19	20.3	22.3
CHLORIDE	MG/L	11.0	6.	7.	4.6
CHROMIUM	MG/L	< 0.01	0.02	< 0.01	< 0.01
COBALT	MG/L	-	< 0.05	-	-
COND.IN-SITU	UMHO/CM	-	-	-	-
CONDUCTANCE	UMHO/CM	210.	180.	140.	160.
COPPER	MG/L	-	< 0.02	-	-
CYANIDE	MG/L	-	< 0.001	-	-
FLUORIDE	MG/L	-	-	-	-
GROSS ALPHA	PCI/L	1.3 1.2	-	-	5.7 1.9
GROSS BETA	PCI/L	1.9 1.5	-	-	7.8 1.5
IRON	MG/L	< 0.03	< 0.03	-	< 0.01
LEAD	MG/L	< 0.01	-	-	< 0.01
MAGNESIUM	MG/L	8.01	3.01	3.12	3.66
MANGANESE	MG/L	< 0.01	< 0.01	-	< 0.01
MERCURY	MG/L	-	-	-	-
MOLYBDENUM	MG/L	< 0.01	0.13	0.22	< 0.01
NICKEL	MG/L	-	< 0.04	-	-
NITRATE	MG/L	18.0	10.	2.	14.
NITRITE	MG/L	-	< 0.1	< 0.1	-
NO2 & NO3	MG/L	-	-	-	-
ORG. CARBON	MG/L	-	-	-	-
P8-210	PCI/L	-	-	-	-
PH	SU	7.96	9.48	8.66	9.03
PHOSPHATE	MG/L	-	-	-	-
PO-210	PCI/L	-	-	-	-
POTASSIUM	MG/L	1.70	8.28	6.87	5.99
RA-226	PCI/L	0.2 0.2	-	-	0.3 0.2
RA-228	PCI/L	0.3 1.5	-	-	0.5 0.7
SELENIUM	MG/L	< 0.005	< 0.005	< 0.005	< 0.005
SILCON	MG/L	-	-	-	-
SILICA	MG/L	11.	8.	-	9.6
SILVER	MG/L	-	< 0.01	-	-
SODIUM	MG/L	7.6	24.4	12.7	10.7
STRONTIUM	MG/L	-	0.4	-	-
SULFATE	MG/L	11.	9.	8.1	9.
SULFIDE	MG/L	-	-	-	-
TEMP.IN-SITU	C-DEGREE	-	-	-	-
TEMPERATURE	C - DEGREE	17.0	16.5	17.	18.
TH-230	PCI/L	-	-	-	-
THALLIUM	MG/L	-	-	-	-
TIN	MG/L	-	-	-	-
TOTAL SOLIDS	MG/L	170.	121.	126.	114.
TOX	MG/L	-	-	-	-
U-234	PCI/L	-	-	-	-
U-238	PCI/L	-	-	-	-
URANIUM	MG/L	0.007	0.0051	0.0046	0.0040
VANADIUM	MG/L	0.02	-	-	< 0.01
ZINC	MG/L	< 0.005	0.115	-	< 0.005

GROUND WATER QUALITY DATA BY LOCATION
SITE: TUBA CITY
12/18/84 TO 12/12/88
REPORT DATE: 02/02/90

FORMATION OF COMPLETION: NAVAJO SANDSTONE
HYDRAULIC FLOW RELATIONSHIP: ON-SITE

		LOCATION ID - SAMPLE ID AND LOG DATE			
		921-01 09/14/88	921-01 12/13/88	921-01 06/28/89	906-01 01/05/85
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE +/- UNCERTAINTY	PARAMETER VALUE +/- UNCERTAINTY	PARAMETER VALUE +/- UNCERTAINTY	PARAMETER VALUE +/- UNCERTAINTY
ALKALINITY	MG/L CACO3	76.	66.	85.	691.00
ALUMINUM	MG/L	< 0.1	< 0.1	-	< 0.10
AMMONIUM	MG/L	< 0.1	< 0.1	-	1.30
ANTIMONY	MG/L	-	-	-	< 0.003
ARSENIC	MG/L	< 0.01	< 0.01	< 0.01	< 0.01
BARIUM	MG/L	-	-	< 0.1	< 0.10
BERYLLIUM	MG/L	-	-	< 0.005	-
BORON	MG/L	-	-	-	0.06
CADMIUM	MG/L	< 0.001	< 0.001	< 0.001	< 0.001
CALCIUM	MG/L	24.	26.	-	580.00
CHLORIDE	MG/L	7.7	8.8	-	74.00
CHROMIUM	MG/L	< 0.01	< 0.01	< 0.01	< 0.01
COBALT	MG/L	-	-	< 0.03	< 0.05
COND.IN-SITU	UMHO/CM	-	-	-	-
CONDUCTANCE	UMHO/CM	165.	170.	180.	4390.00
COPPER	MG/L	-	-	< 0.01	< 0.02
CYANIDE	MG/L	-	-	< 0.01	-
FLUORIDE	MG/L	-	-	0.3	0.15
GROSS ALPHA	PCI/L	7.6 1.8	0.0 70.	6.8 2.6	-
GROSS BETA	PCI/L	5.3 1.7	25. 62.	6.0 1.8	-
IRON	MG/L	< 0.03	< 0.03	-	< 0.03
LEAD	MG/L	< 0.01	< 0.01	< 0.01	< 0.01
MAGNESIUM	MG/L	3.53	3.94	-	210.00
MANGANESE	MG/L	< 0.01	< 0.01	-	0.15
MERCURY	MG/L	-	-	< 0.0002	< 0.0002
MOLYBDENUM	MG/L	< 0.01	< 0.01	< 0.01	< 0.01
NICKEL	MG/L	-	-	< 0.04	< 0.04
NITRATE	MG/L	13.4	12.1	25.7	580.00
NITRITE	MG/L	-	-	-	-
NO2 & NO3	MG/L	-	-	-	-
ORG. CARBON	MG/L	-	-	-	6.00
PB-210	PCI/L	-	-	-	< 1.50
PH	SU	8.5	8.86	8.50	6.63
PHOSPHATE	MG/L	-	-	-	< 0.15
PO-210	PCI/L	-	-	-	< 1.00
POTASSIUM	MG/L	6.5	5.6	-	5.29
RA-226	PCI/L	0.2 0.1	0.3 0.1	0.2 0.2	< 1.00
RA-228	PCI/L	1.7 1.5	0.6 1.6	0.0 1.2	< 1.00
SELENIUM	MG/L	< 0.005	< 0.005	< 0.005	0.015
SILCON	MG/L	-	-	-	8.60
SILICA	MG/L	10.0	9.	-	-
SILVER	MG/L	-	-	< 0.01	< 0.01
SODIUM	MG/L	10.0	9.3	-	435.00
STRONTIUM	MG/L	-	-	-	4.43
SULFATE	MG/L	10.2	9.0	2.6	1200.00
SULFIDE	MG/L	-	-	< 0.1	-
TEMP.IN-SITU	C-DEGREE	-	-	-	-
TEMPERATURE	C - DEGREE	17.0	18.	20.5	13.00
TH-230	PCI/L	-	-	-	< 1.00
THALLIUM	MG/L	-	-	< 0.1	-
TIN	MG/L	-	-	< 0.005	< 0.005
TOTAL SOLIDS	MG/L	142.	124.	122.	3820.00
TOX	MG/L	-	-	-	-
U-234	PCI/L	-	-	-	122.00
U-238	PCI/L	-	-	-	95.00
URANIUM	MG/L	< 0.003	0.008	0.010	-

GROUND WATER QUALITY DATA BY LOCATION
SITE: TUBA CITY
12/18/84 TO 12/12/88
REPORT DATE: 02/02/90

FORMATION OF COMPLETION: NAVAJO SANDSTONE
HYDRAULIC FLOW RELATIONSHIP: ON-SITE

		LOCATION ID - SAMPLE ID AND LOG DATE							
		906-01 03/31/85		906-01 07/25/85		906-01 05/12/88		906-01 09/14/88	
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE	+/- UNCERTAINTY	PARAMETER VALUE	+/- UNCERTAINTY	PARAMETER VALUE	+/- UNCERTAINTY	PARAMETER VALUE	+/- UNCERTAINTY
ALKALINITY	MG/L CACO3	857.00		901.00		948.		953.	
ALUMINUM	MG/L	< 0.10		-		0.42		< 0.1	
AMMONIUM	MG/L	0.50		0.10		< 0.1		< 0.1	
ANTIMONY	MG/L	< 0.003		-		-		-	
ARSENIC	MG/L	< 0.01		< 0.01		0.007		< 0.01	
BARIUM	MG/L	< 0.10		0.10		-		-	
BERYLLIUM	MG/L	-		-		-		-	
BORON	MG/L	0.30		0.30		-		-	
CADMIUM	MG/L	< 0.03		0.012		0.003		< 0.001	
CALCIUM	MG/L	760.00		840.00		878.		820.	
CHLORIDE	MG/L	100.00		140.00		130.		121.	
CHROMIUM	MG/L	0.03		0.02		0.18		< 0.01	
COBALT	MG/L	< 0.05		< 0.05		-		-	
COND,IN-SITU	UMHO/CM	3950.00		-		-		-	
CONDUCTANCE	UMHO/CM	-		4600.00		3975.		4100.	
COPPER	MG/L	0.03		0.02		-		-	
CYANIDE	MG/L	< 0.01		-		-		-	
FLUORIDE	MG/L	0.10		0.10		-		-	
GROSS ALPHA	PCI/L	< 20.00	4.00000	860.00	350.00000	670.	90.	364.	53.
GROSS BETA	PCI/L	64.00	4.00000	120.00	460.00000	150.	20.	117.	29.
IRON	MG/L	0.06		0.04		0.13		< 0.03	
LEAD	MG/L	< 0.01		< 0.01		< 0.01		< 0.01	
MAGNESIUM	MG/L	260.00		310.00		258.		283.	
MANGANESE	MG/L	0.15		0.13		0.09		0.05	
MERCURY	MG/L	< 0.0002		0.0002		-		-	
MOLYBDENUM	MG/L	0.07		0.21		0.12		0.02	
NICKEL	MG/L	0.16		0.17		-		-	
NITRATE	MG/L	920.00		1000.00		1100.		770.	
NITRITE	MG/L	-		-		-		-	
NO2 & NO3	MG/L	1.20		230.00		-		-	
ORG. CARBON	MG/L	7.00		2.00		-		-	
PB-210	PCI/L	0.70	0.90000	0.30	0.80000	-		-	
PH	SU	6.47		6.19		6.7		6.33	
PHOSPHATE	MG/L	< 0.10		-		-		-	
PO-210	PCI/L	0.10	0.20000	-0.10	0.30000	-		-	
POTASSIUM	MG/L	5.90		5.40		7.72		6.1	
RA-226	PCI/L	0.20	0.40000	0.20	0.20000	0.1	0.2	0.2	0.2
RA-228	PCI/L	-0.30	1.10000	-0.10	0.90000	0.0	0.8	1.3	1.3
SELENIUM	MG/L	0.027		0.039		0.014		< 0.005	
SILCON	MG/L	-		-		-		-	
SILICA	MG/L	19.00		-		17.4		17.7	
SILVER	MG/L	0.02		0.01		-		-	
SODIUM	MG/L	200.00		210.00		212.		210.	
STRONTIUM	MG/L	7.90		8.40		-		-	
SULFATE	MG/L	1800.00		1500.00		1760.		1700.	
SULFIDE	MG/L	< 0.10		< 0.10		-		-	
TEMP,IN-SITU	C-DEGREE	15.00		-		-		-	
TEMPERATURE	C - DEGREE	-		18.00		15.5		18.	
TH-230	PCI/L	0.00	0.10000	-0.10	0.10000	-		-	
THALLIUM	MG/L	-		-		-		-	
TIN	MG/L	< 0.05		< 0.50		-		-	
TOTAL SOLIDS	MG/L	5000.00		5100.00		5160.		4980.	
TOX	MG/L	< 0.10		-		-		-	
U-234	PCI/L	-		-		-		-	
U-238	PCI/L	-		-		-		-	
URANIUM	MG/L	1.00		2.40		0.958		0.72	
VANADIUM	MG/L	< 0.01		0.01		0.10		< 0.01	
ZINC	MG/L	0.11		0.068		0.081		0.035	

GROUND WATER QUALITY DATA BY LOCATION
SITE: TUBA CITY
12/18/84 TO 12/12/88
REPORT DATE: 02/02/90

FORMATION OF COMPLETION: NAVAJO SANDSTONE
HYDRAULIC FLOW RELATIONSHIP: ON-SITE

		LOCATION ID - SAMPLE ID AND LOG DATE							
		906-01 12/13/88		906-02 12/13/88		906-03 12/13/88		906-04 12/13/88	
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE +/- UNCERTAINTY		PARAMETER VALUE +/- UNCERTAINTY		PARAMETER VALUE +/- UNCERTAINTY		PARAMETER VALUE +/- UNCERTAINTY	
ALKALINITY	MG/L CACO3	972.		972.		972.		972.	
ALUMINUM	MG/L	< 0.1		< 0.1		< 0.1		< 0.1	
AMMONIUM	MG/L	0.1		0.1		< 0.1		< 0.1	
ANTIMONY	MG/L	-		-		-		-	
ARSENIC	MG/L	< 0.01		< 0.01		< 0.01		< 0.01	
BARIUM	MG/L	-		-		-		-	
BERYLLIUM	MG/L	-		-		-		-	
BORON	MG/L	-		-		-		-	
CADMIUM	MG/L	< 0.001		< 0.001		< 0.001		< 0.001	
CALCIUM	MG/L	920.		820.		950.		820.	
CHLORIDE	MG/L	420.		420.		420.		420.	
CHROMIUM	MG/L	< 0.01		< 0.01		< 0.01		< 0.01	
COBALT	MG/L	-		-		-		-	
COND.IN-SITU	UMHO/CM	-		-		-		-	
CONDUCTANCE	UMHO/CM	3750.		3750.		3750.		3750.	
COPPER	MG/L	-		-		-		-	
CYANIDE	MG/L	-		-		-		-	
FLUORIDE	MG/L	-		-		-		-	
GROSS ALPHA	PCI/L	340.	54.	440.	60.	340.	54.	320.	53.
GROSS BETA	PCI/L	170.	33.	200.	34.	143.	31.	123.	30.
IRON	MG/L	0.03		< 0.03		0.03		< 0.03	
LEAD	MG/L	< 0.01		< 0.01		< 0.01		< 0.01	
MAGNESIUM	MG/L	280.		250.		300.		260.	
MANGANESE	MG/L	0.05		0.04		0.04		0.05	
MERCURY	MG/L	-		-		-		-	
MOLYBDENUM	MG/L	0.03		0.02		0.01		0.01	
NICKEL	MG/L	-		-		-		-	
NITRATE	MG/L	940.		940.		960.		820.	
NITRITE	MG/L	-		-		-		-	
NO2 & NO3	MG/L	-		-		-		-	
ORG. CARBON	MG/L	-		-		-		-	
PB-210	PCI/L	-		-		-		-	
PH	SU	6.52		6.52		6.52		6.52	
PHOSPHATE	MG/L	-		-		-		-	
PO-210	PCI/L	-		-		-		-	
POTASSIUM	MG/L	5.6		5.6		5.6		5.6	
RA-226	PCI/L	0.1	0.1	0.1	0.1	0.2	0.1	0.2	0.1
RA-228	PCI/L	1.1	1.4	0.0	1.5	0.8	1.1	0.9	1.1
SELENIUM	MG/L	< 0.005		0.008		< 0.005		< 0.005	
SILCON	MG/L	-		-		-		-	
SILICA	MG/L	17.		16.		16.		17.	
SILVER	MG/L	-		-		-		-	
SODIUM	MG/L	190.		200.		191.		190.	
STRONTIUM	MG/L	-		-		-		-	
SULFATE	MG/L	1680.		1700.		1700.		1700.	
SULFIDE	MG/L	-		-		-		-	
TEMP.IN-SITU	C-DEGREE	-		-		-		-	
TEMPERATURE	C - DEGREE	15.5		15.5		15.5		15.5	
TH-230	PCI/L	-		-		-		-	
THALLIUM	MG/L	-		-		-		-	
TIN	MG/L	-		-		-		-	
TOTAL SOLIDS	MG/L	4800.		4810.		4810.		4800.	
TOX	MG/L	-		-		-		-	
U-234	PCI/L	-		-		-		-	
U-238	PCI/L	-		-		-		-	
URANIUM	MG/L	0.636		0.683		0.772		0.721	
VANADIUM	MG/L	< 0.01		0.02		< 0.01		< 0.01	

GROUND WATER QUALITY DATA BY LOCATION
SITE: TUBA CITY
12/18/84 TO 12/12/88
REPORT DATE: 02/02/90

FORMATION OF COMPLETION: NAVAJO SANDSTONE
HYDRAULIC FLOW RELATIONSHIP: ON-SITE

		LOCATION ID - SAMPLE ID AND LOG DATE							
		906-05 12/13/88		906-01 06/27/89		906-02 06/27/89		906-03 06/27/89	
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE	+/- UNCERTAINTY	PARAMETER VALUE	+/- UNCERTAINTY	PARAMETER VALUE	+/- UNCERTAINTY	PARAMETER VALUE	+/- UNCERTAINTY
ALKALINITY	MG/L CACO3	972.		1005.		1005.		1005.	
ALUMINUM	MG/L	< 0.1		-		-		-	
AMMONIUM	MG/L	< 0.1		-		-		-	
ANTIMONY	MG/L	-		-		-		-	
ARSENIC	MG/L	< 0.01		< 0.01		< 0.01		< 0.01	
BARIUM	MG/L	-		< 0.1		< 0.1		< 0.1	
BERYLLIUM	MG/L	-		< 0.005		< 0.005		< 0.005	
BORON	MG/L	-		-		-		-	
CADMIUM	MG/L	< 0.001		< 0.001		< 0.001		< 0.001	
CALCIUM	MG/L	930.		-		-		-	
CHLORIDE	MG/L	130.		-		-		-	
CHROMIUM	MG/L	< 0.01		< 0.01		< 0.01		< 0.01	
COBALT	MG/L	-		< 0.03		< 0.03		< 0.03	
COND.IN-SITU	UMHO/CM	-		-		-		-	
CONDUCTANCE	UMHO/CM	3750.		4225.		4225.		4225.	
COPPER	MG/L	-		< 0.01		< 0.01		< 0.01	
CYANIDE	MG/L	-		< 0.01		< 0.01		< 0.01	
FLUORIDE	MG/L	-		< 0.1		< 0.1		< 0.1	
GROSS ALPHA	PCI/L	340.	54.	711.	116.	646.	1117.	350.	68.
GROSS BETA	PCI/L	170.	32.	236.	41.	240.	39.	192.	31.
IRON	MG/L	< 0.03		-		-		-	
LEAD	MG/L	< 0.01		< 0.01		< 0.01		< 0.01	
MAGNESIUM	MG/L	300.		-		-		-	
MANGANESE	MG/L	0.05		-		-		-	
MERCURY	MG/L	-		< 0.0002		< 0.0002		< 0.0002	
MOLYBDENUM	MG/L	0.01		0.04		0.04		0.04	
NICKEL	MG/L	-		< 0.04		< 0.04		< 0.04	
NITRATE	MG/L	930.		1000.		1060.		1090.	
NITRITE	MG/L	-		-		-		-	
NO2 & NO3	MG/L	-		-		-		-	
ORG. CARBON	MG/L	-		-		-		-	
PB-210	PCI/L	-		-		-		-	
PH	SU	6.52		6.63		6.63		6.63	
PHOSPHATE	MG/L	-		-		-		-	
PO-210	PCI/L	-		-		-		-	
POTASSIUM	MG/L	5.6		-		-		-	
RA-226	PCI/L	0.1	0.1	0.1	0.2	0.1	0.2	0.0	0.1
RA-228	PCI/L	0.7	1.1	2.8	1.3	0.0	1.3	0.3	1.4
SELENIUM	MG/L	< 0.005		< 0.005		< 0.005		< 0.005	
SILCON	MG/L	-		-		-		-	
SILICA	MG/L	17.		-		-		-	
SILVER	MG/L	-		< 0.01		< 0.01		< 0.01	
SODIUM	MG/L	180.		-		-		-	
STRONTIUM	MG/L	-		-		-		-	
SULFATE	MG/L	1650.		1840.		1800.		1810.	
SULFIDE	MG/L	-		< 0.1		< 0.1		< 0.1	
TEMP.IN-SITU	C-DEGREE	-		-		-		-	
TEMPERATURE	C - DEGREE	15.5		18.0		18.0		18.0	
TH-230	PCI/L	-		-		-		-	
THALLIUM	MG/L	-		0.1		0.1		0.1	
TIN	MG/L	-		< 0.005		< 0.01		< 0.005	
TOTAL SOLIDS	MG/L	4960.		4980.		4850.		4860.	
TOX	MG/L	-		-		-		-	
U-234	PCI/L	-		-		-		-	
U-238	PCI/L	-		-		-		-	
URANIUM	MG/L	0.738		0.99		0.90		0.86	
VANADIUM	MG/L	0.02		< 0.01		< 0.01		< 0.01	
ZINC	MG/L	< 0.005		0.011		0.012		0.017	

GROUND WATER QUALITY DATA BY LOCATION
SITE: TUBA CITY
12/18/84 TO 12/12/88
REPORT DATE: 02/02/90

FORMATION OF COMPLETION: NAVAJO SANDSTONE
HYDRAULIC FLOW RELATIONSHIP: ON-SITE

		LOCATION ID - SAMPLE ID AND LOG DATE			
		906-04 06/27/89	906-05 06/27/89		
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE +/- UNCERTAINTY	PARAMETER VALUE +/- UNCERTAINTY	PARAMETER VALUE +/- UNCERTAINTY	PARAMETER VALUE +/- UNCERTAINTY
ALKALINITY	MG/L CACO3	1005.	1005.		
ALUMINUM	MG/L	-	-		
AMMONIUM	MG/L	-	-		
ANTIMONY	MG/L	-	-		
ARSENIC	MG/L	< 0.01	< 0.01		
BARIUM	MG/L	< 0.1	< 0.1		
BERYLLIUM	MG/L	< 0.005	< 0.005		
BORON	MG/L	-	-		
CADMIUM	MG/L	< 0.001	< 0.001		
CALCIUM	MG/L	-	-		
CHLORIDE	MG/L	-	-		
CHROMIUM	MG/L	< 0.01	< 0.01		
COBALT	MG/L	< 0.03	< 0.03		
COND.IN-SITU	UMHO/CM	-	-		
CONDUCTANCE	UMHO/CM	4225.	4225.		
COPPER	MG/L	0.01	< 0.01		
CYANIDE	MG/L	< 0.01	< 0.01		
FLUORIDE	MG/L	< 0.1	< 0.1		
GROSS ALPHA	PCI/L	652. 125.	578. 106.		
GROSS BETA	PCI/L	295. 46.	272. 42.		
IRON	MG/L	-	-		
LEAD	MG/L	< 0.01	< 0.01		
MAGNESIUM	MG/L	-	-		
MANGANESE	MG/L	-	-		
MERCURY	MG/L	< 0.0002	< 0.0002		
MOLYBDENUM	MG/L	0.05	0.04		
NICKEL	MG/L	< 0.04	< 0.04		
NITRATE	MG/L	1040.	1040.		
NITRITE	MG/L	-	-		
NO2 & NO3	MG/L	-	-		
ORG. CARBON	MG/L	-	-		
PB-210	PCI/L	-	-		
PH	SU	6.63	6.63		
PHOSPHATE	MG/L	-	-		
PO-210	PCI/L	-	-		
POTASSIUM	MG/L	-	-		
RA-226	PCI/L	0.1 0.2	0.1 0.2		
RA-228	PCI/L	0.3 1.4	0.0 1.4		
SELENIUM	MG/L	< 0.005	< 0.005		
SILCON	MG/L	-	-		
SILICA	MG/L	-	-		
SILVER	MG/L	< 0.01	< 0.01		
SODIUM	MG/L	-	-		
STRONTIUM	MG/L	-	-		
SULFATE	MG/L	1790.	1810.		
SULFIDE	MG/L	< 0.1	< 0.1		
TEMP.IN-SITU	C-DEGREE	-	-		
TEMPERATURE	C - DEGREE	18.0	18.0		
TH-230	PCI/L	-	-		
THALLIUM	MG/L	< 0.1	0.1		
TIN	MG/L	< 0.01	< 0.005		
TOTAL SOLIDS	MG/L	4840.	4830.		
TOX	MG/L	-	-		
U-234	PCI/L	-	-		
U-238	PCI/L	-	-		
URANIUM	MG/L	0.99	0.86		
VANADIUM	MG/L	< 0.01	< 0.01		

ATTACHMENT 2

STATIC GROUNDWATER LEVELS BY LOCATION

TUBA CITY, ARIZONA, DISPOSAL SITE

STATIC GROUND WATER LEVELS
SITE: TUBA CITY

FORMATION OF COMPLETION: NAVAJO SANDSTONE

LOCATION ID	NORTH COORDINATE (FT.)	EAST COORDINATE (FT.)	LOG DATE	LOG TIME	GROUND ELEVATION (FT. MSL)	GROUND WATER DEPTH (FT.)	GROUND WATER ELEVATION (FT. MSL)
901	12095.8	11034.6	04/03/86	14:34	5105.08	54.28	5050.80
901	12095.8	11034.6	05/11/88	13:45	5105.08	54.40	5050.68
901	12095.8	11034.6	12/12/88	09:00	5105.08	54.77	5050.31
901	12095.8	11034.6	06/27/89	09:15	5105.08	54.67	5050.41
902	-1533.8	10903.5	04/03/86	10:44	4732.94	27.75	4705.19
903	6994.3	12116.7	04/03/86	13:14	4980.44	22.72	4957.72
903	6994.3	12116.7	05/15/88	12:20	4980.44	22.76	4957.68
903	6994.3	12116.7	12/13/88	12:15	4980.44	22.92	4957.52
903	6994.3	12116.7	06/26/89	13:15	4980.44	23.00	4957.44
904	4196.4	12585.8	04/03/86	11:00	4899.35	20.23	4879.12
904	4196.4	12585.8	05/15/88	13:25	4899.35	20.00	4879.35
904	4196.4	12585.8	12/13/88	10:00	4899.35	20.12	4879.23
904	4196.4	12585.8	06/28/89	11:30	4899.35	20.20	4879.15
906	8352.0	11652.6	04/03/86	15:19	5060.39	39.26	5021.13
906	8352.0	11652.6	05/11/88	09:00	5060.39	40.61	5019.78
906	8352.0	11652.6	12/12/88	15:00	5060.39	40.82	5019.57
906	8352.0	11652.6	06/27/89	16:30	5060.39	41.25	5019.14
908	8183.7	10178.9	04/03/86	14:57	5055.88	45.23	5010.65
908	8183.7	10178.9	05/11/88	11:00	5055.88	45.65	5010.23
908	8183.7	10178.9	12/12/88	12:45	5055.88	45.82	5010.06
908	8183.7	10178.9	06/27/89	14:30	5055.88	46.10	5009.78
909	7562.4	11734.9	04/03/86	14:38	5054.16	56.51	4997.65
909	7562.4	11734.9	05/13/88	14:50	5054.16	53.18	5000.98
909	7562.4	11734.9	12/13/88	14:00	5054.16	53.49	5000.67
909	7562.4	11734.9	06/28/89	16:45	5054.16	54.10	5000.06
910	12018.4	11067.7	04/03/86	14:27	5105.94	56.79	5049.15
910	12018.4	11067.7	05/13/88	08:00	5105.94	56.58	5049.36
910	12018.4	11067.7	12/12/88	09:00	5105.94	57.44	5048.50
910	12018.4	11067.7	06/27/89	08:30	5105.94	58.13	5047.81
911	12097.8	11115.1	04/03/86	14:30	5106.15	51.45	5054.70
912	8127.1	10136.1	04/03/86	11:24	5057.85	47.02	5010.83
912	8127.1	10136.1	04/27/88	10:45	5057.85	47.73	5010.12
912	8127.1	10136.1	12/12/88	12:45	5057.85	48.21	5009.64
912	8127.1	10136.1	06/27/89	13:30	5057.85	49.93	5007.92
913	8056.4	10138.2	04/03/86	11:18	5057.88	65.80	4992.08
914	8272.0	13537.0	04/03/86	10:17	5068.37	98.06	4970.31
914	8272.0	13537.0	05/10/88	09:45	5068.37	98.46	4969.91
914	8272.0	13537.0	12/13/88	16:00	5068.37	98.38	4969.99
914	8272.0	13537.0	06/27/89	15:15	5068.37	98.26	4970.11
915	8361.9	13554.7	04/03/86	10:24	5068.58	91.56	4977.02
916	8298.0	13625.1	04/03/86	10:20	5068.10	112.93	4955.17
917	4847.0	8034.9	04/03/86	11:32	5046.05	66.91	4979.14
919	4857.8	8133.3	04/03/86	11:36	5046.17	143.83	4902.34
920	6903.8	12062.5	04/03/86	13:18	4980.64	26.14	4954.50
920	6903.8	12062.5	05/15/88	08:00	4980.64	26.31	4954.33
920	6903.8	12062.5	12/14/88	09:30	4980.64	26.47	4954.17
920	6903.8	12062.5	06/26/89	14:45	4980.64	26.68	4953.96
921	6907.3	12179.8	04/03/86	13:22	4976.84	35.96	4940.88
921	6907.3	12179.8	05/14/88	08:00	4976.84	36.08	4940.76
921	6907.3	12179.8	12/13/88	09:45	4976.84	36.79	4940.05
921	6907.3	12179.8	06/28/89	08:30	4976.84	36.88	4939.96

ATTACHMENT 3

MONITOR WELL INFORMATION

TUBA CITY, ARIZONA, DISPOSAL SITE

MONITORING WELL INFORMATION
SITE: TUBA CITY

LOCATION ID	NORTH COORDINATE (FT.)	EAST COORDINATE (FT.)	BOREHOLE ELEVATION (FT. MSL)	BOREHOLE DEPTH (FT.)	BOREHOLE DIAMETER (IN.)	WELL CASING ELEVATION (FT. MSL)	WELL CASING DEPTH (FT.)	WELL CASING DIAMETER (IN.)	SCREENED DEPTH (FT.)	INTERVAL LENGTH (FT.)	FLOW RELATIONSHIP
FORMATION OF COMPLETION: NAVAJO SANDSTONE											
901	12095.8	11034.6	5105.08	80.00	6.625	5106.81	82.00	2.000	58.00	56.0	UP GRADIENT
902	-1533.8	10903.5	4732.94	75.00	6.500	4734.94	77.00	2.000	63.00	54.0	BACKGROUND
903	6994.3	12116.7	4980.44	50.00	6.500	4982.44	50.00	2.000	28.00	47.0	DOWN GRADIENT
904	4196.4	12585.8	4899.35	44.00	6.625	4901.35	42.00	2.000	32.00	32.0	BACKGROUND
906	8352.0	11652.6	5060.39	70.50	6.625	5061.39	67.00	2.000	32.00	57.0	ON-SITE
908	8183.7	10178.9	5055.88	80.00	6.625	5056.88	69.00	2.000	52.00	53.0	DOWN GRADIENT
909	7562.4	11734.9	5054.46	85.00	6.625	5055.46	79.00	2.000	68.00	39.0	DOWN GRADIENT
910	12018.4	11067.7	5105.94	200.00	8.500	5107.81	199.00	4.000	97.00	100.0	BACKGROUND
911	12097.8	11115.1	5106.15	351.40	8.500	5108.15	353.40	4.000	311.40	40.0	BACKGROUND
912	8127.1	10136.1	5057.85	165.00	8.500	5059.87	167.00	4.000	125.00	40.0	DOWN GRADIENT
913	8056.4	10138.2	5057.88	380.00	8.500	5060.11	372.70	4.000	330.70	40.0	DOWN GRADIENT
914	8272.0	13537.0	5068.37	156.20	8.500	5070.16	158.20	4.000	146.20	10.0	DOWN GRADIENT
915	8361.9	13554.7	5068.58	182.00	8.500	5070.58	184.00	4.000	172.00	10.0	DOWN GRADIENT
916	8298.0	13625.1	5068.10	357.70	8.500	5069.93	359.70	4.000	347.70	10.0	DOWN GRADIENT
917	4847.0	8034.9	5046.05	150.00	8.500	5048.06	152.00	4.000	130.00	20.0	DOWN GRADIENT
919	4857.8	8133.3	5046.17	355.00	8.500	5048.23	351.70	4.000	339.70	10.0	DOWN GRADIENT
920	6903.8	12062.5	4980.64	170.00	8.500	4982.61	158.40	4.000	118.40	40.0	DOWN GRADIENT
921	6907.3	12179.8	4976.84	360.00	8.500	4978.81	358.80	4.000	318.80	40.0	DOWN GRADIENT

ATTACHMENT 4

MONITOR WELL COMPLETION RECORDS

TUBA CITY, ARIZONA, DISPOSAL SITE

JACOBS ENGINEERING GROUP INC.
ADVANCED SYSTEMS DIVISION, ALBUQUERQUE OPERATIONS

WELL COMPLETION RECORD

(901)

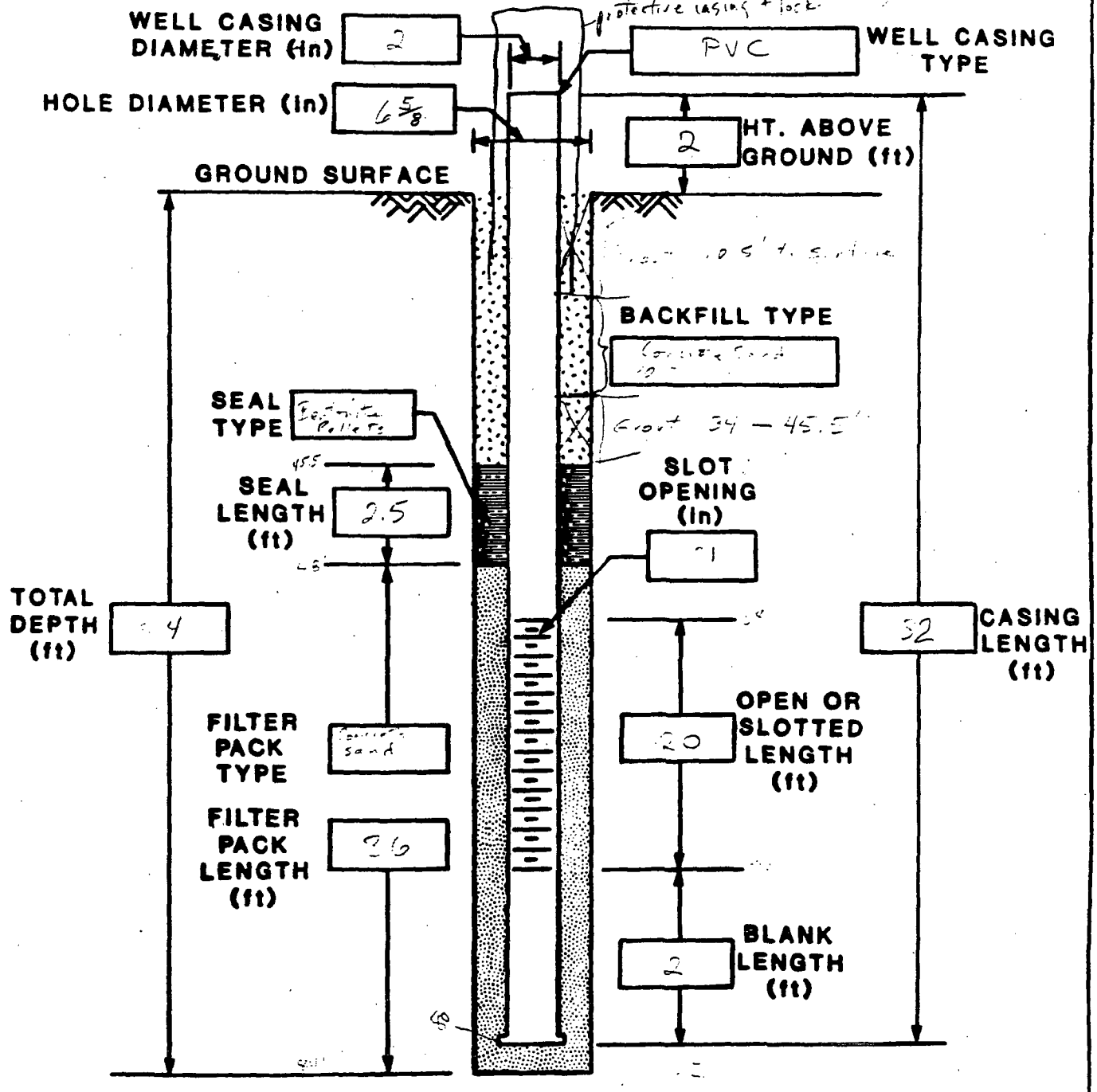
SITE ID: TVB-01 LOCATION ID: 01 DATE INSTALLED: 10/-13.87

~~APPROX~~. SITE COORDINATES: (FT.) N 12095.433 ~~N/C~~ E ~~N/C~~ 1034.345

OPEN AREA PER LINEAL FT. ($IN^2/FT.$) ~~N/C~~ 0.440 × 6 rows = 2.64

FORMATION OF COMPLETION: Naval SANDSTONE

FIELD REP.: G. CZYZEWSKI - I. HART DRILLER: J. CARTER / W. JENNINGS



COMMENTS: over-filled sand filter pack to 8'

Ground elev. ~~5100.15~~. TOP OF CASING ELEV. ~~5102.02~~.

JEG-AL-ENG-3 (3/84) 5105.08FT 5106.81

18.19.2.5

JACOBS ENGINEERING GROUP INC.
ADVANCED SYSTEMS DIVISION, ALBUQUERQUE OPERATIONS

WELL COMPLETION RECORD

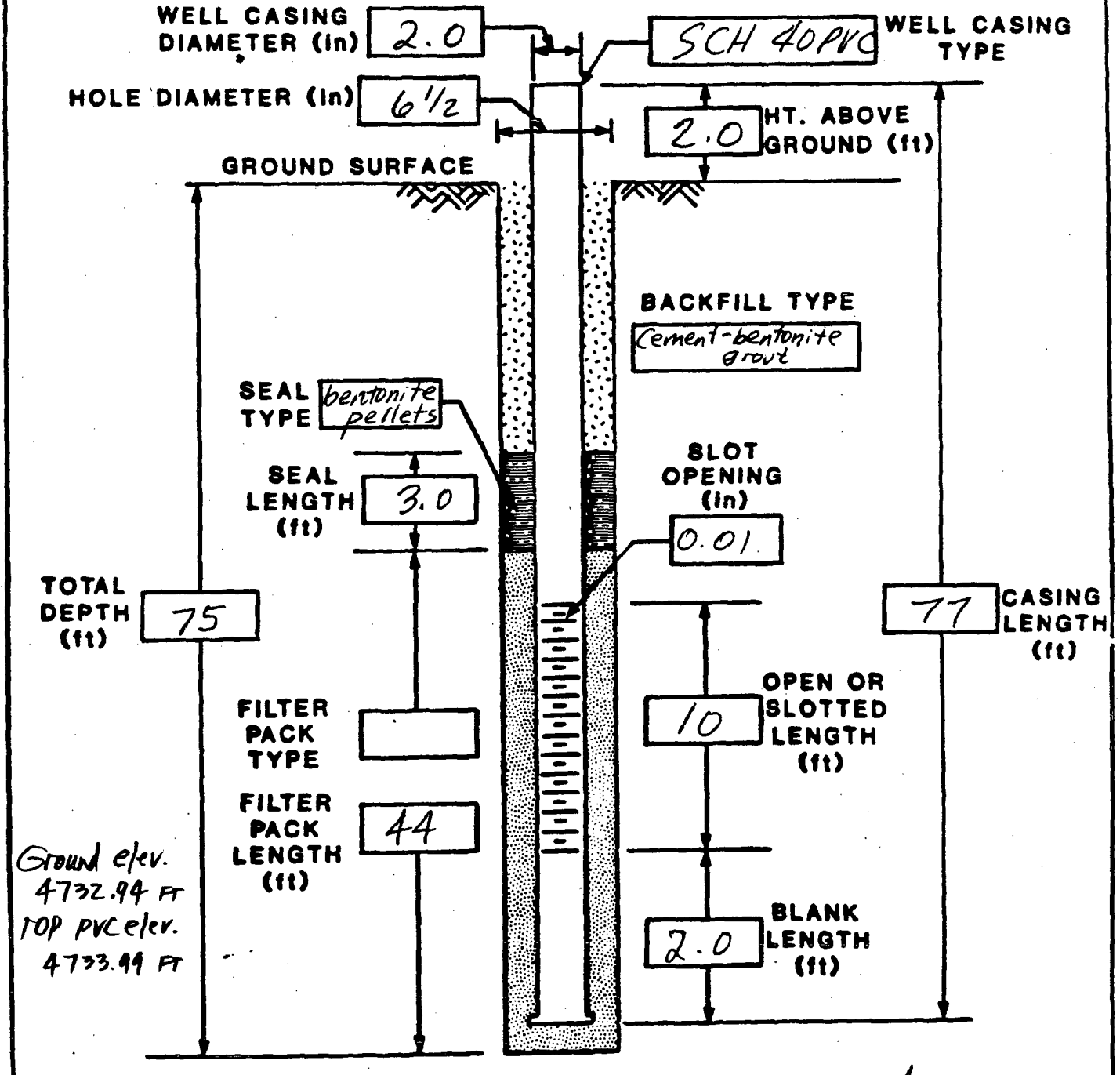
SITE ID: TUB LOCATION ID: 902 DATE INSTALLED: 12-2-84

APPROX. SITE COORDINATES: (FT.) N ~~-1533.840~~ ~~36° 07' 30"~~ E ~~111° 09' 30"~~ 10903.517

OPEN AREA PER LINEAL FT. ($IN^2/FT.$) ~~56~~ 2.64

FORMATION OF COMPLETION: Ss Aquifer

FIELD REP.: J. Hoopes DRILLER: J. Carter



COMMENTS: Filter pack type same as used on other TUB wells — Silica Sand.

JEG-AL-ENG-3 (3/84)

JACOBS ENGINEERING GROUP INC.
ADVANCED SYSTEMS DIVISION, ALBUQUERQUE OPERATIONS

WELL COMPLETION RECORD

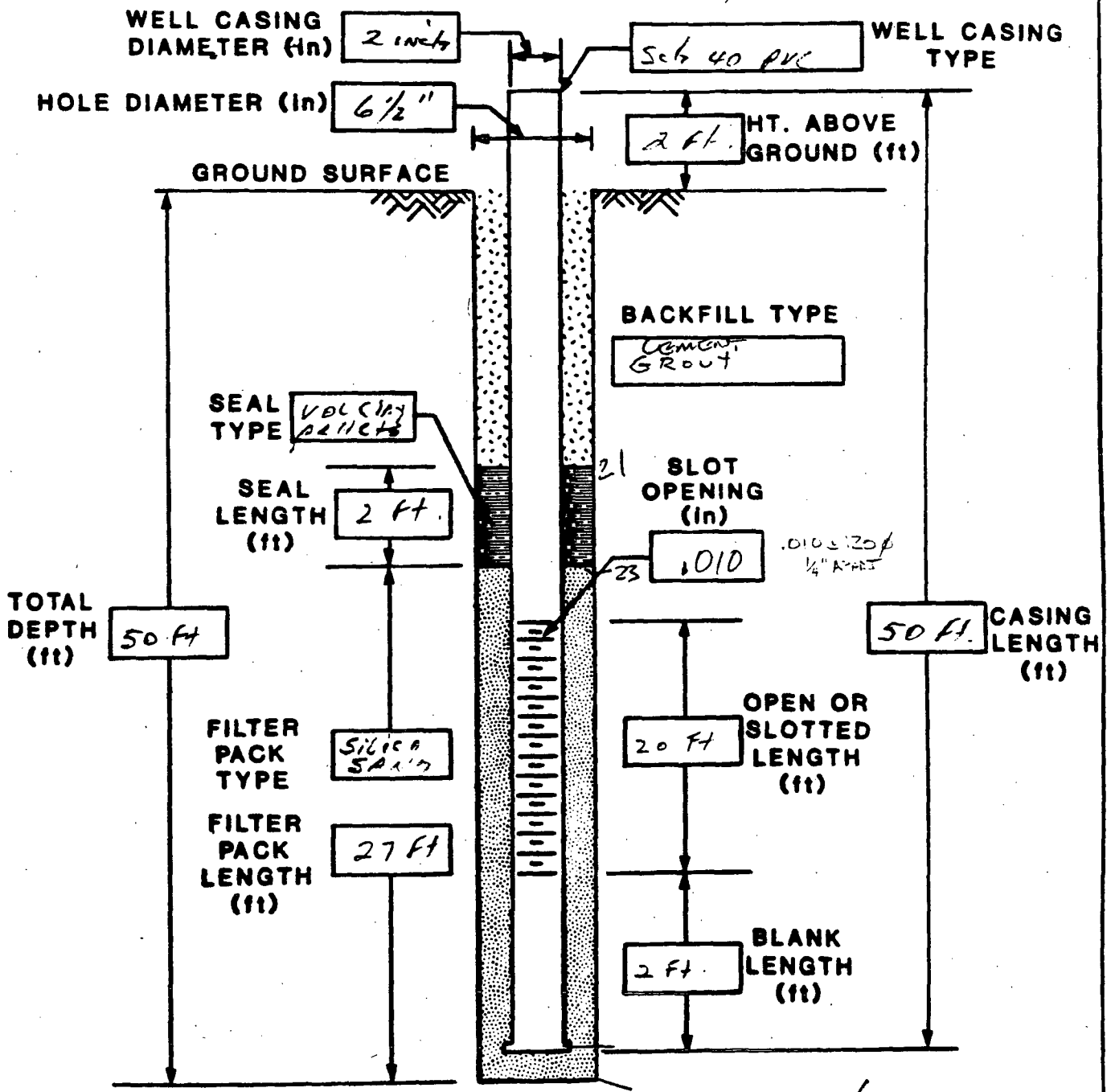
SITE ID: TUB01 LOCATION ID: ~~TBC-03~~ 903 DATE INSTALLED: 10-30-84

~~APPROX.~~ SITE COORDINATES: (FT.) N 6994.266 E 12116.686

OPEN AREA PER LINEAL FT. ($IN^2/FT.$) ~~0.440~~ 2.64

FORMATION OF COMPLETION: NAVAJO SS

FIELD REP.: SILVA DRILLER: SHB/JCARTER, TCATT



COMMENTS: Drilled to 64 Stayed cement to 58' / Cored Sand 650

GROUND ELEV — ~~5004.06.~~ TOP OF CASING ELEV — ~~5005.86.~~

JEG-AL-ENG-3 (3/84) 4980.44 4982.24

JACOBS ENGINEERING GROUP INC.
ADVANCED SYSTEMS DIVISION, ALBUQUERQUE OPERATIONS

WELL COMPLETION RECORD

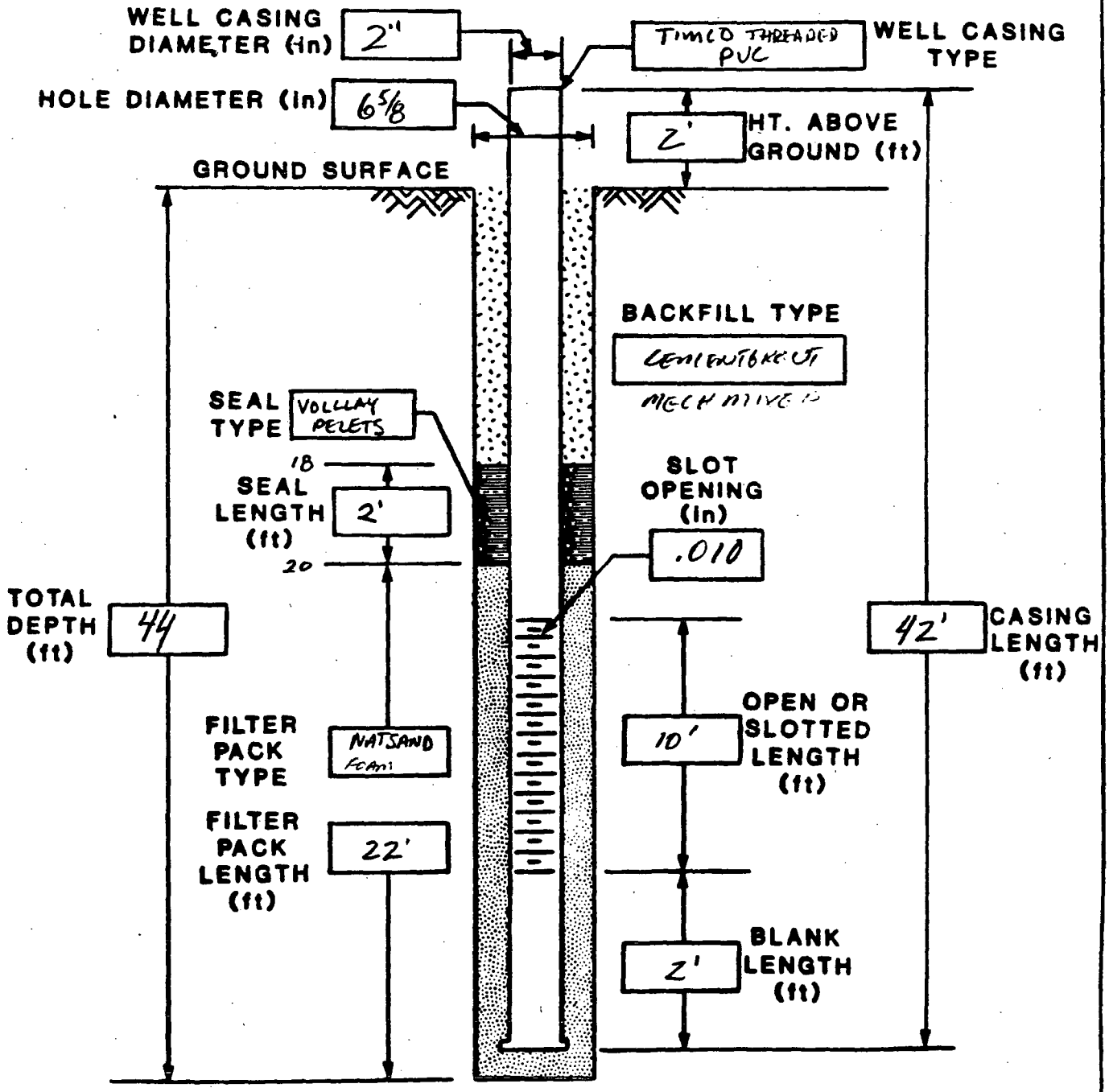
SITE ID: TVB01 LOCATION ID: 904 09 DATE INSTALLED: 11-7-[illegible]

~~APPROX.~~ SITE COORDINATES: (FT.) N 496.42 E 1258.5.778

OPEN AREA PER LINEAL FT. ($IN^2/FT.$) ~~0.440~~ 2.64

FORMATION OF COMPLETION:

FIELD REP.: SILVA DRILLER: SHB - BEAR



COMMENTS: GROUND ELEV - ~~4922.97~~ 4899.35. TOP OF CASING ELEV - ~~4925.07~~ 4901.45

JEG-AL-ENG-3 (3/84)

18.19.2.5

JACOBS ENGINEERING GROUP INC.
ADVANCED SYSTEMS DIVISION, ALBUQUERQUE OPERATIONS

WELL COMPLETION RECORD

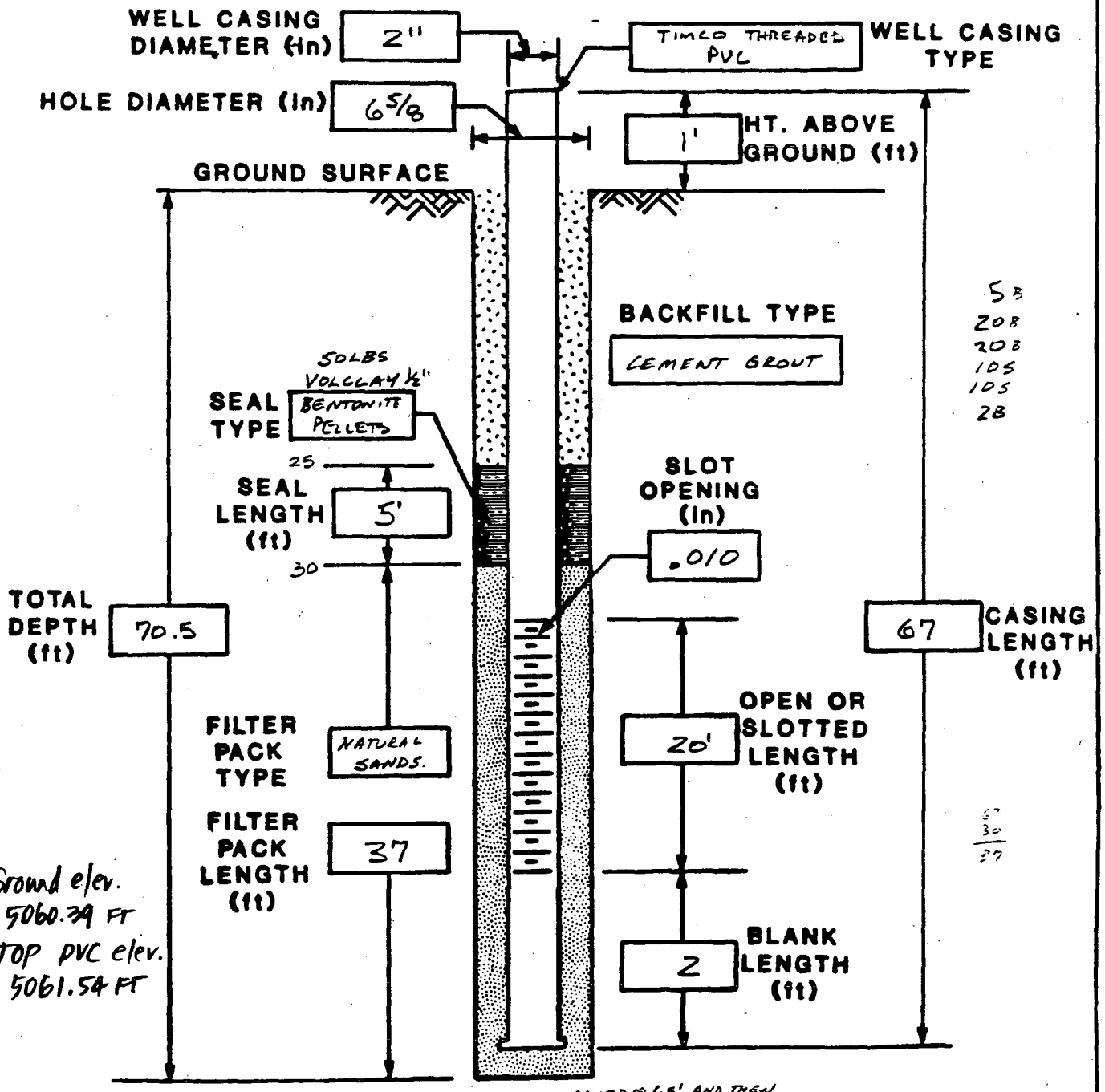
SITE ID: TUB 01 LOCATION ID: 906 DATE INSTALLED: 11-27-84

APPROX. SITE COORDINATES: (FT.) N 8352.002 E 11652.586

OPEN AREA PER LINEAL FT. ($IN^2/FT.$) 2.64

FORMATION OF COMPLETION: NAVAJO SANDSTONE

FIELD REP.: SILVA DRILLER: SHB - BEAR & B.W.



COMMENTS: FOLLOWING PACKER TESTS HOLE WAS REAMED TO 70.5' - PVC INSTALLED INSIDE AUGER - AUGER REMOVED - HOLE CAVED @ 30'

JEG-AL-ENG-3 (3/84)

NOTE 12" PROTECTIVE CASING LEFT IN PLACE TO 8'

JACOBS ENGINEERING GROUP INC.
ADVANCED SYSTEMS DIVISION, ALBUQUERQUE OPERATIONS

WELL COMPLETION RECORD

3/4

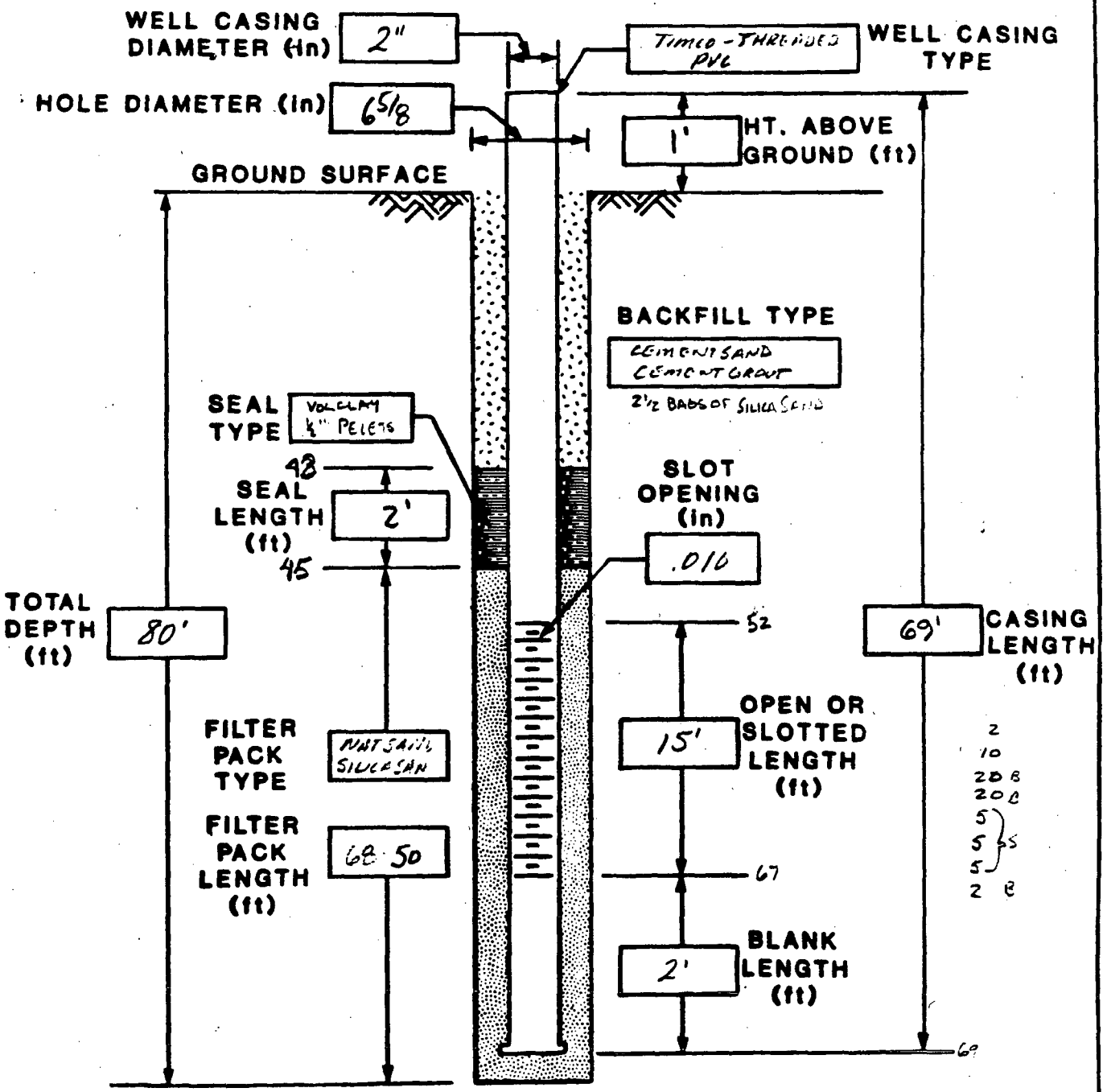
SITE ID: TUBO1 LOCATION ID: 908 DATE INSTALLED: 11-17-84

APPROX. SITE COORDINATES: (FT.) N ~~8200~~ 8183.658 E ~~10455~~ 10178.948

OPEN AREA PER LINEAL FT. ($IN^2/FT.$) 0.440 2.64

FORMATION OF COMPLETION: WHITE SANDSTONE

FIELD REP.: SILVA DRILLER: BEAR/SHE & B.W.



COMMENTS: WATER @ 4' 2½ BAGS SILICA SAND 50# VOLCLAY

GROUND ELEV - 5055.88. TOP OF CASING ELEV - 5057.44.

JEG-AL-ENG-3 (3/84)

JACOBS ENGINEERING GROUP INC.
ADVANCED SYSTEMS DIVISION, ALBUQUERQUE OPERATIONS

3/84

WELL COMPLETION RECORD

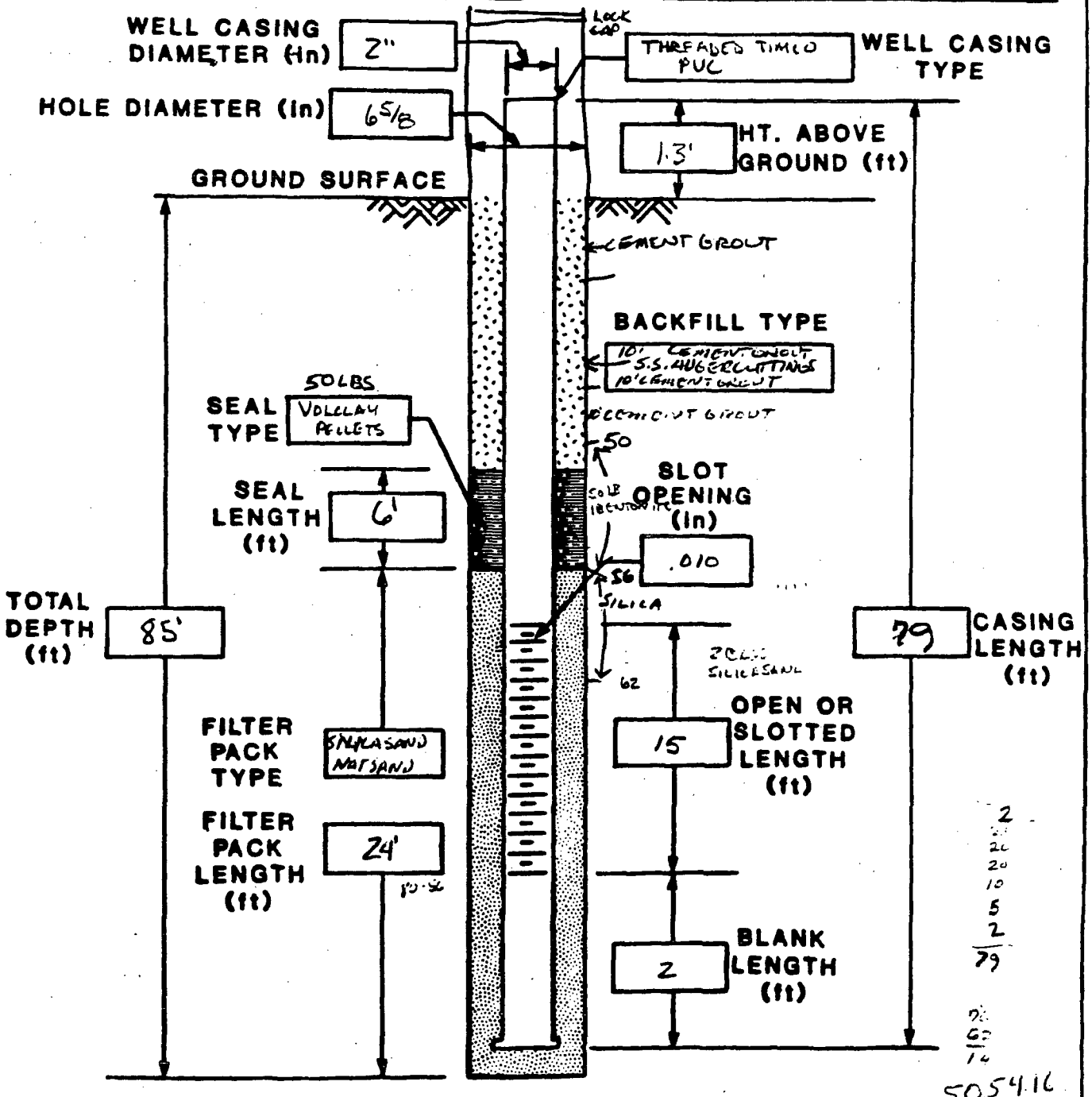
SITE ID: TUB01 LOCATION ID: 909 DATE INSTALLED: 11-12-84

APPROX. SITE COORDINATES: (FT.) N 7562.398 E 11734.890

OPEN AREA PER LINEAL FT. ($IN^2/FT.$) 0.440 2.64

FORMATION OF COMPLETION: SANDSTONE

FIELD REP.: SILVA DRILLER: SHB



COMMENTS: JETTED CASING DOWN FROM 77-82' GROUND ELEV — ~~5078.66~~ 5054.16.

INSTALL CASING OPEN TO 62' AFTER PULLING AUGER TOP OF CASING ELEV — ~~5080.36~~.

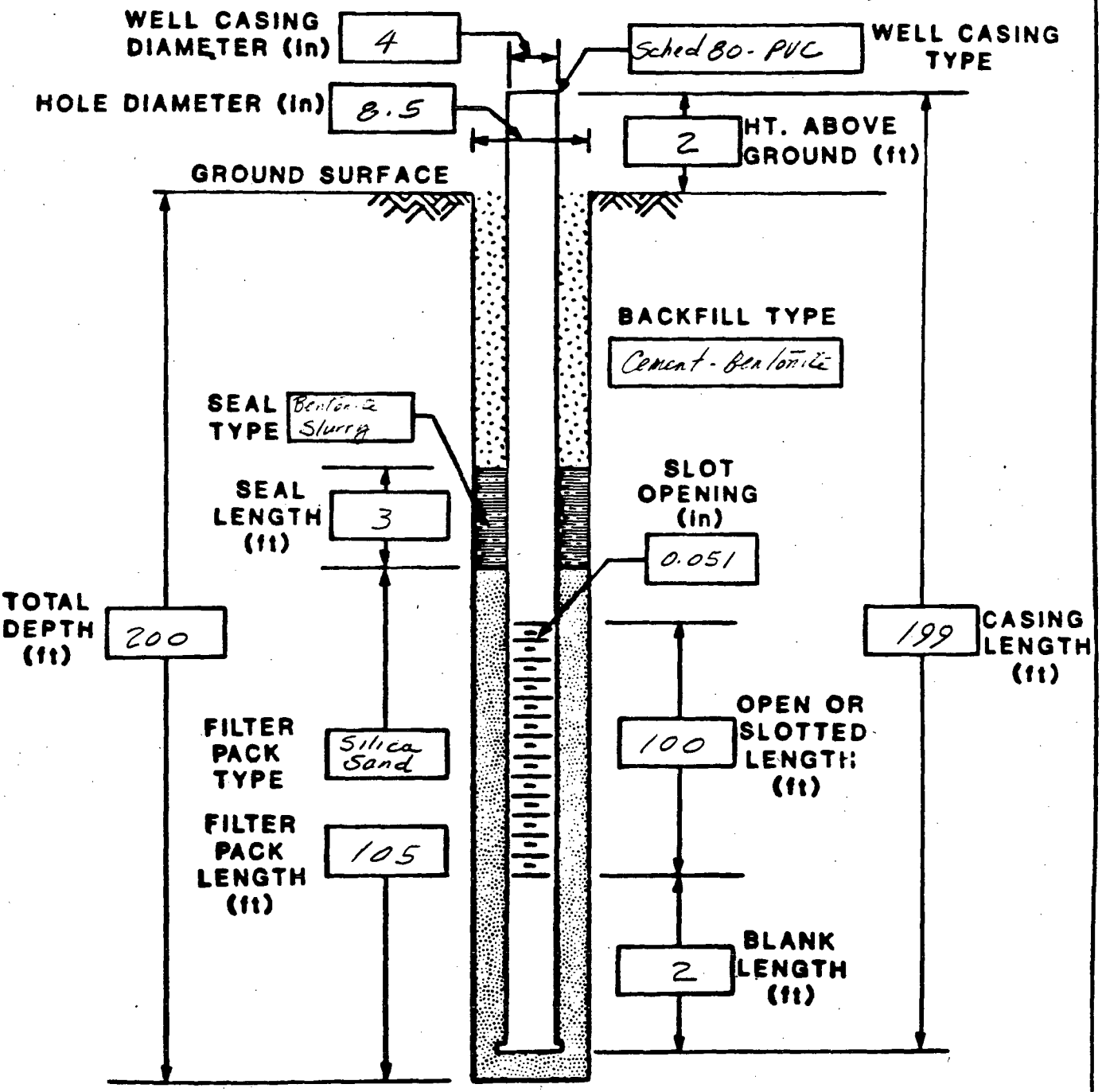
JEG-AL-ENG-3 (3/84)

5055.84

JACOBS ENGINEERING GROUP INC. Well No. 03T-564
ADVANCED SYSTEMS DIVISION, ALBUQUERQUE OPERATIONS

WELL COMPLETION RECORD

SITE ID: TUA 01 LOCATION ID: 910 DATE INSTALLED: 7-30-85
APPROX. SITE COORDINATES: (FT.) N 12018.395 E 11067.695
OPEN AREA PER LINEAL FT. ($IN^2/FT.$) 12
FORMATION OF COMPLETION: Navajo Sandstone
FIELD REP.: W R Wood DRILLER: Basin & Range



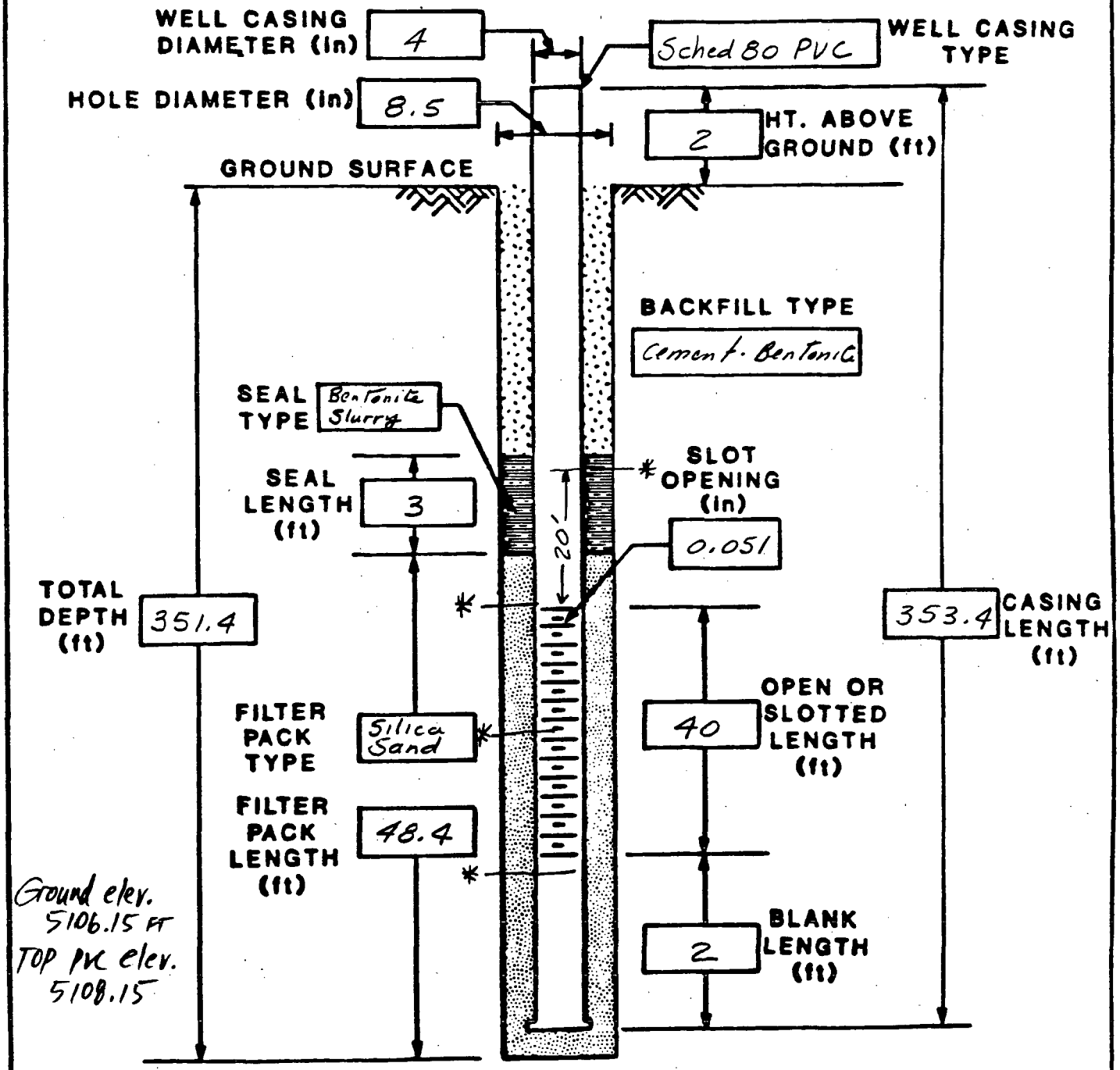
COMMENTS: Ground elev. 5105.94 FT
Top PVC elev. 5107.81 FT

JEG-AL-ENG-3 (3/84)

JACOBS ENGINEERING GROUP INC.
ADVANCED SYSTEMS DIVISION, ALBUQUERQUE OPERATIONS

WELL COMPLETION RECORD Well 03T-565

SITE ID: TUB 01 LOCATION ID: 911 DATE INSTALLED: 7-29-85
APPROX. SITE COORDINATES: (FT.) N 12097.826 E 11115.131
OPEN AREA PER LINEAL FT. ($IN^2/FT.$) 12
FORMATION OF COMPLETION: Navajo Sandstone
FIELD REP.: MR Wood DRILLER: Basin & Ranac



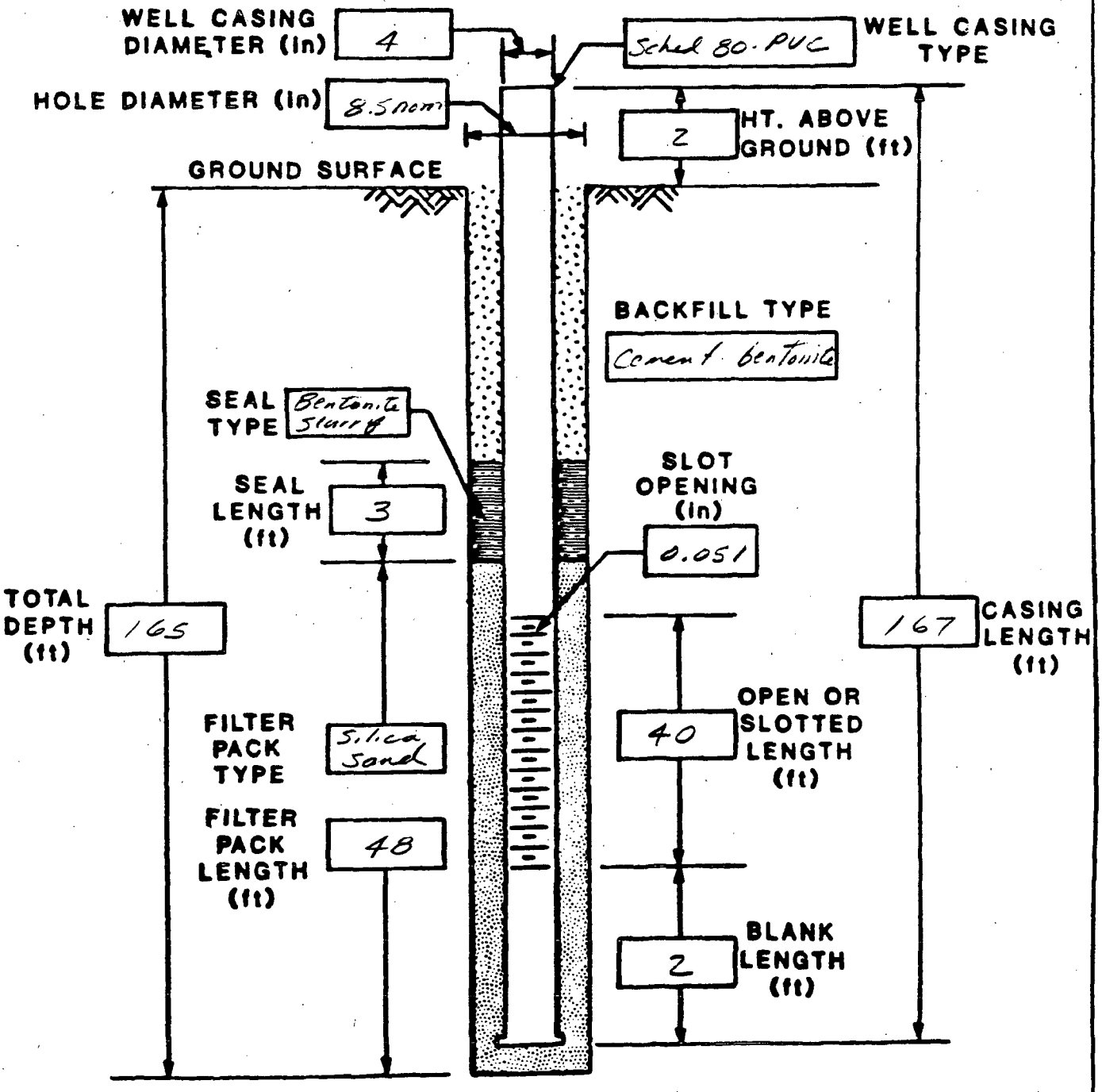
COMMENTS: Cut steel casing while over hole - dropped 1"x3" iron nipple down tremie pipe (non-galvanized) * Centralizers

JEG-AL-ENG-3 (3/84)

JACOBS ENGINEERING GROUP INC. Well No 03T-566
ADVANCED SYSTEMS DIVISION, ALBUQUERQUE OPERATIONS

WELL COMPLETION RECORD

SITE ID: TWR01 LOCATION ID: 912 DATE INSTALLED: 8-14-85
APPROX. SITE COORDINATES: (FT.) N 8127.144 E 10136.118
OPEN AREA PER LINEAL FT. ($IN^2/FT.$) 12
FORMATION OF COMPLETION: Navajo Sandstone
FIELD REP.: W R Wood DRILLER: Basin Surveys



COMMENTS: Ground elev. 5057.85 FT
Top P.V.C. elev. 5059.87 FT

JEG-AL-ENG-9 (3/84)

JACOBS ENGINEERING GROUP INC. Well No OBT-567
ADVANCED SYSTEMS DIVISION, ALBUQUERQUE OPERATIONS

WELL COMPLETION RECORD

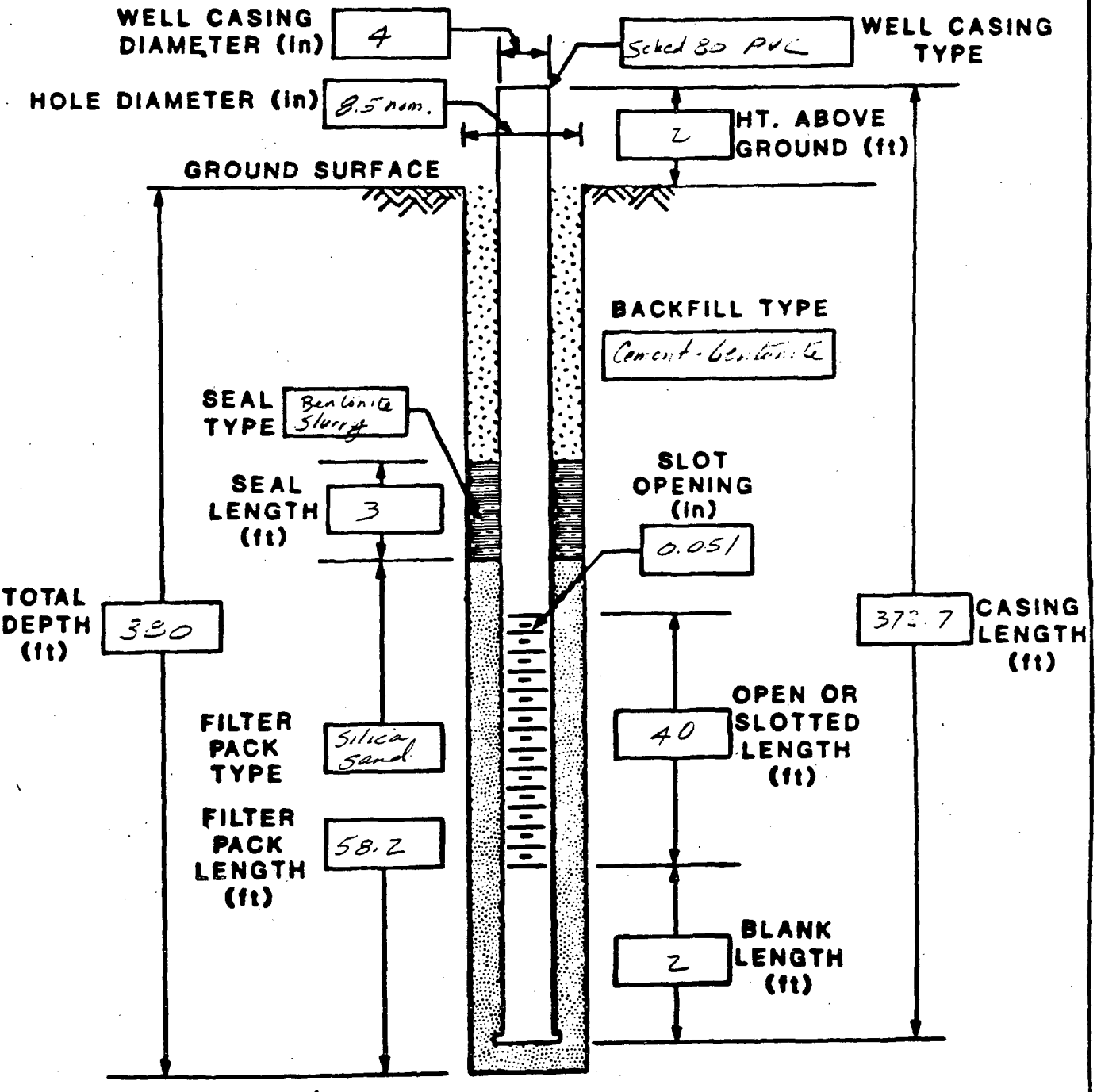
SITE ID: Tus 01 LOCATION ID: 913 DATE INSTALLED: 8-7-85

APPROX. SITE COORDINATES: (FT.) N 8056.375 E 10138.154

OPEN AREA PER LINEAL FT. ($IN^2/FT.$) 12

FORMATION OF COMPLETION: Navajo Sandstone

FIELD REP.: W R Wood DRILLER: Basin & Range



COMMENTS: Ground elev. 5057.88 FT

Top PVC elev. 5060.11 FT

JEG-AL-ENG-3 (3/84)

JACOBS ENGINEERING GROUP INC. Well No 03T-568
ADVANCED SYSTEMS DIVISION, ALBUQUERQUE OPERATIONS

WELL COMPLETION RECORD

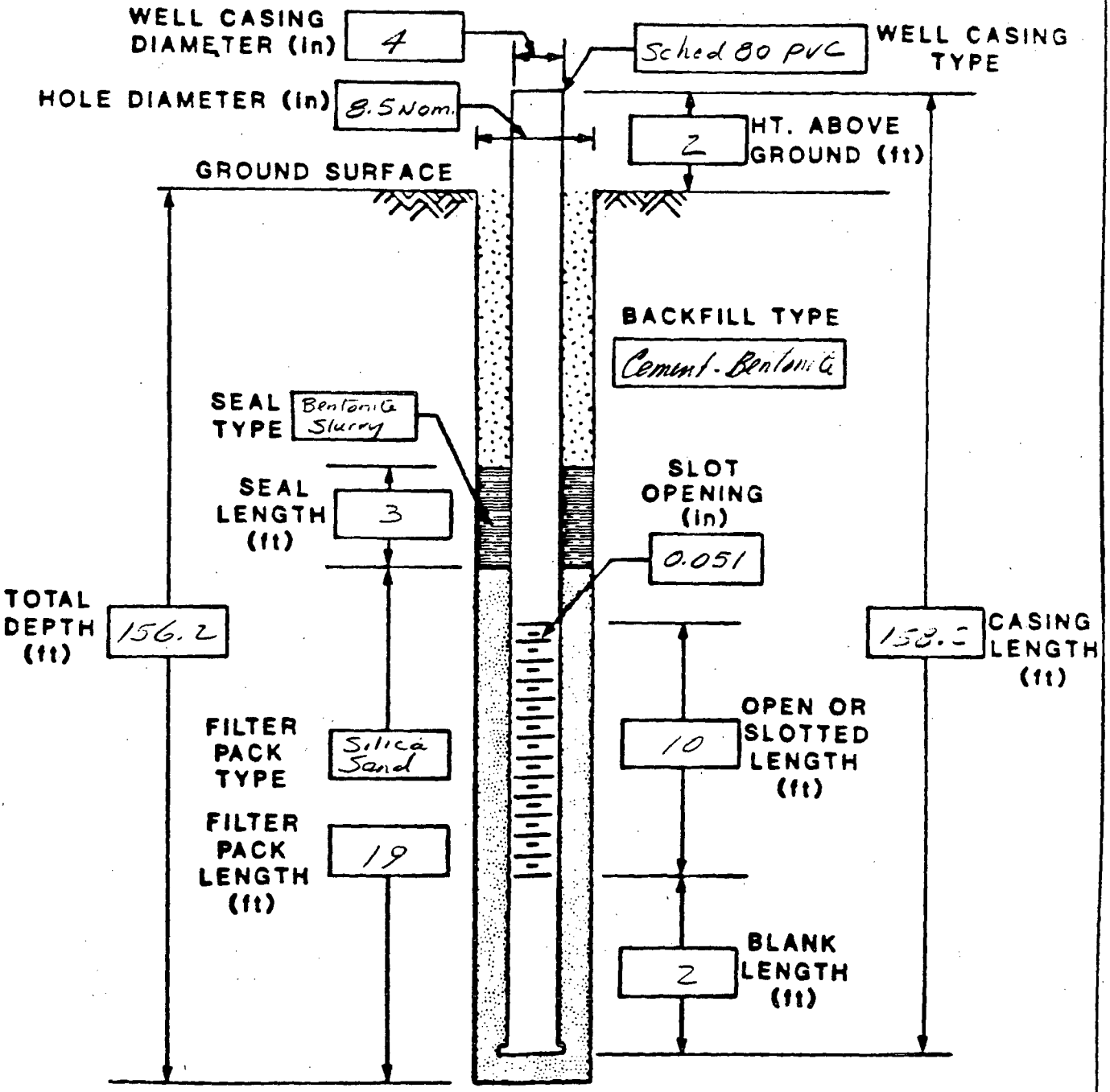
SITE ID: TUB 01 LOCATION ID: 914 DATE INSTALLED: 8-23-85

APPROX. SITE COORDINATES: (FT.) N 8271.891 E 13537.008

OPEN AREA PER LINEAL FT. ($IN^2/FT.$) 12

FORMATION OF COMPLETION: Navajo Sandstone

FIELD REP.: W R Wood DRILLER: Basin Range



COMMENTS: Ground elev. 5068.37 FT

Top PVC elev. 5070.16 FT

JACOBS ENGINEERING GROUP INC. Well № OBT-569
ADVANCED SYSTEMS DIVISION, ALBUQUERQUE OPERATIONS

WELL COMPLETION RECORD

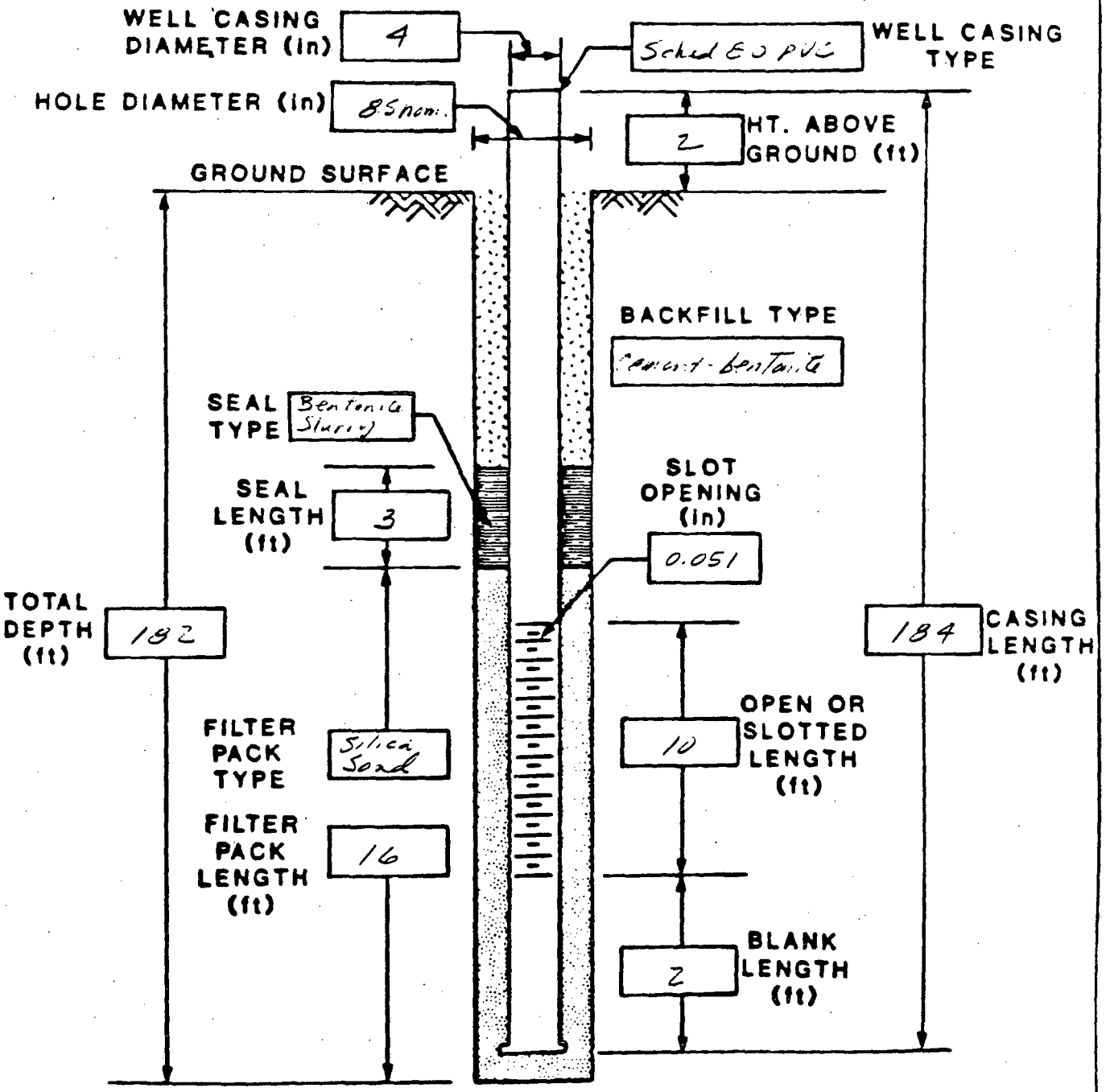
SITE ID: Tub 01 LOCATION ID: 915 DATE INSTALLED: 8-27-85

APPROX. SITE COORDINATES: (FT.) N 8361.948 E 13554.727

OPEN AREA PER LINEAL FT. ($IN^2/FT.$) 12

FORMATION OF COMPLETION: Navajo Sandstone

FIELD REP.: W R Wood DRILLER: Basin Range



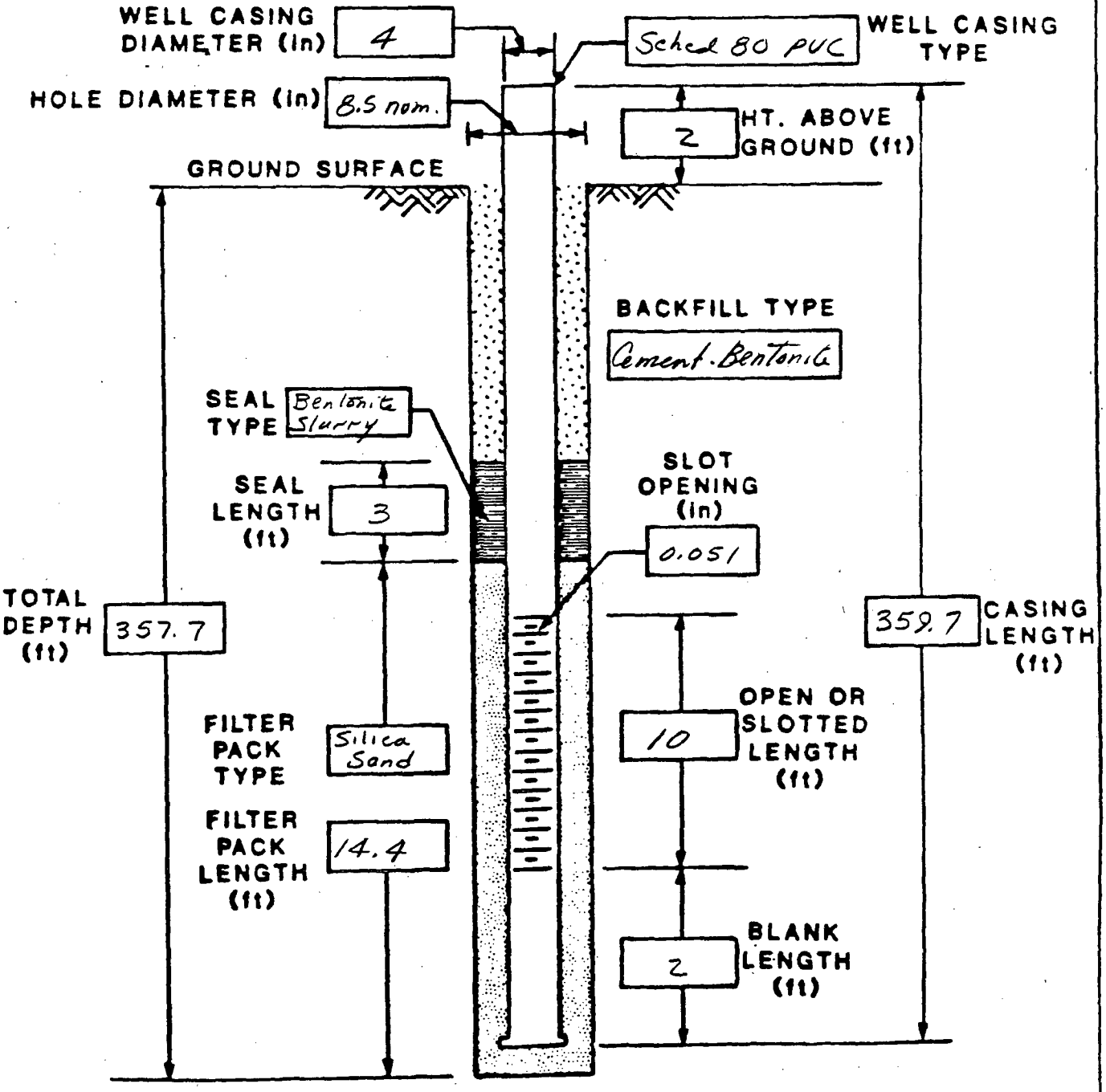
COMMENTS: Ground elev. 5068.58 FT

Top PVC elev. 5070.58 FT

JACOBS ENGINEERING GROUP INC. Well No 03T-570
ADVANCED SYSTEMS DIVISION, ALBUQUERQUE OPERATIONS

WELL COMPLETION RECORD

SITE ID: TUB 01 LOCATION ID: 916 DATE INSTALLED: 8-26-85
APPROX. SITE COORDINATES: (FT.) N 8297.953 E 13625.106
OPEN AREA PER LINEAL FT. ($IN^2/FT.$) 12
FORMATION OF COMPLETION: Navajo Sa. & Tcs
FIELD REP.: WR Wood DRILLER: Basin Rays



COMMENTS: Ground elev. 5068.10 FT
Top PVC elev. 5069.93 FT

JACOBS ENGINEERING GROUP INC.
ADVANCED SYSTEMS DIVISION, ALBUQUERQUE OPERATIONS

WELL COMPLETION RECORD

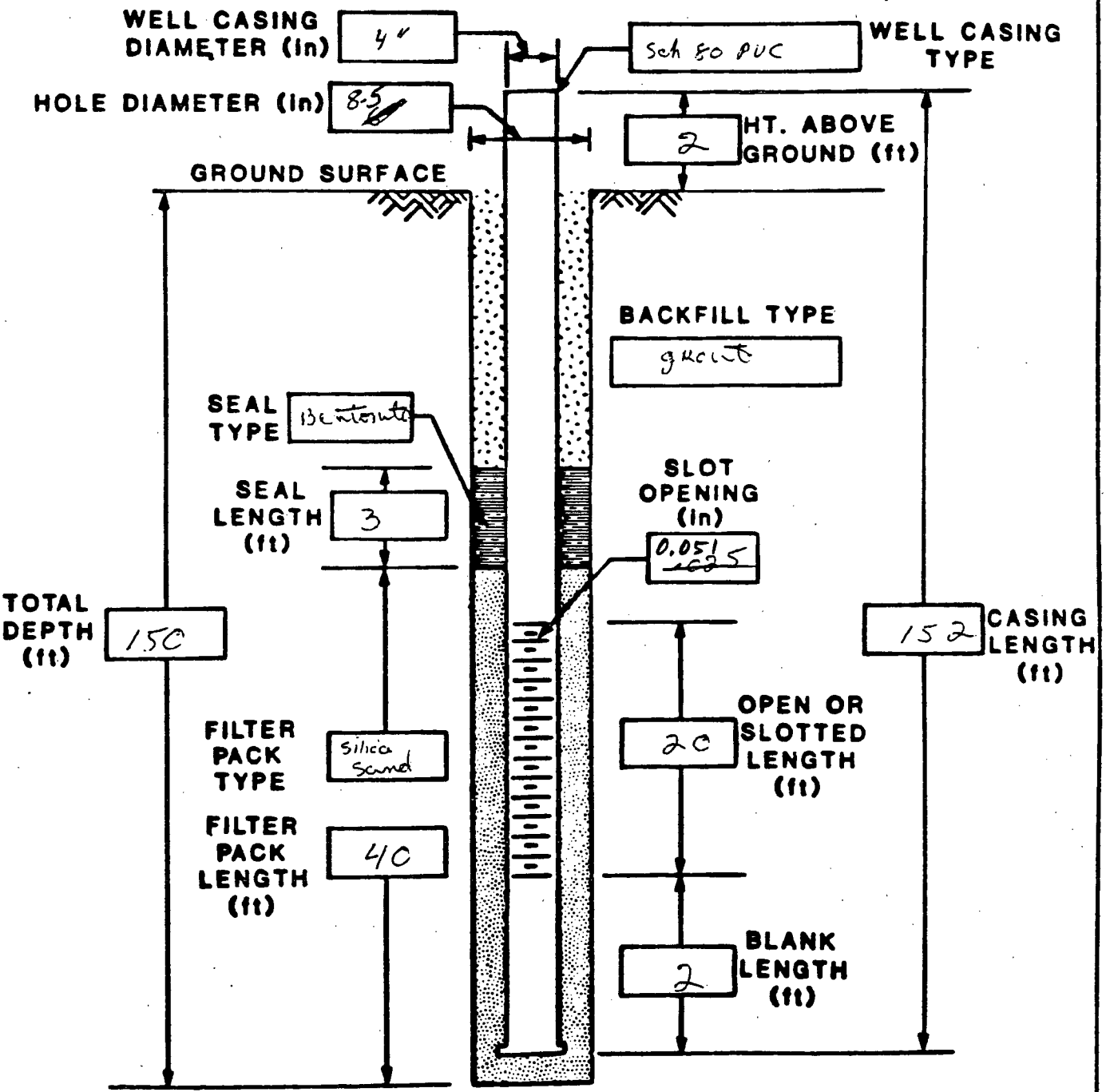
SITE ID: Tub #1 LOCATION ID: 917 DATE INSTALLED: 85/8/14-15

APPROX. SITE COORDINATES: (FT.) N 4847.024 E 8034.934

OPEN AREA PER LINEAL FT. ($IN^2/FT.$) 12

FORMATION OF COMPLETION: Navajo SS

FIELD REP.: McKenzie DRILLER: Basin & Range



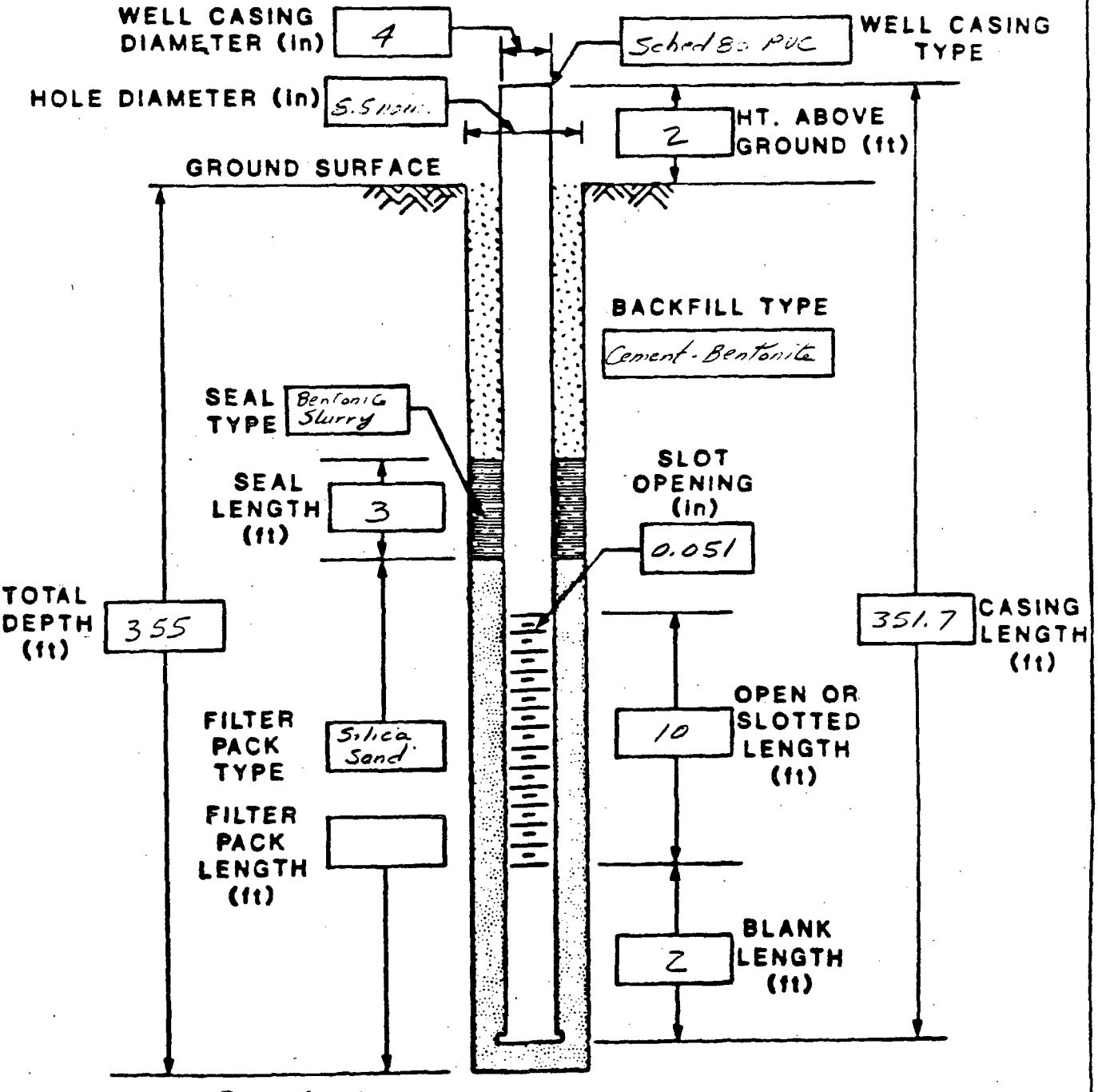
COMMENTS: Ground elev. 5046.05 FT

TOP PVC elev. 5048.06 FT

JACOBS ENGINEERING GROUP INC. Well Nº 03T-573
ADVANCED SYSTEMS DIVISION, ALBUQUERQUE OPERATIONS

WELL COMPLETION RECORD

SITE ID: TUB 01 LOCATION ID: 919 DATE INSTALLED: 8-29-95
APPROX. SITE COORDINATES: (FT.) N 4857.765 E 8133.299
OPEN AREA PER LINEAL FT. ($IN^2/FT.$) 12
FORMATION OF COMPLETION: Navajo Sandstone
FIELD REP.: WR Wood DRILLER: Bushnell



COMMENTS: Ground elev. 5046.17 FT
Top PVC elev. 5048.23 FT

JACOBS ENGINEERING GROUP INC.
ADVANCED SYSTEMS DIVISION, ALBUQUERQUE OPERATIONS

WELL COMPLETION RECORD Well 03T-574

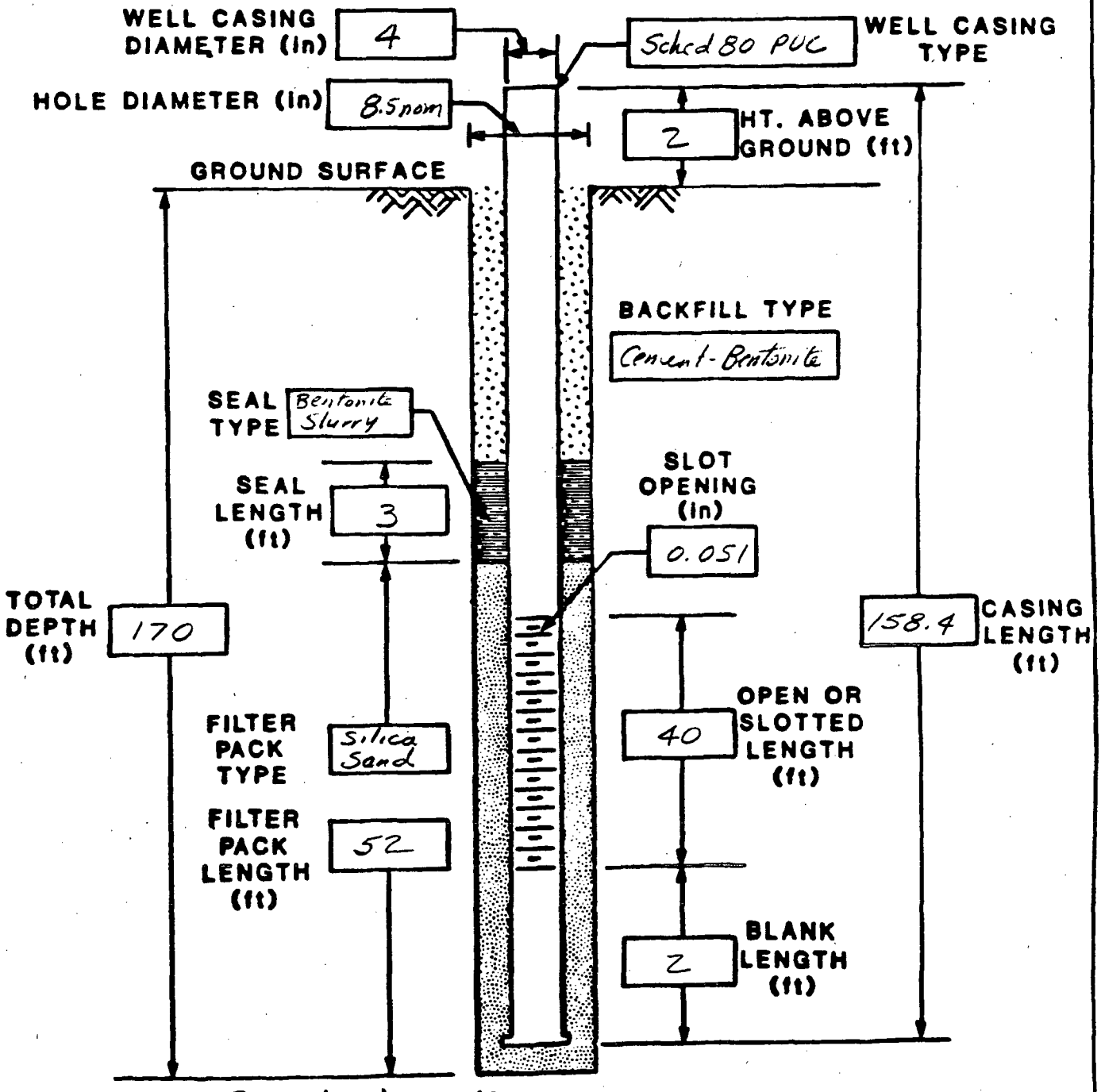
SITE ID: TUB 01 LOCATION ID: 920 DATE INSTALLED: 8-3-85

APPROX. SITE COORDINATES: (FT.) N 6903.774 E 12062.484

OPEN AREA PER LINEAL FT. ($IN^2/FT.$) 12

FORMATION OF COMPLETION: Navajo Sandstone

FIELD REP.: W R Wood DRILLER: Basin & Range



COMMENTS: Ground elev. 4980.64 FT

TOP PVC elev. 4982.61 FT

JEG-AL-ENG-3 (3/84)

JACOBS ENGINEERING GROUP INC.
ADVANCED SYSTEMS DIVISION, ALBUQUERQUE OPERATIONS

WELL COMPLETION RECORD Well OBT-575

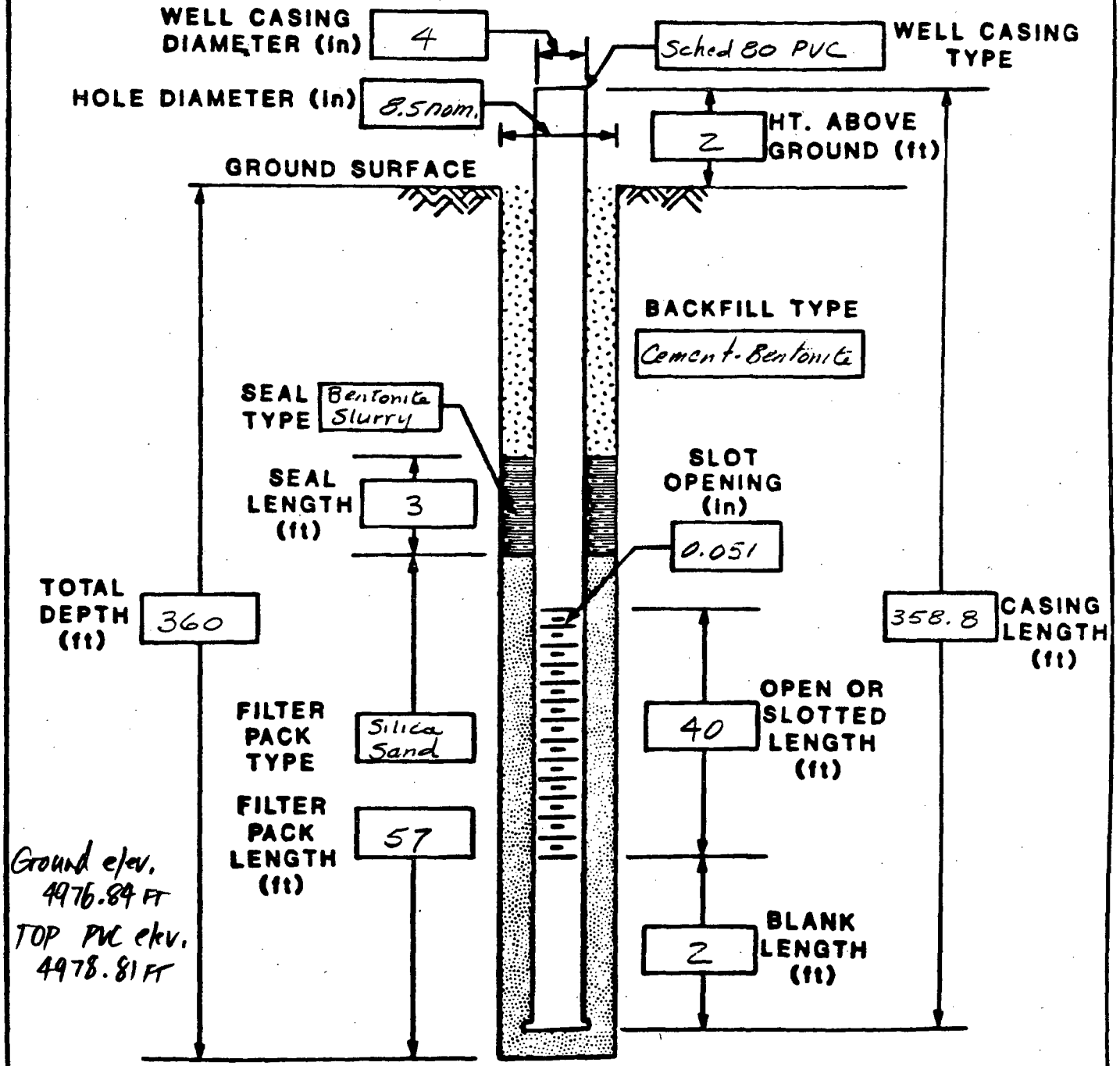
SITE ID: Tub 01 LOCATION ID: 921 DATE INSTALLED: 8-1-85

APPROX. SITE COORDINATES: (FT.) N 6907.318 E 12179.826

OPEN AREA PER LINEAL FT. ($IN^2/FT.$) 12

FORMATION OF COMPLETION: Navajo Sandstone

FIELD REP.: W R Wood DRILLER: Basin & Range



COMMENTS: 10' of native sands at bottom around screen - overfilled filter pack 15' above screen for settlement during development.

ATTACHMENT 5

BOREHOLE/WELL CONSTRUCTION LOGS

TUBA CITY, ARIZONA, DISPOSAL SITE

N-1533.840 E 10903.717 902 NEW BOREHOLE

JE JACOBS ENGINEERING GROUP INC.
ADVANCED SYSTEMS DIVISION, ALBUQUERQUE OPERATIONS

BOREHOLE/WELL CONSTRUCTION LOG

SITE ID: TUB LOCATION ID: 902 FIELD REP: J. Hoopes

APPROX. SITE COORDINATES (FT.): (N) ~~36°07'30"~~ 4732.94 (E) 111°09'30"

GROUND ELEVATION (FT. MSL): 4760 ~~4790.49~~ COMPLETION DATE: 12-2-84

BOREHOLE SUMMARY

DRILLER: J. Carter

RIG TYPE: CME-75 Rotary

BIT TYPE	HOLE DIA. (in.)	END DEPTH (ft.)	FLUID TYPE
HSA	6 1/2	75	NA

CASING SUMMARY

CASING TYPE	DESCRIPTION	DIA. (in.)	END DEPTH (ft.)
P	Steel casing	4	2
B	Sch. 40 PVC	2	63
S	Sch. 40 PVC	2	73
B	Sch. 40 PVC	2	75

P-Protective S-Screen B-Blank O-Open N-None

Depth from Top of Casing

WELL CONSTRUCTION

TYPE CODE	DESCRIPTION	END DEPTH (ft.)
B	Cement-bentonite grout	28
S	Bentonite pellets	31
B	Medium grade concrete sand	58
F	Silica Sand, 5-15% grade	68
B	Hole cave-in mat'l	75

B - Backfill S - Seal F - Filter Pack

Depth from Ground Surface

CONSTRUCTION TIME LOG

ACTIVITY	START DATE	START TIME	END TIME
DRILLING	12-2-84	10:15AM	12:15PM
CASING	12-2-84	3:00PM	3:30PM
FILTER PACK	12-2-84	3:45PM	4:30PM
SEAL	12-2-84	4:45PM	5:00PM
BACKFILL	12-2-84	5:00PM	5:30PM
DEVELOPMENT			
OTHER			

WELL DEVELOPMENT

COMMENTS: Filter pack type same as approved for other TUB wells. Well not developed 12-2-84.

TOP OF CASING - ~~4790.54~~ 4733.99

JACOBS ENGINEERING GROUP INC.
ADVANCED SYSTEMS DIVISION, ALBUQUERQUE OPERATIONS

BOREHOLE/WELL CONSTRUCTION LOG

SITE ID: TUBO1 LOCATION ID: ~~TB-1-03~~ 903 FIELD REP: SILVA

~~APPROX.~~ SITE COORDINATES (FT.): N 6994.266 E 12116.686

GROUND ELEVATION (FT. MSL): ~~5004.06~~ 4980.44 COMPLETION DATE:

BOREHOLE SUMMARY

DRILLER: SHB/JCARTER, T CATT

RIG TYPE:

BIT TYPE	HOLE DIA. (in.)	END ● DEPTH (ft.)	FLUID TYPE
HSA	6"	34'	H_2O/FOAM
CHRIS DRILL 2" DIAMOND	2"	174'	H_2O/FOAM
11SA	6"	50'	H_2O FOAM

CASING SUMMARY

CASING TYPE*	DESCRIPTION	DIA. (in.)	END✚ DEPTH (ft.)
2	2' STICK UP		
2	TOP & BOTTOM CAPS	2"	52
P	4' PROTECTIVE STEEL LOCKUP	6"	0-2
2	CENTRALIZERS (2)	2"	—
10 B	10' BLANK	2"	0-10
20' B	20' BLANK		10-30
10' S	10' SCREENED @ .010		30-40
10 S	10' SCREENED .010		40-50
2'B	2' BLANK		50-52

* P-Protective S-Screen B-Blank O-Open N-None

✚ Depth from Top of Casing

CONSTRUCTION TIME LOG

ACTIVITY	START DATE	START TIME	END TIME
DRILLING	10·28	8-	6:00
	10·29	6 Am	6:30 PM
	10·30	6:30	10:30
CASING	10/30	12	12:15
FILTER PACK		12:30	1:00
SEAL		1:00	1:30
BACKFILL		1:30	2:30
DEVELOPMENT	10/31	8:45	
OTHER			

WELL CONSTRUCTION

TYPE CODE*	DESCRIPTION	END● DEPTH (ft.)
B	5 BAGS CEMENT 20% BENTONITE GROUT BACKFILL	0-21
S	25# VOLCLAY PELLETS SEAL	23-21
F	SILICA - CRYSTAL #20 3@100 LBS	50-23'
B	BOTTOM OF HOLE FILLED WITH	174-50
	CONCRETE SAND BACKFILL	

* B - Backfill S - Seal F - Filter Pack

● Depth from Ground Surface

WELL DEVELOPMENT

WATER WAS AIRLIFTED & ALLOWED TO RECOVER, WATER WAS CONTINUED TO BE LIFTED UNTIL DISCHARGE WATER RAN CLEAR

COMMENTS: GARDNER DENVER SPI50G "ROTA SCREW" COMPRESSOR

TOP OF CASING ELEV — ~~5005.86~~ 4982.24

JEG-AL-ENG-1 (8/84)

JACOBS ENGINEERING GROUP INC.
ADVANCED SYSTEMS DIVISION, ALBUQUERQUE OPERATIONS

BOREHOLE/WELL CONSTRUCTION LOG

SITE ID: TUB01 LOCATION ID: 904B4 FIELD REP: SILVA

APPROX. SITE COORDINATES (FT.): N 496.412 E 12585.778

GROUND ELEVATION (FT. MSL): ~~4922.97~~ 4899.35 COMPLETION DATE: 11/6/84

BOREHOLE SUMMARY

DRILLER: BEAR-SHB

RIG TYPE: MOBILE B-80

BIT TYPE	HOLE DIA. (in.)	END DEPTH ● (ft.)	FLUID TYPE
6" HSA	6 5/8	47'	DRY-NAT
2" DRILLSTEEL	2"	47'	AIR-FOAM

CASING SUMMARY

CASING TYPE*	DESCRIPTION	DIA. (in.)	END● DEPTH (ft.)
4' P	PROTECTIVE LOCKING CAP	6"	0-4'
10 B	BLANK 10'		0-10
20'B	BLANK 20'	2"	10-20
10'S	.010 SCREEN 5'		20 30
10'S	.010 SCREEN 5'		30 40
2'B	BLANK 2'		40-42

* P-Protective S-Screen B-Blank O-Open N-None

● Depth from Top of Casing

CONSTRUCTION TIME LOG

ACTIVITY	START DATE	START TIME	END TIME
DRILLING	11/6/84	8:AM	11:45
		12:30	2:00
AIRLIFT CUTTINGS		2:00	
CASING	11/7/84	10:00	10:45
FILTER PACK		10:45	10:51
SEAL		10:45	-10:47
BACKFILL		10:50	11:50
DEVELOPMENT			
OTHER			

WELL CONSTRUCTION

TYPE CODE*	DESCRIPTION	END● DEPTH (ft.)
B	CEMENT GROUT	0-10
B	SAND-NATURAL	10-18
B	SAND BACKFILL + BENTONITE	18-20
B	CEMENT GROUT BACKFILL	20
S	VOLCLAY PELLETS SEAL 18-20'	20
F	NAT SAND FILTER	20-40

18'
20'

* B - Backfill S - Seal F - Filter Pack

● Depth from Ground Surface

WELL DEVELOPMENT

NOTE; BOTTOM OF PIPE @ 40' BELOW GROUND SURFACE

LARGE CAVING EXISTS @ 20'- 55 gal OF CEMENT GROUT + BENTONITE + SAND BACKFILL WAS USED TO FILL CAVE. TOOLS TO 20' WITH NO CORRELATION OF LEVEL RISE - SAND AND BENTONITE ADDED UNTIL LEVEL ROSE TO 18' THEN VOLCLAY SEAL THEN NAT SAND TO 10' THEN GROUT TO SURFACE

COMMENTS:

HOLE WAS DRILLED TO 47' WITH 6" HSA - HOLE CAVED @ 20'. CUTTINGS WERE THEN AIRLIFTED WITH RIG COMPRESSOR AND FOAM MIX USING CORING STEEL

HOLE CASING - SET PVC INSIDE OF 6 1/2"

CEMENT MECHANICALLY MIXED

TOP OF CASING ELEV - 4925.07

JACOBS ENGINEERING GROUP INC.
ADVANCED SYSTEMS DIVISION, ALBUQUERQUE OPERATIONS

BOREHOLE/WELL CONSTRUCTION LOG

5/5

SITE ID: TUDO1 LOCATION ID: 905 FIELD REP: SILVA

~~APPROX.~~ SITE COORDINATES (FT.): N 9351.868 E 13758.486

GROUND ELEVATION (FT. MSL): 5070.12 COMPLETION DATE: 11/17/84

BOREHOLE SUMMARY

DRILLER: SHB - BEAR

RIG TYPE: ~~CAT 55~~ MOBILE B-20

BIT TYPE	HOLE DIA. (in.)	END DEPTH● (ft.)	FLUID TYPE

CASING SUMMARY

CASING TYPE*	DESCRIPTION	DIA. (in.)	END✚ DEPTH (ft.)
P	4' 6" PROTECTIVE LOCKCAP	6"	
2'B	2' BLANK CASING	2"	2
20'B	20' BLANK CASING		22
20'B	"		42
20'B	"		62
15'S	15' SCREEN 0.010		77
2'B	2' BLANK CASING		79

* P-Protective S-Screen B-Blank O-Open N-None

✚ Depth from Top of Casing

WELL CONSTRUCTION

TYPE CODE*	DESCRIPTION	END● DEPTH (ft.)
B	CEMENT GROUT	10'
B	CEMENT SAND + BENTONITE	10'
B	CEMENT GROUT	41.5
S	VOLCLAY PELLETS	48.5
F	SILICA SAND FILTER	50
F	NAT SAND FILTER	66'

* B - Backfill S - Seal F - Filter Pack

● Depth from Ground Surface

CONSTRUCTION TIME LOG

ACTIVITY	START DATE	START TIME	END TIME
DRILLING	11/15/84	8:00	5:30
CASING	11/16/84	8:00	4:00
FILTER PACK	11/16/84	4:00	4:30
SEAL		4:30	4:35
BACKFILL		4:35	5:00
DEVELOPMENT			
OTHER			

WELL DEVELOPMENT

COMMENTS: AIR USED TO 60'

AIR & FOAM USED 60-70'

NSA USED FROM 70-82'

30 GAL H_2O USED TO JET CASING

TOP OF CASING ELEV — 5072.27.

JACOBS ENGINEERING GROUP INC.
ADVANCED SYSTEMS DIVISION, ALBUQUERQUE OPERATIONS

BOREHOLE/WELL CONSTRUCTION LOG

SITE ID: TUB01 LOCATION ID: 906 FIELD REP: SILVA

APPROX. SITE COORDINATES (FT.): N ~~B352,002~~ 8300 E ~~4700~~ 11652.566

GROUND ELEVATION (FT. MSL): 5060.39 COMPLETION DATE: 11-27-84

BOREHOLE SUMMARY

DRILLER: SHB- BEAR

RIG TYPE: MOBILE B-80

BIT TYPE	HOLE DIA. (in.)	END DEPTH ● (ft.)	FLUID TYPE
HSA	6"	32'	DRY
CARBIDE NQ CORING	3"	70.5'	FOAM-AIR
HSA REAM	6"	70	DRY

CASING SUMMARY

CASING TYPE●	DESCRIPTION	DIA. (in.)	END✚ DEPTH (ft.)
4' P	PROTECTIVE CASING 4'	6"	3'
45' B	TIMCO THREADED BLANK	2"	44'
20' S	.010 SCREEN	↓	64'
2' B	BLANK 2'	↓	66'

● P-Protective S-Screen B-Blank O-Open N-None

✚ Depth from Top of Casing

WELL CONSTRUCTION

TYPE CODE●	DESCRIPTION	END● DEPTH (ft.)
B	CEMENT GROUT BACKFILL	25'
S	VOLCLAY-PELLETS ½"	30'
F	NATURAL SAND FILTER	70'

● B - Backfill S - Seal F - Filter Pack

● Depth from Ground Surface

CONSTRUCTION TIME LOG

ACTIVITY	START DATE	START TIME	END TIME
DRILLING			
SET CASING & GROUT			
HSA	11/19/84	2:30PM	5:30PM
CORE	11/20/84	8:15AM	2:PM
REAM	11/27	12:30	2:30
CASING	11/27	2:30	2:40
FILTER PACK		2:40	3:00
SEAL		3:00	3:10
BACKFILL		3:10	4:50
DEVELOPMENT			
OTHER			
PACKER TESTING	11/27/84	10:00AM	12:15PM

WELL DEVELOPMENT

WELL NOT DEVELOPED @ TIME OF INSTALLATION

FOLLOWING CORING TO 70' HOLE WAS ALLOWED TO SIT FOR 7 DAYS THEN

COMMENTS: HOLE WAS PRESSURE TESTED USING DOUBLE PACKERS- THEN REAMED TO 70' USING 6" HSA- PVC SET INSIDE OF AUGER THEN AUGER PULLED- HOLE CAVED @ 30'- NATURAL SAND USED FOR FILTER PACK

NOTE 12" PROTETIVE CASING-PVC TO 8'

TOP OF CASING ELEV — 5061.54'

10.11.2.2.3

4/4

JE JACOBS ENGINEERING GROUP INC.
ADVANCED SYSTEMS DIVISION, ALBUQUERQUE OPERATIONS

BOREHOLE/WELL CONSTRUCTION LOG

SITE ID: TUBO1 LOCATION ID: 908 FIELD REP: SILVA

APPROX. SITE COORDINATES (FT.): N 8183.658 E 10178.948

GROUND ELEVATION (FT. MSL): 5055.88 COMPLETION DATE: 11-17-84

BOREHOLE SUMMARY

DRILLER: BEAR - SHB

RIG TYPE: MOBILE B-80

BIT TYPE	HOLE DIA. (in.)	END DEPTH● (ft.)	FLUID TYPE
6" HSA	6"	80'	DRY

CASING SUMMARY

CASING TYPE*	DESCRIPTION	DIA. (in.)	END DEPTH◆ (ft.)
4 P	PROTECTIVE CAP	6"	2
2 B	BLANK 2'		2
10 B	" 10'		12
20 B	" 20'		32
20 B	" 20'		52
15 S	.010 SCREEN		67
2 B	2' BLANK		69

* P-Protective S-Screen B-Blank O-Open N-None

◆ Depth from Top of Casing

WELL CONSTRUCTION

TYPE CODE*	DESCRIPTION	END DEPTH● (ft.)
B	CEMENT GROUT	0-10'
B	CEMENT SAND	10-32
B	CEMENT GROUT	32-42
S	VOLCLAY PELLETS	42-45
F	SILICA SAND FILTER	52-69
F	NAT SAND FILTER	67-70

* B - Backfill S - Seal F - Filter Pack

● Depth from Ground Surface

CONSTRUCTION TIME LOG

ACTIVITY	START DATE	START TIME	END TIME
DRILLING	11-17-84	10:30	2:00
CASING		2:00	2:15
FILTER PACK		2:15	2:30
SEAL		2:30	2:37
BACKFILL		2:37	3:00
DEVELOPMENT			
OTHER CLEANUP		3:00	4:20

WELL DEVELOPMENT

COMMENTS: WATER USED TO JET CASING IN HOLE

TOP OF CASING ELEV — 5057.44.

JACOBS ENGINEERING GROUP INC.
ADVANCED SYSTEMS DIVISION, ALBUQUERQUE OPERATIONS

BOREHOLE/WELL CONSTRUCTION LOG

4/4

SITE ID: TVB01 LOCATION ID: 909 FIELD REP: SILVA

APPROX. SITE COORDINATES (FT.): N 7562.398 E 11734.890

GROUND ELEVATION (FT. MSL): ~~5078.68~~ 5054.16 COMPLETION DATE: 11-18-84

BOREHOLE SUMMARY

DRILLER: SHB - BEAR / B.W

RIG TYPE: MOBILE B-80

BIT TYPE	HOLE DIA. (in.)	END DEPTH● (ft.)	FLUID TYPE
6" HSA	6 5/8	82'	DRY - NONE

CASING SUMMARY

CASING TYPE*	DESCRIPTION	DIA. (in.)	END✚ DEPTH (ft.)
4'P	PROTECTIVE STEEL CASING	6"	2'
5B	5' BLANK		5
20B	20' BLANK	2"	25
20B	"		45
20B	"		65
10'S	10' SLOTTED .010		75
5'S	5' " "		80
2B	2' BLANK		82

* P-Protective S-Screen B-Blank O-Open N-None

✚ Depth from Top of Casing

CONSTRUCTION TIME LOG

ACTIVITY	START DATE	START TIME	END TIME
DRILLING	11-18-84	10:00	1:15
CASING		1:15	1:25
FILTER PACK	11-19-84	10:10	10:30
SEAL		10:30	10:45
GROUT MIXING		11:00	11:30
BACKFILL		11:30	12:00
GROUT MIX CLEANOUT		12:00	[illegible]
DEVELOPMENT			
OTHER			

WELL CONSTRUCTION

TYPE CODE*	DESCRIPTION	END● DEPTH (ft.)
B	CEMENT GROUT	10
B	WHITE SS AUGER CUTTINGS	10-40
B	CEMENT GROUT	40-50'
S	SEAL	50-56
F	SILICA SAND	56-62
F	NATURAL SAND	62-79

* B - Backfill S - Seal F - Filter Pack

● Depth from Ground Surface

WELL DEVELOPMENT

WELL NOT DEVELOPED IMMEDIATELY AFTER DRILLING
* HOLE ADVANCED TO 85' USING H.S.A.
* CASING SET INSIDE AUGERS @ 77-82'
* NOTE THAT AUGER WAS JUNDED BY [illegible] OR ROCK @ 15' - (WHEN 50' OF AUGERS WERE IN HOLE AUGER ONLY TWISTED ½ ✆ WHEN JUNDED) BIT BROKE & HAD TO FINISH PULLING AUGERS ON 11/19/84 AFTER WELDING. HOLE WAS CLEANED TO 62'

COMMENTS: WELL NOT DEVELOPED IMMEDIATELY AFTER DRILLING

TOP OF CASING ELEV. ~~5080.36~~ 5055.54

18.19 2.5

JE JACOBS ENGINEERING GROUP INC. Well No. 03T-564
ADVANCED SYSTEMS DIVISION, ALBUQUERQUE OPERATIONS

BOREHOLE/WELL CONSTRUCTION LOG

SITE ID: TUB 01 LOCATION ID: 910 FIELD REP: S. Michelson - B Wood

APPROX. SITE COORDINATES (FT.): N 4000700± E 487630±

GROUND ELEVATION (FT. MSL): NK COMPLETION DATE: 7-30-85

BOREHOLE SUMMARY

DRILLER: Basin & Range

RIG TYPE: Portadrill

BIT TYPE	HOLE DIA.* (in.)	END DEPTH● (ft.)	FLUID TYPE
8½" Gear	8.5	200	Bentonite

CASING SUMMARY

CASING TYPE*	DESCRIPTION	DIA. (in.)	END✚ DEPTH (ft.)
P	Galvanized Iron Pipe	8	5.2
B	Sched 80 PVC	4	97
S	0.051" Slotted Sched 80 PVC	4	197
B	Sch 80 PVC	4	199

* P-Protective S-Screen B-Blank O-Open N-None

✚ Depth from Top of Casing

WELL CONSTRUCTION

TYPE CODE*	DESCRIPTION	END● DEPTH (ft.)
B	Cement - Bentonite Grout	89
S	Bentonite Slurry	92
F	Silica Sand	197

* B - Backfill S - Seal F - Filter Pack

● Depth from Ground Surface

CONSTRUCTION TIME LOG

ACTIVITY	START DATE	START TIME	END TIME
DRILLING	7-26-85 7-27-85	7:30 A	12:30 P
CASING	7-27-85	5:00 P	6:00 P
FILTER PACK	7-27-85	7:00 P	11:30 P
SEAL	7-29-85	11:07 A	1:21 P
BACKFILL	7-29-85	1:21 P	2:14 P
Top off	7-29-85	5:00 P	5:30 P
	7-30-85	8:00 A	8:30 A
DEVELOPMENT	7-30-85	10:15 A	2:15 P
OTHER			
Protective Casing	7-29-85	5:30	6:30

WELL DEVELOPMENT

COMMENTS: Used 15 sacks cement in fill filling: 2 sacks Top off plus 1 3/4 [illegible]

Top off

JACOBS ENGINEERING GROUP INC.
ADVANCED SYSTEMS DIVISION, ALBUQUERQUE OPERATIONS

BOREHOLE/WELL CONSTRUCTION LOG Well 03T-365

SITE ID: TUB 01 LOCATION ID: 911 FIELD REP: W R Wood

APPROX. SITE COORDINATES (FT.): N 4000780± E 487820±

GROUND ELEVATION (FT. MSL): NK COMPLETION DATE: 7-31-85

BOREHOLE SUMMARY

DRILLER: Basin & Range

RIG TYPE: Longyear 44 & Portadrill

BIT TYPE	HOLE DIA. (in.)	END DEPTH ● (ft.)	FLUID TYPE
NQ	2.5	351	Bentonite
8½" Gear	8.5	351.4	Bentonite

CASING SUMMARY

CASING TYPE*	DESCRIPTION	DIA. (in.)	END DEPTH ✚ (ft.)
P	Galvanized Steel	8	5.2
B	Sched 80 - PVC	4	311.4
S	0.051 slot Sched 80 PVC	4	351.4
B	Sched 80 PVC	4	353.4

* P-Protective S-Screen B-Blank O-Open N-None

✚ Depth from Top of Casing

WELL CONSTRUCTION

TYPE CODE*	DESCRIPTION	END DEPTH ● (ft.)
B	Cement - Bentonite Grout	300.0
S	Bentonite Slurry	303.0
F	Silica Sand.	351.4

* B - Backfill S - Seal F - Filter Pack

● Depth from Ground Surface

CONSTRUCTION TIME LOG

ACTIVITY	START DATE	START TIME	END TIME
DRILLING Coring	7-18-85	1:55 P	8:00 P
	7-19-85	9:00 A	6:00 P
	7-20-85	9:15 A	4:15 P
Reaming	7-24-85	10:25 A	6:00 P
	7-25-85	7:30 A	3:25 P
CASING	7-26-85	10:15 A	11:00 A
	7-26-85	5:55 P	7:15 P
FILTER PACK	7-26-85	7:15 P	9:55 P
SEAL	7-27-85	4:00 P	4:30 P
BACKFILL	7-27-85	4:30 P	6:00 P
Top off →	7-29-85	3:00 P	3:20 P
	7-30-85	7:30 A	8:00 A
DEVELOPMENT	7-30-85	4:34 P	4:40 P
	7-30-85	5:19 P	7:49 P
	7-31-85	7:56 A	9:36 A
OTHER protective Casing	7-29-85	4:30	5:00

WELL DEVELOPMENT

COMMENTS: Took 44 bags of cement for original grouting. 8 bags [illegible] to top off plus 1 3/4 sacks to complete to surface

JACOBS ENGINEERING GROUP INC. Well No 03T-566
ADVANCED SYSTEMS DIVISION, ALBUQUERQUE OPERATIONS

BOREHOLE/WELL CONSTRUCTION LOG

SITE ID: TUB 01 LOCATION ID: 912 FIELD REP: W R Wood

APPROX. SITE COORDINATES (FT.): N 3999400± E 487260±

GROUND ELEVATION (FT. MSL): NK COMPLETION DATE: 8-15-85

BOREHOLE SUMMARY

DRILLER: Basin & Range

RIG TYPE: Portadrill

BIT TYPE	HOLE DIA. (in.)	END DEPTH (ft.) ●	FLUID TYPE
Gear Bit	8.5 nom.	165	Bentonite

CASING SUMMARY

CASING TYPE*	DESCRIPTION	DIA. (in.)	END DEPTH (ft.) ✚
P	Galvanized Iron	8	5.4
B	Sched 80 PVC	4	123
S	0.031" Slotted PVC	4	163
B	Sched 80 PVC	4	165

* P-Protective S-Screen B-Blank O-Open N-None

✚ Depth from Top of Casing

WELL CONSTRUCTION

TYPE CODE*	DESCRIPTION	END DEPTH (ft.) ●
B	cement-bentonite Grout	114
S	Bentonite Slurry	117
F	Silica Sand	165

* B - Backfill S - Seal F - Filter Pack

● Depth from Ground Surface

CONSTRUCTION TIME LOG

ACTIVITY	START DATE	START TIME	END TIME
DRILLING			
CASING	8-13-85	5:50P	6:11P
FILTER PACK	8-13-85	7:19P	8:00P
SEAL	8-14-85	9:10A	9:42A
BACKFILL	8-14-85	9:42A	10:31A
DEVELOPMENT	8-15-85	10:39A	2:39P
OTHER Protective Casing	8-14-85	10:55A	11:07A

WELL DEVELOPMENT

COMMENTS:

JACOBS ENGINEERING GROUP INC. Well No 03T-567
ADVANCED SYSTEMS DIVISION, ALBUQUERQUE OPERATIONS

BOREHOLE/WELL CONSTRUCTION LOG

SITE ID: TUB 01 LOCATION ID: 913 FIELD REP: W R Wood

APPROX. SITE COORDINATES (FT.): N 3999410± E 487410±

GROUND ELEVATION (FT. MSL): NK COMPLETION DATE:

BOREHOLE SUMMARY

DRILLER: Basin & Range

RIG TYPE: Portadrill

BIT TYPE	HOLE DIA.* (in.)	END DEPTH● (ft.)	FLUID TYPE
Gear Bit	8.5	380	Bentonite

CASING SUMMARY

CASING TYPE*	DESCRIPTION	DIA. (in.)	END DEPTH◆ (ft.)
P	Galvanized Iron	8	5.4
B	Sched 80 PVC	4	330.7
S	0.051" Slotted PVC	4	370.7
B	Sched 80 PVC	4	372.7

* P-Protective S-Screen B-Blank O-Open N-None

◆ Depth from Top of Casing

WELL CONSTRUCTION

TYPE CODE*	DESCRIPTION	END DEPTH● (ft.)
B	Cement Bentonite Grout	309.5
S	Bentonite Slurry	312.5
F	Silica Sand	370.7

* B - Backfill S - Seal F - Filter Pack

● Depth from Ground Surface

CONSTRUCTION TIME LOG

ACTIVITY	START DATE	START TIME	END TIME
DRILLING	8-2-85	5:10P	6:25P
	8-3-85	7:30A	5:15P
	8-5-85	7:30A	6:40P
	8-6-85	8:00A	2:00P
	8-7-85	8:30A	3:40P
CASING	8-7-85	3:40P	4:20P
FILTER PACK	8-7-85	4:41P	6:30P
SEAL	8-7-85	7:17P	7:50P
BACKFILL	8-7-85	7:50P	10:48P
	8-12-85	1:29P	2:03P
DEVELOPMENT	8-14-85	3:45P	9:15P
OTHER			

WELL DEVELOPMENT

COMMENTS:

JACOBS ENGINEERING GROUP INC. Well No OST-502
ADVANCED SYSTEMS DIVISION, ALBUQUERQUE OPERATIONS

BOREHOLE/WELL CONSTRUCTION LOG

SITE ID: TUB 01 LOCATION ID: 914 FIELD REP: WR Wood

APPROX. SITE COORDINATES (FT.): N 3999440± E 488440±

GROUND ELEVATION (FT. MSL): NK COMPLETION DATE: 8-24-85

BOREHOLE SUMMARY

DRILLER: Basin & Range

RIG TYPE: Portadrill

BIT TYPE	HOLE DIA. (in.)	END DEPTH● (ft.)	FLUID TYPE
Geor Bit	8.5	156.2	Bentonite

CASING SUMMARY

CASING TYPE●	DESCRIPTION	DIA. (in.)	END DEPTH✤ (ft.)
P	Galvanized Iron	8	7.5
B	Sched 80 PVC	4	139.2
S	0.051" slotted PVC	4	156.2
B	Sched 80 PVC	4	158.2

● P-Protective S-Screen B-Blank O-Open N-None

✤ Depth from Top of Casing

WELL CONSTRUCTION

TYPE CODE●	DESCRIPTION	END DEPTH● (ft.)
B	Cement-Bentonite Grout	134.2
S	Bentonite Slurry	137.2
F	Silica Sand	156.2

● B - Backfill S - Seal F - Filter Pack

● Depth from Ground Surface

CONSTRUCTION TIME LOG

ACTIVITY	START DATE	START TIME	END TIME
DRILLING			
CASING	8-22-85	10:45 A	11:07 A
FILTER PACK	8-22-85	1:33 P	2:36 P
SEAL	8-23-85	11:27 A	11:35 A
BACKFILL	8-23-85	11:45 A	12:23 P
DEVELOPMENT	8-24-85	2:24 P	5:50 P
OTHER Protective Casing	8-23-85	1:54 P	2:12 P

WELL DEVELOPMENT

COMMENTS:

JEG-AL-ENG-1 (3/84)

JACOBS ENGINEERING GROUP INC. Well No 03T-569
ADVANCED SYSTEMS DIVISION, ALBUQUERQUE OPERATIONS

BOREHOLE/WELL CONSTRUCTION LOG

SITE ID: TAB 01 LOCATION ID: 915 FIELD REP: W R Wood

APPROX. SITE COORDINATES (FT.): N 3999650± E 488490±

GROUND ELEVATION (FT. MSL): NK COMPLETION DATE:

BOREHOLE SUMMARY

DRILLER: Basin & Range

RIG TYPE: Portadrill

BIT TYPE	HOLE DIA.* (in.)	END DEPTH● (ft.)	FLUID TYPE
Gear Bit	8.5	182	Bentonite

CASING SUMMARY

CASING TYPE*	DESCRIPTION	DIA. (in.)	END✚ DEPTH (ft.)
P	Galvanized Iron	8	7.5
B	Sched 80 PVC	4	172
S	0.051" Slotted PVC	4	182
B	Sched 40 PVC	4	184

* P-Protective S-Screen B-Blank O-Open N-None

✚ Depth from Top of Casing

WELL CONSTRUCTION

TYPE CODE*	DESCRIPTION	END● DEPTH (ft.)
B	Cement-Bentonite Grout	163
S	Bentonite Slurry	166
F	Silica Sand	182

* B - Backfill S - Seal F - Filter Pack

● Depth from Ground Surface

CONSTRUCTION TIME LOG

ACTIVITY	START DATE	START TIME	END TIME
DRILLING			
CASING	8-25-85	4:00 P	4:42 P
FILTER PACK	8-25-85	5:29 P	5:58 P
SEAL	8-27-85	9:14 A	10:22 A
BACKFILL	8-27-85	10:22 A	11:10 A
DEVELOPMENT	8-29-85	3:05 P	6:29 P
OTHER Protective Casing	8-27-85	11:14 A	11:30 A

WELL DEVELOPMENT

COMMENTS:

JEG-AL-ENG-1 (3/84)

JACOBS ENGINEERING GROUP INC. Well No. 03T-570
ADVANCED SYSTEMS DIVISION, ALBUQUERQUE OPERATIONS

BOREHOLE/WELL CONSTRUCTION LOG

SITE ID: TUB 01 LOCATION ID: 916 FIELD REP: WR Wood
APPROX. SITE COORDINATES (FT.): N 3999560± E 488550±
GROUND ELEVATION (FT. MSL): NK COMPLETION DATE:

BOREHOLE SUMMARY

DRILLER: Basin & Range
RIG TYPE: Portadrill

BIT TYPE	HOLE DIA. (in.)	END DEPTH● (ft.)	FLUID TYPE
Gear Bit	8.5	357.7	Bentonite

CASING SUMMARY

CASING TYPE*	DESCRIPTION	DIA. (in.)	END✚ DEPTH (ft.)
P	Galvanized Iron	8	7.5
B	Sched 80 PVC	4	347.7
S	0.051" slotted PVC	4	357.7
B	Sched 80 PVC	4	359.7

* P-Protective S-Screen B-Blank O-Open N-None
✚ Depth from Top of Casing

WELL CONSTRUCTION

TYPE CODE*	DESCRIPTION	END● DEPTH (ft.)
B	Cement-Bentonite Grout	340.3
S	Bentonite Slurry	343.3
F	Silica Sand	357.7

* B - Backfill S - Seal F - Filter Pack
● Depth from Ground Surface

CONSTRUCTION TIME LOG

ACTIVITY	START DATE	START TIME	END TIME
DRILLING			
CASING	8-24-85	1:35P	2:21P
FILTER PACK	8-24-85	4:20P	5:50P
SEAL	8-26-85	8:45A	8:54A
BACKFILL	8-26-85	9:06A	11:22A
DEVELOPMENT			
OTHER	8-26-85	12:30P	12:41P

WELL DEVELOPMENT

COMMENTS:

JACOBS ENGINEERING GROUP INC.
ADVANCED SYSTEMS DIVISION, ALBUQUERQUE OPERATIONS

BOREHOLE/WELL CONSTRUCTION LOG

SITE ID: Tub01 LOCATION ID: 917 FIELD REP: McKenzie

APPROX. SITE COORDINATES (FT.): N _____ E _____

GROUND ELEVATION (FT. MSL): _____ COMPLETION DATE: _____

BOREHOLE SUMMARY

DRILLER: Basin & Range

RIG TYPE: Portadrill

BIT TYPE	HOLE DIA.* (in.)	END DEPTH● (ft.)	FLUID TYPE
Gear	11	8	air
Gear	8.5	150	bentonite

CASING SUMMARY

CASING TYPE*	DESCRIPTION	DIA. (in.)	END✚ DEPTH (ft.)
B	Sch 80 PVC	4	30
S	Sch 80 PVC slotted .025	4"	150
B	Sch 80 PVC	4	152

* P-Protective S-Screen B-Blank O-Open N-None

✚ Depth from Top of Casing

WELL CONSTRUCTION

TYPE CODE*	DESCRIPTION	END● DEPTH (ft.)
F	Silica Sand Evenly graded	~~150~~ 107
S	Bentonite slurry	~~[illegible]~~ [illegible]
B	Grout	~~[illegible]~~ 104

* B - Backfill S - Seal F - Filter Pack

● Depth from Ground Surface

CONSTRUCTION TIME LOG

ACTIVITY	START DATE	START TIME	END TIME
DRILLING			
CASING			
FILTER PACK			
SEAL			
BACKFILL			
DEVELOPMENT			
OTHER			

WELL DEVELOPMENT

COMMENTS: _____

JE JACOBS ENGINEERING GROUP INC. Well No 03T-573
ADVANCED SYSTEMS DIVISION, ALBUQUERQUE OPERATIONS

BOREHOLE/WELL CONSTRUCTION LOG

SITE ID: TUB 01 LOCATION ID: 919 FIELD REP: W R Wood

APPROX. SITE COORDINATES (FT.): N 3998540± E 487190±

GROUND ELEVATION (FT. MSL): NK COMPLETION DATE: 8-30-85

BOREHOLE SUMMARY

DRILLER: Basin & Range

RIG TYPE: Porta drill

BIT TYPE	HOLE DIA. (in.)	END DEPTH● (ft.)	FLUID TYPE
Glar Bit	8.5	355	Bentonite

CASING SUMMARY

CASING TYPE*	DESCRIPTION	DIA. (in.)	END✤ DEPTH (ft.)
P	Galvanized Iron	8	5.3
B	Sched 80 PVC	4	339.7
S	0.051" Sch 80 PVC	4	349.7
B	Sched 80 PVC	4	351.7

* P-Protective S-Screen B-Blank O-Open N-None

✤ Depth from Top of Casing

WELL CONSTRUCTION

TYPE CODE*	DESCRIPTION	END● DEPTH (ft.)
B	Cement-Bentonite Grout	331.7
S	Bentonite Slurry	334.7
F	Silica Sand.	349.7

* B - Backfill S - Seal F - Filter Pack

● Depth from Ground Surface

CONSTRUCTION TIME LOG

ACTIVITY	START DATE	START TIME	END TIME
DRILLING			
CASING	8-27-85	6:53P	7:33P
FILTER PACK	8-27-85	8:02P	9:00P
SEAL	8-29-85	9:15A	10:30A
BACKFILL	8-29-85	10:30A	12:30P
DEVELOPMENT	8-30-85	3:46P	7:45P
OTHER protective casing	8-30-85	2:42P	3:00P

WELL DEVELOPMENT

COMMENTS: Well would not clean up to small volume of water flow.

JACOBS ENGINEERING GROUP INC.
ADVANCED SYSTEMS DIVISION, ALBUQUERQUE OPERATIONS

BOREHOLE/WELL CONSTRUCTION LOG Well 03T-574

SITE ID: TUB 01 LOCATION ID: 920 FIELD REP: W R WOOD

APPROX. SITE COORDINATES (FT.): N 3999080± E 487900±

GROUND ELEVATION (FT. MSL): NK COMPLETION DATE: 8-3-85

BOREHOLE SUMMARY

DRILLER: Basin & Range

RIG TYPE: Portadrill

BIT TYPE	HOLE DIA.* (in.)	END DEPTH● (ft.)	FLUID TYPE
Gear Bit	8.5 nom	170	Bentonite

CASING SUMMARY

CASING TYPE*	DESCRIPTION	DIA. (in.)	END✤ DEPTH (ft.)
P	Galvanized Iron	8	
B	Sched 80 PVC	4	116.4
S	0.051" slotted PVC	4	156.4
B	Sched 40 PVC	4	158.4

* P-Protective S-Screen B-Blank O-Open N-None

✤ Depth from Top of Casing

WELL CONSTRUCTION

TYPE CODE*	DESCRIPTION	END● DEPTH (ft.)
B	Cement-Bentonite Grout	103.4
S	Bentonite Slurry	106.4
F	Silica Sand	158.4

* B - Backfill S - Seal F - Filter Pack

● Depth from Ground Surface

CONSTRUCTION TIME LOG

ACTIVITY	START DATE	START TIME	END TIME
DRILLING	7-30-85	3:50P	7:00P
	7-31-85	8:05A	1:30P
CASING	7-31-85	5:55P	6:21P
FILTER PACK	7-31-85	10:00P	10:45P
	8-1-85	9:45A	9:52A
SEAL	8-1-85	11:49A	12:13P
BACKFILL	8-1-85	12:13P	1:10P
Top off	8-3-85	2:30P	3:00P
DEVELOPMENT	8-3-85	8:40A	1:00P
OTHER			
Protective Casing	8-1-85	5:00P	5:05P

WELL DEVELOPMENT

COMMENTS:

JACOBS ENGINEERING GROUP INC.
ADVANCED SYSTEMS DIVISION, ALBUQUERQUE OPERATIONS

BOREHOLE/WELL CONSTRUCTION LOG

Well 03T-575

SITE ID: Tub 01 LOCATION ID: 921 FIELD REP: W R Wood

APPROX. SITE COORDINATES (FT.): N 399100± E 488050±

GROUND ELEVATION (FT. MSL): NK COMPLETION DATE: 8-3-85

BOREHOLE SUMMARY

DRILLER: Basin & Range

RIG TYPE: Longyear 44 & Portadrill

BIT TYPE	HOLE DIA.* (in.)	END DEPTH● (ft.)	FLUID TYPE
NQ Diamond	2.5	348	Bentonite
Gear Bit	8.5	360	Bentonite

CASING SUMMARY

CASING TYPE*	DESCRIPTION	DIA. (in.)	END◆ DEPTH (ft.)
P	Galvanized Iron	8	
B	Sched 80 PVC	4	315.2
S	0.051" slotted PVC	4	355.2
B	Sched 80 PVC	4	357.2

* P-Protective S-Screen B-Blank O-Open N-None

◆ Depth from Top of Casing

WELL CONSTRUCTION

TYPE CODE*	DESCRIPTION	END● DEPTH (ft.)
B	Cement-Bentonite Grout	298.4
S	Bentonite Slurry	301.4
F	Silica Sand	346

* B - Backfill S - Seal F - Filter Pack

● Depth from Ground Surface

CONSTRUCTION TIME LOG

ACTIVITY	START DATE	START TIME	END TIME
DRILLING (Core)	7-22-85	7:15 P	8:40 P
	7-23-85	9:47 A	8:15 P
	7-24-85	8:20 A	3:30 P
DRILLING (Rotary)	7-29-85	9:00 A	6:30 P
	7-30-85	1:10 P	2:55 P
CASING	7-31-85	2:05 P	4:00 P
FILTER PACK	7-31-85	4:11 P	9:01 P
SEAL	8-1-85	1:55 P	2:01 P
BACKFILL	8-1-85	2:01 P	5:35 P
Top off	8-3-85	8:45 A	10:15 A
DEVELOPMENT	8-3-85	2:20 P	6:20 P
OTHER			
Protective Casing	8-3-85	12:50 P	12:55 P

WELL DEVELOPMENT

COMMENTS: Native sand around bottom 10' of screen - Pulled out during development

ATTACHMENT 6

PHASE I INSPECTION CHECKLIST

PHASE I INSPECTION CHECKLIST

The Phase I inspection checklist that follows has been prepared and formatted as a general document, applicable to all mill tailings disposal sites following remedial action. The checklist is adaptable to each site's unique conditions. The adaptation will consist of such actions as:

- o Deleting inspection checks that do not apply and adding those not contemplated but needed because of unique design features.
- o Providing lists of off-site features that must be assessed in the field.
- o Providing specifics as to location of monuments, fences, signs, monitoring wells, and other site features.
- o Determining the minimum number of photos needed to document site conditions.

It must be noted that the checklist will be used by a team which may not have the experience to cover the multidiscipline subject areas. Therefore, the checklist must be complete and detailed to direct the inspection team to observe and record all pertinent data. The checklist must also be complete and detailed as it will become a legal record of responsible agency surveillance.

PHASE I INSPECTION CHECKLIST FOR THE
URANIUM MILL TAILINGS DISPOSAL SITE

Date of Last Inspection: _____ Reason for Last Inspection: _____

Responsible Agency: _____

Address: _____

Responsible Agency Official: _____

Inspection Start Date and Time: _____

Weather Conditions at Site: _____

Inspection Completion Date and Time: _____

Chief Inspector: _____
Name Title Organization

Assistant Inspectors: _____
Name Title Organization

_____
Name Title Organization

A. GENERAL INSTRUCTION

1. All checklist items must be completed and detailed comments made to document the results of the site inspection. The completed checklist is part of the Field record of the inspection. Additional pages should be used as necessary to ensure that a complete record is made. Attach the additional pages and number all pages upon completion of the inspection.

2. Inspectors are to provide an up-to-date resume or vitae for inclusion in the inspection report.

3. Any checklist line item marked by an * that is checked by an inspector must be fully explained or an appropriate reference to previous reports provided. The purpose of this requirement is to provide a written explanation of inspector observations and the inspector's rationale for conclusions and recommendations. Explanations are to be placed on additional attachments and cross-referenced appropriately. Explanations, in addition to narrative, will take the form of sketches, measurements, and annotated site atlas overlays.

4. The site inspection is a walking inspection of the entire site. including the perimeter and sufficient transects to be able to inspect the entire surface and all features specifically described in this checklist. Every monument, site marker, sign, monitor well, and erosion control marker will be inspected.

5. A standard set of color print 35mm photographs is required. For this site, the standard set consists of _____ photographs. In addition, all anomalous features or new features (such as changes in adjacent area land use) are to be photographed. A photo log entry will be made for each photograph taken.

6. References to applicable sections of the SSMP are shown throughout the checklist in brackets.

7. Field notes taken to assist in completion of this checklist will become part of the inspection record. No form is specified: the field notes must be legible and in sufficient detail to enable-review by succeeding inspectors and the responsible agency.

B. PREPARATION (To be completed prior to site visit)

	Yes	No
1. License (includes site surveillance and maintenance plan) reviewed.	____	____*
2. Site as-built plans reviewed and base map with copies of the following site atlas overlays obtained:	____	____*

a. Adjacent off-site features and land use; fences, gates, and signs; access roads and paths.

b. Survey monuments, boundary markers, site markers, aerial photo ground controls, ground photo locations.

c. Monitor wells, site drainage, diversion channels.

d. Planned inspection transects and vegetation cover.

e. Others.

These overlays will be used to identify site features and record, as appropriate, field data.

3. Previous inspection reports reviewed.	____	____*
a. Were anomalies or trends in modifying processes detected on previous inspections?	____*	____

	Yes	No
b. Was a Phase II inspection conducted?	____*	____
c. Was custodial maintenance performed?	____*	____
d. Was contingency repair work done as a result of the Phase II inspection?	____*	____
4. Site custodial maintenance and contingency repair records reviewed.	____	____*
a. Has site contingency repair resulted in a change from as-built conditions?	____*	____
b. Are revised as-builts available that reflect contingency repair changes?	____	____*
5. If required, adjacent property entry approval obtained (attach signed access agreement).	____	____*

6. Aerial photos, if taken since last inspection, reviewed. For each set, enter date taken, scale, and if interpreted.

Set	Date	Scale	Interpreted Yes	Interpreted No
1.	_____	_____	____	____
2.	_____	_____	____	____
3.	_____	_____	____	____

	Yes	No
7. Were any of the following suggested by examination of aerial #hotographs? (If yes, give photo set date and indicate if item noted by interpreter or inspector):		
a. Intrusion by man?	____*	____
b. Intrusion by animals?	____*	____
c. Channelized erosion on slopes?	____*	____
d. Change in area drainage?	____*	____
e. Landslides?	____	____
f. Creep on slopes?	____	____

	Yes	No
g. Obstruction of diversion channels?	____*	____
h. Bank erosion of diversion channels?	____*	____
i. Seepage?	____*	____
j. Cracking?	____*	____
k. Change in vegetative cover?	____*	____
l. Displacement of fences, site markers, boundary markers, or monuments?	____*	____
m. Change in adjacent land use?	____*	____
n. Evidence of tailings exposure or transport?	____*	____

8. From as-builts, or subsequent inspection reports, note distance and azimuth from designated site location, such as a monument, to adjacent off-site features that could eventually affect integrity of site.

Off-site feature	Site monument #	Distance	Azimuth
1.____	____	____	____
2.____	____	____	____
3.____	____	____	____

9. Assemble and check out the following equipment as needed to conduct inspections:

a. Cameras, film, and miscellaneous support equipment.
b. Binoculars.
c. Tape measure.
d. Optical ranging device.
e. Brunton compass .
f. Photo scale stick.
g. Erasable board.
h. Plant press, plastic bags for vegetation.
i. Keys to locks.
j. Bolt cutters.
k. Hand lens.
l. Clipboard.
m. Others.

C. SITE INSPECTION

	Yes	No
1. Adjacent off-site features (within 0.25 mile of site boundary) (Township, Range, 1/4 1/4 Section).		
a. Have there been any ch#ges in use of adjacent areas? (Grazing, construction, agriculture)	____*	____
b. Are there any new roads or trails?	____*	____
c. Has there been a change in the position of nearby stream channels?	____*	____
d. Has there been headward erosion of nearby gullies?	____*	____
e. Are there new drainage channels?	____*	____
f. Others?		
2. Access roads and paths, fences, gates, and signs (Section ___).		
a. Is there a break in the fence?	____*	____
b. Have any posts been damaged or their anchoring weakened?	____*	____
c. Is there evidence of erosion or digging beneath the fence?	____*	____
d. Does the gate show evidence of tampering or damage?	____*	____
e. Is there any evidence of human intrusion?	____*	____
f. Is there any evidence of large animal intrusion?	____*	____
g. Have any signs been damaged or removed? (Number of signs replaced: _____)	____*	____
h. Are access roads and paths passible?	____*	____
i. Others?	____*	____
3. Monuments and other permanent features (Section __)		
a. Have the survey or boundary monuments been defaced or disturbed?	____*	____
b. Have the site markers been disturbed by man or natural processes?	____*	____

c. Do natural processes threaten the integrity of any monument or site marker? ____* ____

d. Have aerial photo ground controls been disturbed? ____* ____

e. Others?

4. Crests (Section ___)

a. Is there evidence of uneven settling? (depressions, scarps) ____* ____

b. Is there cracking? ____* ____

c. Has the outer cover layer been breached? ____ ____

d. Is there evidence of erosion?

(1) By water? (rills, rivulets) ____ ____

(2) By wind: (pedestal rocks, ripple marks) ____ ____

e. Is the vegetation cover as described in the as-builts? ____ ____

f. Is there evidence of animal burrowing?

g. Is there evidence of tiprap or gravel deterioration? ____ ____

h. Others?

5. Slopes (Section ____)

a. Is there evidence of gradual downslope movement (creep)? (terraces, deflection of plants) ____ ____

b. Is there cracking? ____ ____

c. Can depressions or bulges on the slope be seen? ____ ____

d. Has the outer cover layer been breached? ____ ____

e. Is there evidence of erosion:

(1) By water? ____ ____

(2) By wind? ____ ____

f. Has water runoff become channelized: (rivulets, gullies) ____ ____

		Yes	No
g.	Is there evidence of seepage? (moisture, color, vegetation)	____*	____
h.	Has the vegetation cover changed significantly since the last inspection?	____*	____
i.	Is there evidence of animal burrowing?	____*	____
j.	Is there evidence of deterioration of riprap or gravel cover?	____*	____
k.	Others?	____*	____

6. Periphery (within site boundaries) (Section __)

a.	Is there evidence of seepage such as wet areas or localized change of vegetation?	____*	____
b.	Is there evidence of sediment transport from the tailings pile by water or wind?	____	____
c.	Is the vegetation cover as described in the as-builts?	____*	____
d.	Is the drainage as described in the as-builts?	____*	____
e.	Others?		

7. Diversion channels (Section __)

a.	Is there evidence of bank erosion?	____*	____
b.	Has the integrity of riprap structures been disturbed by man or natural processes?	____*	____
c.	Is there evidence of channel erosion?	____*	____
d.	Is there evidence of sedimantation in the channel?	____*	____
e.	Is the vegetation pattern in the channels consistent with that shown in the as-builts?	____	____
f.	Is the channel obstructed in any way?	____*	____
g.	Is there any evidence that the diversion channels are not performing their function?	____*	____
h.	Others?		

	Yes	No
8. Photography (Section ___)		
a. Have all photos required by the site atlas photo overlay been taken?	___	___
b. Has a photo log sheet been prepared for each roll of film exposed.	___*	___
c. Number of rolls of film exposed: _____		
d. Others?		
9. Monitor wells (Section ___)		
a. Have any monitor wells been disturbed by man or natural processes?	___*	___
b. Does any natural process threaten the integrity any monitor well?	___	___
c. Are all monitor wells' label plates intact and legible?	___*	___
d. Are all monitor wells capped and locked?	___*	___
e. Others?		

D. FIELD CONCLUSIONS

1. Is there an imminent hazard to the integrity of the tailings pile? (Immediate report required) Person _____ Agency to whom report made: _____	___*	___
2. Are more frequent Phase I inspections required?	___*	___
3. Are existing contingency repair actions satisfactory?	___*	___
4. Is a Phase II inspection required?	___*	___
5. Is contingency report or custodial maintenance required?	___*	___

6. Rationale for field conclusions _____

_____

_____

_____.