NYE COUNTY NUCLEAR WASTE REPOSITORY PROJECT OFFICE

TECHNICAL PROCEDURE

TITLE: **Drill Site Management**	Revision: **4** Date: **5-28-08** Page: **1 of** 14
TECHNICAL PROCEDURE NUMBER: **TP-7.0**	SUPERSEDES: **Revision 3, 9-30-02**

APPROVAL

Director — Date: 5/28/08

CONCURRENCE

Geoscience Manager — Date: 5/28/08

Principal Investigator — Date: 5/28/08

Quality Assurance Officer — Date: 5/28/08

1.0 INTRODUCTION

This procedure provides instructions for the planning, management and documentation of borehole drilling activities by the Nye County Nuclear Waste Repository Project Office (NWRPO) as a part of its Early Warning Drilling Program (EWDP). More specifically, this procedure identifies approved work plans (drilling package) that provide detailed instructions for drilling and testing operations, presents instructions for making necessary changes to these work plans in response to conditions encountered in the field, and provides a series of data forms (drilling operations records) that facilitate the management and documentation of drilling operations.

2.0 PURPOSE

This procedure includes activities required to plan, manage, and document the drilling and testing of boreholes for NWRPO's EWDP.

2.1 Applicability

This procedure applies to NWRPO principal investigators (PI) and designated staff and contractors performing drilling, logging, testing, and sampling of NWRPO boreholes as described in Work Plans and related sub-plans (e.g., a drilling package). These individuals will be referred to collectively as NWRPO field personnel.

2.2 Training

NWRPO field personnel will be trained to this procedure before conducting work, and will document that they have read and understand this procedure. Documentation of training will be submitted to the NWRPO Quality Assurance Records Center (QARC). Personnel performing drilling will supply the QARC with a statement of previous training and experience. NWRPO field personnel will conform to the latest revision of the Health and Safety Plan HSP-1.0 *Independent Scientific Investigations Program Heath and Safety Plan for General Field Activities*.

3.0 DEFINITIONS

3.1 Aquifer Testing Plan – A work plan describing aquifer-testing strategies for different EWDP borehole and well conditions.

3.2 Drilling Operations Records – A set of data forms designed to facilitate the detailed documentation of drilling and well construction operations at EWDP rigs. This set of forms includes: Drilling/Coring Data Sheets, Tubing and Casing Records, Daily Drilling Activities Records, and Field Change Approval Forms. These forms can be found in Attachments A through D. The Daily Drilling Activities Record contains sub-forms applicable to different types of drilling operations.

3.3 Drilling Package – The work plans and all related sub-plans that relate to a specific borehole drilling program. The Drilling Package for the EWDP consists of the following related work plans: WP-5.0, *Phase VI Drilling and Well Construction*; WP-8.0, *Sample Management*; WP-4, *Aquifer Testing Plan for Nye County's Independent Scientific Investigations Program*; and WP-6, *Early Warning Drilling Program Geophysical Logging Plan*.

3.4 Drilling and Well Construction Plan – A work plan describing drilling and well completion specifications to meet EWDP objectives, applicable environmental and other regulatory requirements, and sampling requirements as defined in WP-8.0.

3.5 Geophysical Logging Plan – A work plan describing types of borehole geophysical logs available for use in EWDP boreholes, as well as strategies for selecting suites of logs in specific EWDP boreholes.

3.6 Sample Management Plan – A work plan describing sample collection, handling, testing, and archiving requirements for a borehole or series of boreholes. The Sample Management Plan will delineate expected sample depth intervals, documentation requirements, and required environmental conditions for collection, transporting, testing, and archiving.

3.7 Sample – A physical specimen of either a natural or a man-made material, which is analyzed to gain information about the nature of a large population. Samples can be solid, liquid or gaseous, and commonly include core, drill cuttings, construction materials, geologic hand specimens, and water.

3.8 Technical Procedure – A set of instructions for routine data collection and/or analysis related activities. Technical Procedures are controlled documents that are subject to review and approval. All NWRPO Technical Procedures are developed under the controls of *NWRPO Quality Assurance Program Plan*, Section 5.0, "Instructions, Procedures, and Drawings" and 11.0 "Test Control."

3.9 Work Plan – A document that provides a detailed description of the planned work, including methods, the design and rationale of the task, the schedule, data requirements, and personnel responsibilities. Work Plans reference applicable Technical Procedures, and are controlled documents that are subject to review and approval. All NWRPO Work Plans are developed under the controls of *NWRPO Quality Assurance Program Plan*, Section 5.0, "Instructions, Procedures, and Drawings" and 11.0, "Test Control."

4.0 RESPONSIBILITIES

4.1 The PI is responsible for the preparation, and revision (as needed) of this procedure.

4.2 The Geoscience Manager (GSM) is responsible for the oversight of the performance of this procedure, as well as approving any changes to the work plans prior to being executed in the field.

4.3 The NWRPO person in charge in the field or designee is responsible for the implementation of this procedure. That is, this individual is responsible for supervising NWRPO field personnel and ensuring that field operations are conducted in accordance with this procedure.

5.0 PROCESS

Drilling and related operations will be conducted in accordance with the drilling package and in accordance with applicable industry standards and regulatory requirements.

5.1 Preparation

1. Review the drilling package for specific information for drill site activities and verify that all equipment meets specifications outlined in the relevant plans.

2. Ensure that all required health and safety training has been completed by NWRPO field personnel.

3. Ensure that appropriate field support areas have been prepared (e.g., sample logging areas, rest areas, etc.). Ensure that adequate physical space for the planned operations is reserved on site.

4. If required, ensure that approval from DOE has been obtained for site use and access.

5. Ensure that the work site is cleared of all brush and minor obstructions and have the location of utilities (if applicable) properly staked and identified.

6. Ensure that proposed drilling locations are not traversed by utility transmissionlines.

7. Ensure that all-necessary equipment and supplies are in place and in working order.

8. Ensure that all site environmental permitting requirements are followed.

5.2 Field Changes to Drilling Package

It is the responsibility of the NWRPO person in charge in the field to execute fieldwork in accordance with the controls of the approved drilling package.

However, unanticipated conditions may require deviation from the approved drilling package. It is the intent of this technical procedure to ensure prior approval for field changes that may have *significant impact* on the planned purpose of a borehole. This will include significant impact to drilling, sampling, testing, completion, or cost. Insignificant field deviations to the controls of the approved drilling package need not be approved in advance.

The following process shall be followed if significant changes to the drilling package are required:

1. The NWRPO person in charge in the field will contact the GSM and the PI for the drilling package by telephone (a three-way conference call is preferable) or in person to discuss the proposed departure from the approved drilling package prior to carrying out a change. Verbal agreement from the GSM and PI will signal approval for the NWRPO person in charge in the field to execute the change. The NWRPO Person in Charge in the field will document the approval in the scientific (field) notebook for the subject borehole.

2. If verbal approval is given by the GSM and the PI, then the person proposing the change will transmit a summary of the changes on the Field Change Approval Form (Attachment

D) to the GSM within 24 hours. The GSM will sign and date the form and pass it on to the PI. The PI will then sign and date the form, route a copy to the QARC, and give the completed Field Change Approval Form to the NWRPO person in charge in the field.

3. The NWRPO person in charge in the field will document known effects of the field change in the scientific (field) notebook for the subject borehole.

5.3 Field Operations Documentation

The NWRPO person in charge in the field will ensure that drill site operations are documented as specified in the following:

1. Drilling, coring, completion, and abandonment operations will be documented by NWRPO field personnel in drilling operation records. EWDP drilling operation records are listed in Section 7.0 and included as attachments in Section 8.0. Depth control operations during drilling, coring, reaming, and cleanout are documented in the Tubing and Casing Record and the Drilling/Coring Data Sheet. Depth control while running casing during well completion is documented in the Tubing and Casing Record. Both a running time record of drilling operations and a record of materials used are documented in one of the sub-forms of the Daily Drilling Activities Record. Those personnel entering the data in drilling operations records shall sign forms as recorders.

2. All information entered into these forms will be checked for accuracy in the field by NWRPO field personnel different from those originally entering information into the forms. These forms will be transmitted to the QARC generally once per week.

3. Important drilling operations-related information that is not documented in drilling operations records should be recorded in the scientific notebook for a specific borehole.

4. Borehole geophysical logging activities should be documented in the scientific notebook and the geophysical logs produced should be labeled and transmitted to the QARC as described in TP-11.0.

5. Aquifer testing activities should be documented in the scientific notebook and all hard copy and electronic data generated shall be transmitted to the QARC as after testing has been completed according to the appropriate technical procedures.

5.4 Data Acquisition Methodology and Limitations

As described in the preceding section, drilling operations-related data will be recorded on drilling operations records by NWRPO field personnel who will sign these forms as recorders. These data will be independently reviewed for accuracy and the review will be attested to by the reviewer's signature on the drilling operations records. Completed drilling operations records will be submitted to the NWRPO QARC for capture and preservation in the project files. Data and/or related information that are not documented in drilling operations records or other forms associated with aquifer testing and geophysical logging shall be recorded in the scientific notebook.

Uncertainty associated with drilling, testing, and logging data and related information is related to the level of skill and professional judgment of the NWRPO field personnel performing the documentation. NWRPO field personnel who record and review data are trained and have demonstrated proficiency in these tasks.

6.0 REFERENCES

HSP-1.0, *Independent Scientific Investigations Program Health and Safety Plan for General Field Activities*. Health and Safety Plan. Nye County Nuclear Waste Repository Project Office (NWRPO). Pahrump, Nevada.

NWRPO Quality Assurance Program Plan. Quality Assurance Program Plan. Nye County NWRPO. Pahrump, Nevada.

TP-11.0, *Borehole Geophysical Logging Data Identification and Acceptance*. Technical Procedure. Nye County NWRPO. Pahrump, Nevada.

WP-5.0. *Phase V Drilling and Well Construction, Revisions 4 and 5*. Work Plan. Nye County NWRPO. Pahrump, Nevada.

_WP-4. *Aquifer Testing Plan for Nye County's Independent Scientific Investigations Program.*

_WP-6. *Early Warning Drilling Program Geophysical Logging Work Plan*.

_WP-8.0. *Sample Management*.

_WP-4, *Aquifer Testing Plan*.

7.0 RECORDS

Drilling/Coring Data Sheet

Tubing and Casing Record

Daily Drilling Activities Record

Field Change Approval Form

8.0 ATTACHMENTS

A. Drilling/Coring Data Sheet

B. Tubing and Casing Record

C. Daily Drilling Activities Record

D. Field Change Approval Form

Attachment A

Nye County Nuclear Waste Repository Project Office **Sheet _____ of _____**

Drilling/Coring Data Sheet

Borehole Name/ID: **NC-EWDP-**

Date:

Bit Manufacture/ Type:

Bit Size/□Serial Number:

Drill Rig:

Shift:

Circle Activity: Coring Drilling Ream Clean Out

Drilling Method:

Coring Method:

Core/Drill String Data
(Measurement to 0.01 of a foot)

Item No.	Item Description	Item Length	Cumulative Length	Stickup	Hole Depth
BHA	Bottom Hole Assembly				

Core Run/Drill Data
(Measurement to 0.1 of a foot)

Run No.	Time Start/End	From	To	Cut	Preliminary Recovery

Geologic Info:

Comments:

GL - Slips =

Prepared By:

Date:

Checked By:

Date:

Attachment B

Nye County
Nuclear Waste Repository Project Office
TUBING AND CASING RECORD

Form TP-7.0-2(a) Rev. 5 **Page 1 of ___**

ONLY APPLICABLE BLOCKS ARE TO BE COMPLETED

Borehole Name/ID:	Date/Time Started:	Date/Time Completed:
Borehole Depth:	**Borehole Size:**	**Drill Rig Used:**

Description Tubing or Casing:

Tubing or Casing Tally (Measurements to nearest 1/100 of a foot):

Item No.	Item Length	Cum. Length	Item No.	Item Length	Cum. Length	Item No.	Item Length	Cum. Length	Item No.	Item Length	Cum. Length	Item No.	Item Length	Cum. Length
1			21			41			61			81		
2			22			42			62			82		
3			23			43			63			83		
4			24			44			64			84		
5			25			45			65			85		
6			26			46			66			86		
7			27			47			67			87		
8			28			48			68			88		
9			29			49			69			89		
10			30			50			70			90		
11			31			51			71			91		
12			32			52			72			92		
13			33			53			73			93		
14			34			54			74			94		
15			35			55			75			95		
16			36			56			76			96		
17			37			57			77			97		
18			38			58			78			98		
19			39			59			79			99		
20			40			60			80			100		
Total			Total			Total			Total			Total		

Bottom Hole Assembly (BHA) Description/Information:

Tubing or Casing Depth Info:		Remarks/Notes:
BHA Length	ft	
Total ft This Page	ft	
Total From Page 2	ft	
Total Feet	ft	
Stick Up on Last Joint	ft	
String Set at G. L.	ft	

Prepared by: _____ Date: _____

Checked by: _____ Date: _____

Attachment B

Nye County
Nuclear Waste Repository Project Office
TUBING AND CASING RECORD

Form TP-7.0-2(b) Rev. 5 **Page 2 of 2**

ONLY APPLICABLE BLOCKS ARE TO BE COMPLETED

Borehole Name/ID:	Date/Time Started:	Date/Time Completed:
Borehole Depth:	**Borehole Size:**	**Drill Rig Used:**

Description Tubing or Casing:

Tubing or Casing Tally (Measurements to nearest 1/100 of a foot):

Item No.	Item Length	Cum. Length	Item No.	Item Length	Cum. Length	Item No.	Item Length	Cum. Length	Item No.	Item Length	Cum. Length	Item No.	Item Length	Cum. Length
101			121			141			161			181		
102			122			142			162			182		
103			123			143			163			183		
104			124			144			164			184		
105			125			145			165			185		
106			126			146			166			186		
107			127			147			167			187		
108			128			148			168			188		
109			129			149			169			189		
110			130			150			170			190		
111			131			151			171			191		
112			132			152			172			192		
113			133			153			173			193		
114			134			154			174			194		
115			135			155			175			195		
116			136			156			176			196		
117			137			157			177			197		
118			138			158			178			198		
119			139			159			179			199		
120			140			160			180			200		
Total			Total			Total			Total			Total		

Bottom Hole Assembly (BHA) Description/Information:

Tubing or Casing Depth Info:		Remarks/Notes:
BHA Length	ft	
Total ft This Page	ft	
Total From Page 1	ft	
Total Feet	ft	
Stick Up on Last Joint	ft	
String Set at G. L.	ft	

Prepared by: _____ Date: _____

Checked by: _____ Date: _____

Attachment B

Nye County
Nuclear Waste Repository Project Office
TUBING AND CASING RECORD
(reverse tally sheet)

Form TP-7.0-2(c) Rev. 5 **Page 1 of 1**

ONLY APPLICABLE BLOCKS ARE TO BE COMPLETED

Borehole Name/ID:	Date/Time Started:	Date/Time Completed:
Borehole Depth:	Borehole Size:	Drill Rig Used:

Description Tubing or Casing:

Tubing or Casing Tally (Measurements to nearest 1/100 of a foot):

Item No.	Item Length	Cum. Length	Item No.	Item Length	Cum. Length	Item No.	Item Length	Cum. Length	Item No.	Item Length	Cum. Length	Item No.	Item Length	Cum. Length
100			80			60			40			20		
99			79			59			39			19		
98			78			58			38			18		
97			77			57			37			17		
96			76			56			36			16		
95			75			55			35			15		
94			74			54			34			14		
93			73			53			33			13		
92			72			52			32			12		
91			71			51			31			11		
90			70			50			30			10		
89			69			49			29			9		
88			68			48			28			8		
87			67			47			27			7		
86			66			46			26			6		
85			65			45			25			5		
84			64			44			24			4		
83			63			43			23			3		
82			62			42			22			2		
81			61			41			21			1		
Total			Total			Total			Total			Total		

Bottom Hole Assembly (BHA) Description/Information:

Tubing or Casing Depth Info:		Remarks/Notes:
BHA Length	ft	
Total ft Page 1	ft	
Total From Page 2	ft	
Total Feet	ft	
Stick Up on Last Joint	ft	
String Set at G. L.	ft	

Prepared by: _____ Date: _____

Checked by: _____ Date: _____

Attachment C

Example Daily Drilling Activities Record - New Exploratory Boreholes/Piezometers - Nye County Nuclear Waste Repository Project Office

Date:	Time Drilling Co. Arrive / Depart Site: /	Prepared By: (Nye County Contract Geologist)	**Form TP-7.0-3**
Borehole ID.	Time Nye County Arrive / Depart Site: /	Checked By: (Nye County Designated Field Rep.)	
Drilling Co.		Approved By: (Drilling Co. Designated Field Rep.)	PAGE OF

Time		**Elapsed Time**	**Depth Interval (ft, bgs)**		**Footage**	**Billable Line Items**													**Non-Billable Items**				**Description of Other and Comments**
						Footage Items			**Material Items**						**Hourly Items**			**Task Items**							
						Drill 5.5 in. Hole (Includes Eqpt., Labor, and Materials)	**Plug Back** to Bottom of Piezometer Screen (Grout Materials Billed Separately)	**Construct** Piezometers (Materials Billed Separately)	**High Solids Bentonite Grout** (50 lb bags)	**Granular Bentonite** (e.g. Benseal) (50 lb bags)	**Colorado Silica Sand** (8/12 Mesh) (50 lb bags)	**Fine Size Bentonite** (e.g. Casing Seal) (50 lb bags)	**Blank Casing** (2-inch Sch. 80 PVC, Flush Joint)	**Well Screen** (2-inch Sch. 80 PVC, 0.020 slots)	**NWRPO Directed** Rig Operating Time	**Standby Time W/Crew**	**Standby Time Wo/Crew**	**Mobe - Demobe**	**Move to Well**	**Install 60 ft of Surface Casing** (Includes Eqpt., Labor, Materials)	**Construct Surface Pad** (Includes Eqpt., Labor, Materials)	**Tailgate Safety Meeting**	**Equipment Warm-up/Servicing**	**Equipment Repair**	**Other**	
Start	End	hr	From	To	ft	ft	ft	ft	bags	bags	bags	bags	ft	ft	hrs	hrs	hrs	Job	Job	Job	Job					
					TOTALS																					

Attachment C

Example Daily Drilling Activities Record (Part II) - Existing Well Cleanout and Completion - Nye County Nuclear Waste Repository Project Office

Date:	Time Drilling Co. Arrive / Depart Site: /	Prepared By: (Nye County Contract Geologist)	**Form TP-7.0-4**
Borehole ID.	Time Nye County Arrive / Depart Site: /	Checked By: (Nye County Designated Field Rep.)	
Drilling Co.		Approved By: (Drilling Co. Designated Field Rep.)	Page OF

Time		**Elapsed Time**	**Depth Interval (ft, bgs)**		**Footage**	**Billable Line Items**														**Non-Billable Items**				
						Footage Items		**Material Items**								**Hourly Items**				**Task Item**					
						Drill/Cleanout 6 in. Hole to 1800 ft (Includes Eqpt., Labor, and Materials)	**Construct** Piezometer, Install Locking Cap on Surface Casing (Includes Eqpt. and Labor, Materials Billed Separately)	**High Solids Bentonite Grout** (50 lb bags)	**Granular Bentonite** (e.g. Benseal) (50 lb bags)	**Colorado Silica Sand** (8/12 Mesh) (50 lb bags)	**Fine Size Bentonite** (e.g. Casing Seal) (50 lb bags)	**Blank Casing** (2 7/8-inch OD J55 Steel, Flush Joint)	**Well Screen** (2 7/8-inch OD J55 Steel, 0.020 slots)	**Centralizers** (Stainless Steel)	**Water for Dust Control**	**Water Truck Dust Control**	**NWRPO Directed** Rig Operating Time	**Standby Time W/Crew**	**Standby Time Wo/Crew**	**Move to Well**	**Tailgate Safety Meeting**	**Equipment Warm-up/Servicing**	**Equipment Repair**	**Other**	**Description of Other and Comments**
Start	End	hr	From	To	ft	ft	ft	bags	bags	bags	bags	ft	ft	each	K-gal	hrs	hrs	hrs	hrs	Job				
					TOTALS																			

Attachment C

Example Daily Drilling Activities Record (Part III) - Well/Borehole Abandonment - Nye County Nuclear Waste Repository Project Office

Date:	Time Drilling Co. Arrive / Depart Site: /	Prepared By: (Nye County Contract Geologist)	**Form TP-7.0-5**
Borehole ID.	Time Nye County Arrive / Depart Site: /	Checked By: (Nye County Designated Field Rep.)	
Drilling Co.		Approved By: (Drilling Co. Designated Field Rep.)	PAGE OF

Time		**Elapsed Time**	**Depth Interval (ft, bgs)**		**Footage**	**NC-EWDP-XX Billable Items**			**NC-EWDP-YY Billable Items**		**Non-Billable Items**				**Description of Other and Comments**
						Task Item	**Footage Items**		**Task Item**	Footage Item					
						Move to Well, Pull 8-in. Temporary Surface Casing	**Drill Out 11-in. Hole to 50 ft** (Includes Eqpt., Labor, and Materials)	**Plug to Near Surface with Dry Fine Size Bentonite, Top-Off with Concrete** (Includes Eqpt., Labor, Materials)	**Move to Well**	**Plug Both Piezometers to 50 ft from Ground Surface with High Solids Bentonite, Plug to Near Surface with Dry Fine Size Bentonite, Top-Off with Concrete** (Includes Eqpt., Labor, Materials)	**Tailgate Safety Meeting**	**Equipment Warm-up/Servicing**	**Equipment Repair**	**Other**	
Start	End	hr	From	To	ft	Job	ft	ft	Job	ft					
TOTALS															

Nye County Nuclear Waste Repository Project Office

Field Change Approval Form	Controlling Document: TP-7.0
Title(s) of Plan(s) proposed to be changed:	NWRPO Field Personnel In Charge:
	Name Date

DESCRIPTION OF PROPOSED CHANGE - INCLUDE KNOWN EFFECTS OF CHANGE:
(Reference borehole IDs, Locations, Specific Tests, all necessary information to identify change)

APPROVAL: _____ _____
Geoscience Manager Time/Date

APPROVAL: _____ _____
Principal Investigator Time/Date

Copy to: Nye County Nuclear Waste Repository Project Office, Quality Assurance Records Center (QARC)

Form TP-7.0-6 Rev. 4