Monitoring Inspection Report
(40 CFR 194.42)

Of The Waste Isolation Pilot Plant

March 24-25, 1999

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1.0 Executive Summary

The U.S. Environmental Protection Agency (EPA) conducted an inspection of the Department of Energy (DOE) Waste Isolation Pilot Plant (WIPP) March 24-25, 1999, as part of its continuing oversight program. The purpose of this inspection was to verify that DOE is monitoring the ten parameters listed in the WIPP Compliance Certification Application (CCA), Volume 1, Section 7.0, Table 7-7 (See Table 1).

The inspection examined implementation of monitoring for geomechanical, hydrological, waste activity, drilling related, and subsidence parameters. The inspectors toured locations where measurements are taken, reviewed parameter databases, and reviewed documents and procedures directing these monitoring activities.

The EPA inspectors found that DOE through its contractor, Westinghouse, has effectively implemented the monitoring program at WIPP. As determined in the certification decision, May 13, 1998, the program has adequate documentation/ procedures governing the program. The inspection team also confirmed that DOE's program requires reporting the results of these various monitoring programs on an annual basis, as committed to in the CCA.

2.0 Background

The Compliance Criteria at Section 194.42 require DOE to "conduct an analysis of the effects of disposal system parameters on the containment of waste in the disposal system" (40 CFR 194.42 (a)). The results of this analysis is to be include in the CCA and is to be used to develop pre-closure and post-closure monitoring requirements.

Volume 1, Section 7.0 of the CCA documents DOE analysis, Table 7-7 of the CCA (Document COB DOE 194#1, Attachment D.6) lists the ten parameters that DOE discovered may impact the disposal system. These parameters are grouped into major categories and listed in Table 1.

Table 1 - Monitored Parameters

Geomechanical Parameters- -Creep closure, -Extent of deformation, -Initiation of brittle deformation, and -Displacement of deformation features.	**Waste Activity Parameter-** -Waste Activity **Subsidence Parameter-** -Subsidence measurements
Hydrological Parameters- -Culebra groundwater composition and -Change in Culebra groundwater flow direction	**Drilling Related Parameters-** -Drilling rate and -The probability of encountering a Castile brine reservoir.

EPA approved these ten monitoring parameters in the certification rulemaking. Section 194.42(c) requires DOE to have an implemented program before emplacement of waste can begin during the management and storage phase of operation. This inspection was done to verify implementation of the monitoring program at WIPP.

3.0 Scope

Inspection activities included an examination of monitoring and sampling equipment both on and off site, and in the underground. A review of sampling procedures and measurement techniques was conducted.

4.0 Inspection Team, Observers, and Participants

The inspection team consisted of two representatives of the EPA Administrator. Observers from the Environmental Evaluation Group (EEG), Jim Kenney and Bill Bartlett, were also present.

Inspection Team Member	Position	Affiliation
Chuck Byrum	Inspection Team Leader	EPA
Nick Stone	Inspector	EPA

Numerous DOE staff members and contractors participated in the inspection.

DOE/Contractor Participate	Position	Affiliation
George Basabilvazo		DOE/CAO
Harold Johnson		DOE/CAO
Cynthia Zvonar		DOE/CAO
Bob Billett	ES&H	WID
Benny Hooda	ES&H	WID
Ron Richardson	ES&H	WID
Ken Mikus	Waste Ops	WID
Stewart Jones	ES&H	WID
Rey Carrasco	Geo. Engr.	WID
W.R. White	ES&H	WID
T. Kerr		Garwin
Linda Jo Dalton	ES&H	WID

WID = Westinghouse, CAO = Carlsbad Area Office, ES&H = Environmental Safety and Health

The inspection began on Wednesday, March 24, 1999, with a presentation by DOE CAO and WID about the present status of the WIPP monitoring program. Site personnel discussed the monitoring of waste activity, geotechnical parameters, subsidence monitoring, environmental monitoring such as water levels, and drilling related parameters.

The inspection team toured and reviewed various activities to verify effective implementation of the plans and procedures presented during the oral presentations. The team reviewed the WIPP Waste Information System (WWIS) used to capture the activity of waste shipped from the various generator sites. The team reviewed the Delaware Basin Drilling Surveillance program, and the Ground Control Monitoring program.

The inspection team reviewed the ground water monitoring program during the 40 CFR 191.03, Subpart A inspection held on March 22-23, 1999.

5.0 Performance of the Inspection

The EPA inspectors reviewed three fundamental areas to verify implementation of the DOE monitoring program during the management and storage phase, 1) written plans and

procedures, 2) quality assurance procedures and records, and 3) results of the monitoring program in the form of raw data, intermediate reports, and final annual reports, if appropriate.

On February 9-11, 1999, the EPA QA Team performed an annual inspection of the DOE/WID quality assurance programs. The DOE/WID programs were found to be adequately maintained.

The inspection checklist in Attachment A.2 provides details on inspection activities.

5.1 Monitoring of Geomechanical Parameters

DOE committed to measure four geomechanical parameters in the CCA; creep closure, extent of deformation, initiation of brittle deformation, and displacement of deformation features. WIPP has four programs that supply information for these four parameters; the geomechanical monitoring program, the geosciences program, the ground control program, and the rock mechanics program. These programs are documented in the "Geotechnical Engineering Program Plan" (WP 7-1, Attachment D.1, COB 194.X).

The results of the Geotechnical Engineering Program are documented in the Geotechnical Analysis Report for July 1996 - June 1997 (Attachment D.1,COB 194.P).

Rey Carrasco, contractor for DOE, in the opening meeting discussed how the four geomechanical parameters are measured and discussed the instrumentation used to measure the response of shafts and underground openings (Attachment D.1, COB 194C). The inspection team toured and reviewed underground instrumentation, the computer data base, and field data sheets used to record raw measurement data (Attachment D.1, COB 194L.1 to L.6). Mr. Carrasco showed the inspection team the input of data into the computer database and examined the output checkprint (Attachment D.1, COB 194M) to verify implementation of the measurement plan.

5.2 Monitoring of Hydrological Parameters

DOE committed to measure two hydrological parameters in the CCA; Culebra groundwater composition and changes in the Culebra groundwater flow direction. These parameters and related parameters are measured and documented in the WIPP environmental monitoring program. These programs are documented in the Groundwater Surveillance Program Plan (WP 02-1, Attachment D.2, COB 194.W).

The results of this program are documented in the Waste Isolation Pilot Plant Site Environmental Report - Calendar Year 1997 (Attachment D.2, COB 194.T).

In the opening meeting Stewart Jones, contractor for DOE, discussed the program used to measure and document the hydrological parameters. Mr. Jones discussed the measurement methods used to measure groundwater composition and used to measure values used to derive the direction of groundwater flow (Attachment D.2, COB 194W).

The inspection team reviewed water level measurements for the month of March (Attachment D.2, COB 194Q.1 to Q3). The team reviewed the raw data sheets recorded in the field and the quality assurance cross-check, CHECKPRINT, procedures (Attachment D.2, COB 194R).

The inspection team also toured the WQSP-2 groundwater sampling well and the mobile chemistry laboratory. Mr. Jones and other contractor staff presented a detailed explanation of groundwater composition measurement procedures, such as dissolved minerals, and quality assurance requirements.

5.3 Monitoring of Waste Activity Parameters

DOE committed to measure waste activity in the CCA. This parameter is part of the extensive database collected for each container shipped to WIPP and is stored in the WIPP Waste Information System (WWIS). The WWIS is a software system that screens waste container data and provides reports on the TRU waste sent to WIPP. The requirements for the WWIS are discussed in "WIPP Waste Information System Program" (WP 05-WA.02, Attachment D.3, COB 194V).

The facility demonstrated that the WWIS can receive data and that the WWIS can generate reports. The CAO has committed to annual waste activity reports.

Ken Mikus, contractor for DOE, discussed how the WWIS is used to record waste activity information provided by the generator sites and how the computer database that is created is used to produce the necessary reports. The inspection team toured the WWIS computer system where Mr. Mikus demonstrated the transmission of data from the Los Alamos Laboratory generator site and how this information is used to develop different waste activity reports (Attachment D.3, COB 194G.

5.4 Monitoring of Drilling Related Parameters

DOE committed to measure two drilling related parameters in the CCA; the drilling rate and the probability of encountering a Castile brine reservoir. These parameters are measured as part of the "Delaware Basin Drilling Surveillance Program" (WP 02-PC.02, Attachment D.4, COB 194.I). This surveillance program measures or records many parameters related to drilling activities around the WIPP site.

The results of the surveillance program is documented annually in the Delaware Basin Drilling Surveillance Program - Annual Report for October 1997 through September 1998 (Attachment D.4, COB 194.K).

During the opening meeting David Hughes, contractor for DOE, discussed the program used to measure the drilling rate and used to derive the probability of encountering a Castile brine reservoir. He discussed the information sources, such as Dwight's Petroleum commercial information and the state of New Mexico Oil Conservation Division. Mr. Hughes explained the

data collected and placed in the well information database and the quality assurance requirements (Attachment D.4, COB 194F). Mr. Hughes provided the inspection team a hands-on demonstration of the computer database system and showed examples of maps produced and reports generated from the system (Attachment D.4, COB 194J).

5.5 Monitoring of Subsidence Parameters

DOE committed to measure the subsidence at the WIPP site in the CCA. This parameter is documented as part of the of the "WIPP Underground and Surface Surveying Program" (WP09-ES.01, Attachment D.5, COB 194.U). The DOE will perform the subsidence survey at the site annually during pre-closure operations.

The results of this program are to be reported annually in the WIPP Subsidence Monument Leveling Survey - 1998 (Attachment D.5, COB 194.O).

During the opening meeting Rey Carrasco, contractor for DOE, discussed the subsidence parameter measurements program (Attachment D.5, COB 194D). Mr. Carrasco explained how horizontal and vertical surveys would be performed and the quality assurance requirements for these surveys. Mr Carrasco and his staff demonstrated to the inspection team the survey equipment used, the methods used to record and check field data, how these data are input into the computer database and are used to produce the needed reports.

6.0 Summary of finding, observation, concerns, and recommendations.

EPA performed this inspection to verify that DOE/WID has implemented a program at the WIPP site to monitor the ten parameters it found to be important in the CCA. During this inspection the inspectors found that DOE has adequately implemented programs to monitoring these ten parameters during pre-closure operations. DOE/WID also plans to report the results of these monitoring activities as committed to in the CCA documentation.

Attachment A.1

40 CFR 194.42 Inspection Plan

Purpose: Verify that the Department of Energy (DOE) can demonstrate that the Waste Isolation Pilot Plant (WIPP) is monitoring the parameter commitments made in the documentation to support the EPA's certification decision, in particular CCA, Volume 1, Section 7.0 and Appendix MON. This inspection is conducted under the authority of 40 CFR §194.21.

This inspection is part of EPA's continued oversight to ensure that WIPP can, in fact, monitor the performance of significant parameters of the disposal system.

Scope: Inspection activities will include an examination of monitoring and sampling equipment both on and off site, and in the underground. A review of sampling procedures and measurement techniques may be conducted. Quality assurance procedures and documentation for each of these activities may also be reviewed.

Startup Issues: The specific purpose of this inspection is to verify and confirm that WIPP has complied with the requirements of 40 CFR 194.42. As stated in 40 CFR 194.42(c) -

> "...in no case shall waste be emplaced in the disposal system prior to the implementation of pre-closure monitoring."

Therefore, the EPA believes it is appropriate to verify the adequate implementation of pre-closure monitoring before the first receipt of waste at WIPP.

Location: This inspection will be held at the WIPP facility location twenty-six miles south east of Carlsbad, New Mexico and the surrounding vicinity as needed.

Duration: The EPA expects to complete its inspection, with DOE's cooperation, in one day. The day will begin with an opening meeting at 8:00 a.m. and end at 5:00 p.m. with a closeout session.

Date: Expected to be held during the week of March 22, 1999.

Attachment A.2

40 CFR 194.42

Inspection

Check List

40 CFR 194.42 - DOE WIPP Monitoring Commitments Checklist

	Pre-closure Monitoring Commitments		
#	Question	Comment (Objective Evidence)	Result
	Hydrological Parameters		
1	Does DOE demonstrate that they have implemented plans/programs/procedures to measure - a) Culebra Groundwater Composition; b) Change in Culebra Groundwater Flow Direction during the pre-closure phase of operations as specified in the CCA part of WIPP's groundwater monitoring plan? (CCA, Volume 1, Table 7-7; App MON, Table MON-1) 40 CFR 194.42 (c) and (e)	Item #27, below, documents the program planned to measure, document, report, and QA these two activities. Item #27 documents the Groundwater Surveillance Program Plan and records the activities associated with this program, the methods planned to be used, and the reporting plans. Section 4.0, item #27 documents the quality assurance requirements of these activities. Item #22 is an example of actual water level measurements. Item #21 is an computer print out of these measurements and item #23 is a checkprint of these same measurements with a signature verifying QA review. Item #23 is an example of results of these monitoring activities. The inspection team toured and reviewed the WQSP-2 borehole location to evaluate water measurement techniques. The team also evaluated the chemical analysis performed in the mobile laboratory.	Sat.
2	Does DOE demonstrate that they have implemented an effective quality assurance program for item 1 above? (CCA, App MON, Page MON-22) 40 CFR 194.22	EPA performed a quality assurance inspection February 9-11, 1999, and found the program at DOE/WID adequate.	Sat.
3	Does DOE demonstrate that the results of the groundwater monitoring program are reported annually? (CCA, App. MON, Page MON-22)	Item #27, page 28 documents that results of monitoring will be reported annually and will be published in the Annual Site Environmental Report (ASER).	Sat.

Documents Reviewed:

#9 - Environmental Monitoring 40 CFR 194 - Presentation by Stewart Jones
#27 - Groundwater Surveillance Program Plan - WP 02-1, Revision 3
#21 - Computer printouts of water level measurements measured during the month of March 1999
#22 - Actual field copies of raw data of water levels measured in March 1999
#23 - Samples of signed quality assurance check prints of water level measurements during the month of March 1999
#24 - Waste Isolation Pilot Plant Site Environmental Report - Calendar Year 1997

40 CFR 194.42 - DOE WIPP Monitoring Commitments Checklist

	Pre-closure Monitoring Commitments		
#	Question	Comment (Objective Evidence)	Result
	Waste Activity Parameters		
1	Does DOE demonstrate that they have implemented plans/programs/procedures to measure - a) Waste Activity? (CCA, Volume 1, Table 7-7; App MON, Table MON-1) 40 CFR 194.42 (c) and (e)	WWIS will be used to measure and store waste activity among other things. Item #26, below, documents the program planned to measure, document, report, and QA this activity. Item #26 documents the WWIS Program and records the activities associated with this program, the methods planned to be used, and the reporting plans. Item #11 is an example of the Waste Container Report for LANL waste shipped on March 25, 1999 and item #12 is an example of the Nuclide Report for test waste data. The inspection team toured and reviewed the WWIS computer system and the database computer program. The team reviewed the query capabilities of the system to produce waste activity reports.	Sat.
2	Does DOE demonstrate that they have implemented an effective quality assurance program for item 1? (CCA, App WAP, page C-30) 40 CFR 194.22	EPA performed a quality assurance inspection February 9-11, 1999, and found the program at DOE/WID adequate.	Sat.
3	Does DOE demonstrate that the results of the waste activity parameters are reported annually? (CCA Volume, Section 7.2.4 Reporting)	Item #26, page 19 documents that results of monitoring will be reported annually.	Sat.

Documents Reviewed:
#6 - WIPP Waste Information System (WWIS) - Presentation by Ken Mikus
#26 - WIPP Waste Information System Program - WP 05-WA.02, Revision 0
#11 - Sample 'Waste Container Data Report' from the WWIS
#12 - Sample 'Nuclide Report' from the WWIS

40 CFR 194.42 - DOE WIPP Monitoring Commitments Checklist

	Pre-closure and Post Closure Monitoring Commitments		
#	Question	Comment (Objective Evidence)	Result
	Drilling Related Parameters		
1	Does DOE demonstrate that they have implemented plans/programs/procedures to measure - a) Drilling Rate; and b) Probability of Encountering a Castile Brine Reservoir? (CCA, Volume 1, Table 7-7; App MON, Table MON-1) 40 CFR 194.42 (c) and (e)	Item #13, below, documents the program planned to measure, document, report, and QA these two activities. Item #13 documents the Delaware Basin Drilling Surveillance Plan and records the activities associated with this program, the methods planned to be used, and the reporting plans. Section 6.0, item #13 documents the quality assurance requirements of these activities. Item #14 is an example of the information recorded and stored in the drilled hole database. Item #15 is a copy of the annual report; page 15 shows the 1998 calculation of the drilling rate and page shows a discussion of Castile brine pockets. The inspection team toured and reviewed the computer and database system used to record and store drill hole data. The team reviewed the report and mapping capabilities of the computer system..	Sat.
2	Does DOE demonstrate that they have implemented an effective quality assurance program for item 1 above? (CCA, App DMP, page DMP-9) 40 CFR 194.22	EPA performed a quality assurance inspection February 9-11, 1999, and found the program at DOE/WID adequate.	Sat.
3	Does DOE demonstrate that the results of the drilling related parameters are reported annually? (CCA Volume, Section 7.2.4 Reporting; App DMP, page DMP-9)	Item #13, page 5 documents that results of monitoring will be reported annually.	Sat.

Documents Reviewed:

#10 - Delaware Basin Surveillance Plan - Presented by David Hughes
#13 - Delaware Basin Drilling Surveillance Plan - WP 02-PC.02, Revision 0
#14 - Sample print out from the drilling surveillance computer database
#15 - Delaware Basin Drilling Surveillance Program - Annual Report for October 1997 through September 1998

40 CFR 194.42 - DOE WIPP Monitoring Commitments Checklist

	Pre-closure and Post Closure Monitoring Commitments		
#	Question	Comment (Objective Evidence)	Result
	Subsidence Measurements		
1	Does DOE demonstrate that they have implemented plans/programs/procedures to measure - a) Subsidence measurements? (CCA, Volume 1, Table 7-7; App MON, Table MON-1) 40 CFR 194.42 (c) and (e)	Item #25, below, documents the program planned to measure, document, report, and QA these two activities. Item #25 documents the WIPP Underground & Surface Surveying Program and records the activities associated with this program, the methods planned to be used, and the reporting plans. Section 4.0, item #25 documents the quality assurance requirements of these activities. Item #20 is a copy of the annual report for 1998. The inspection team toured and reviewed the computer and database system used to record and store subsidence survey data. The team reviewed the report and mapping capabilities of the computer system..	Sat.
2	Does DOE demonstrate that they have implemented an effective quality assurance program for item 1? 40 CFR 194.22	EPA performed a quality assurance inspection February 9-11, 1999, and found the program at DOE/WID adequate.	Sat.
3	Does DOE demonstrate that the results of the subsidence measurements are reported annually? (CCA Volume, Section 7.2.4 Reporting)	Item #25, page 11 documents that results of monitoring will be reported annually.	Sat.

Documents Reviewed:
#8 - WIPP Subsidence Monitoring - Presented by Rey Carrasco
#25 - WIPP Underground and Surface Surveying Program - WP 09-ES.01, Revision 1
#20 - WIPP Subsidence Monument Leveling survey - 1998

Attachment B

Opening and Closing

Sign Up Sheets

ENVIRONMENTAL PROTECTION AGENCY
CFR 194.42 OPENING MEETING ATTENDANCE
March 24, 1999

PRINTED NAME	SIGNATURE	ORGANIZATION	PHONE NUMBER
R.A. Billett		(W) / ES&H	234-8270
Benny Hooda		(W) / ES&H	234-8932
Ron Richardson		(W) / ES&H	234-8395
Ken Mikus		(W) Waste Ops	234-8524
Bill Bartlett		EEG	(505) 828-1003
Chuck Byrum		U.S. EPA	214 665 7555
George Basabilvazo		DOE/CAO	234-7488
Vicki Stone		US EPA	214 665-7226
Stewart Jones		(W), ES&H	505 234-8293
Jim Kenney		EEG	505-885-9675
Rey Carrasco		(W) / Geo Engs.	505-234-8698
Harold Johnson		DOE/CAO	234-7349
Cynthia Zvonar		DOE/CAO	234-7495
WR White		(W) ESH	234 8267
T. Kerr		GARWIN	234-8180
Linda Jo Dalton		(W) ESH	234-8348

ENVIRONMENTAL PROTECTION AGENCY
CFR 194.42 CLOSE-OUT MEETING ATTENDANCE
March 25, 1999

PRINTED NAME	SIGNATURE	ORGANIZATION	PHONE NUMBER
Bill Bartlett	Bill Bartlett	EEG	(505) 828-1003
Bruce Lilly	Bruce Lilly	DOE	8136
Richard Farrell	Richard Farrell	DOE/CAO	505 234 8318
KEVIN DONOVAN	Kevin Donovan	Westinghouse/ES+H	505 234 8325
George BASABILVAZO	George T. Basabilvazo	DOE/CAO	234-7488
Nick Stone	Nick Stone	US EPA	214 665-7226
Chuck Byrum	Charles D. Byrum	US EPA	214 665 7555
John Lee	John Lee	(W) GMO	234-8202
Jim Kenney	Jim Kenney	EEG	(505) 885-9615
Stewart Jones	Stewart Jones	(W), ES+H	(505) 234-8293
Harold Johnson	Harold Johnson	DOE	(505) 234-7349
STRAIT ANNE	A E Strait	W ENG	505 234 8636
Cynthia Zvonar	Cynthia Zvonar	CAO	11 11 7495
Bob Billett	R C Billett	(W) / ES+H	234-8270
Linda Jo DALTON	L J Dalton	(W) / ES+H	234-8348
DAVID HUGHES	David L Hughes	(W) / ES+H	234-8175
Larry Madl	Larry J Madl	(W) ES+H	234-8400
REY CARRASCO	Rey Carrasco	(W) / Geo Engr.	234-8698
STEVE CASEY	Steve Casey	(W) / ES+H	234-8414

CFR 194 MTZ

40 CFR 194.42 - DOE WIPP Monitoring Commitments Checklist

	Pre-closure Monitoring Commitments		
#	Question	Comment (Objective Evidence)	Result
	Geomechanical Parameters		
1	Does DOE demonstrate that they have implemented plans/programs/procedures to measure - a) Creep Closure; b) Extent of Deformation; c) Initiation of Brittle Deformation and d) Displacement of Deformation Features during the pre-closure phase of operations as specified in the CCA part of the geomechanical monitoring system? (CCA, Volume 1, Table 7-7; App MON, Table MON-1) 40 CFR 194.42 (c) and (e)	Item #28, below, documents the program planned to measure, document, report, and QA these four activities. Section 3.0, item #28 documents the Geomechanical Monitoring Program and records the activities associated with this program, the methods planned to be used, and the reporting plans. Section 4.0, item #28 documents the quality assurance requirements of these activities. Items #16 and #17 are examples of raw data collection and verification. Items #18 and #19 are examples of results of these monitoring activities. The inspection team toured and reviewed the computer system and database systems used to collect and process these data.	Sat.
2	Does DOE demonstrate that they have implemented an effective quality assurance program for item 1 above? 40 CFR 194.22	EPA performed a quality assurance inspection February 9-11, 1999, and found the program at DOE/WID adequate.	Sat.
3	Does DOE demonstrate that the results of the geotechnical investigations are reported annually? (CCA, App. MON, Page MON-10)	Item #28, page 8 requires that analysis will be performed annually and the results will be published in the geotechnical analysis report.	Sat.

Documents Reviewed:
#7 - WIPP Geotechnical Engineering Monitoring - Presentation by Rey Carrasco
#28 - WIPP Geotechnical Engineering Program Plan - WP 07-01, Revision 2
#16 - Sample - raw data - GIS Field Data Sheets, Room Closure Measurements
#17 - Sample - raw data - CVPT Field Data Checkprint
#18 - Long-Term Ground Control Plan for the Waste Isolation Pilot Plant
#19 - Geotechnical Analysis Report for July 1996 - June 1997

Attachment C

Documents

Reviewed

	Documents Reviewed and Copies Received	194.42 Monitoring Inspection	DOE Documents	
#	Document Title	Subject Matter	Source and Location	Copy
1	Table 7-7 from Chapter 7 of the CCA; Pre-closure and Post-closure Monitored Parameters.	Parameters committed by DOE to be measured. COB DOE194#1	DOE, CCA, Chapter 7, Table 7-7. Attachment D.6	Yes
2	CCA, Appendix MON and Attachment MONPAR. In particular Table MON-1, pages MON-10, MON-29	Both documents discuss the pre- and post-closure parameter selected to be monitored at the WIPP site. COB DOE 194#2	DOE, CCA documentation. *Not included in this report	No*
3	Status of Implementation of WIPP Long-Term Monitoring Programs	One page description of the present status of the monitoring program. Documents referenced are: WP 09-ES.01; WP 05-WA.02, Rev. 0; WP 02-PC.02, Rev. 0; WP 02-1, Rev. 3; and WP 07-01, Rev. 2. COB DOE 194#3	DOE e-mail dated 030899. Attachment D.6	Yes
4	CFR 194.42 Opening Meeting Attendance March 24, 1999 Closeout Meeting Attendance - March 25, 1999	List of addends for opening meeting. COB 194-MT1 COB 194-MT2	DOE, at the WIPP site. Attachment B	Yes
5	Compliance with 40 CFR 194.42 WIPP Presentations, 03/24/99	Introductory remarks by George Basabilvazo of DOE CAO. COB 194-A	DOE, opening meeting of inspection. Attachment D.6	Yes
6	WIPP Waste Information System (WWIS)	Presentation by Ken Mikus on the WWIS system recording of waste activity. COB 194-B	DOE/WID, opening meeting of inspection. Attachment D.3	Yes
7	WIPP Geotechnical Engineering Monitoring	Presented by Rey Carrasco on the monitoring of creep closure, etc. COB 194-C	DOE/WID, opening meeting of inspection. Attachment D.1	Yes

	Documents Reviewed and Copies Received	194.42 Monitoring Inspection	DOE Documents	
#	Document Title	Subject Matter	Source and Location	Copy
8	WIPP Subsidence Monitoring	Presented by Rey Carrasco on subsidence monitoring. COB 194-D	DOE/WID, opening meeting of inspection. Attachment D.5	Yes
9	Environmental Monitoring 40 CFR 194	Presented by Stewart Jones on hydrological monitoring. COB 194-E	DOE/WID, opening meeting of inspection. Attachment D.2	Yes
10	Delaware Basin Surveillance Plan	Presented by David Hughes on the monitored drilling related parameters. COB 194-F	DOE/WID, opening meeting of inspection. Attachment D.4	Yes
11	Sample 'Waste Container Data Report' from the WWIS computer system.	Provided by Ken Mikus during the demonstration of the WWIS computer system. LANL data. COB 194-G	DOE/WID Attachment D.3	Yes
12	Sample 'Nuclide Report' from the WWIS computer system	Provided by Ken Mikus during the demonstration of the WWIS computer system. Test Data. COB 194-H	DOE/WID Attachment D.3	Yes
13	Delaware Basin Drilling Surveillance Plan WP 02-PC.02, Revision 0	Provided by David Hughes during the demonstration of the drilling surveillance computer system and database. COB 194-I	DOE/WID Attachment D.4	Yes
14	Sample print out from the drilling surveillance computer database.	Provided by David Hughes during the demonstration of the drilling surveillance computer system and database. COB 194-J	DOE/WID Attachment D.4	Yes

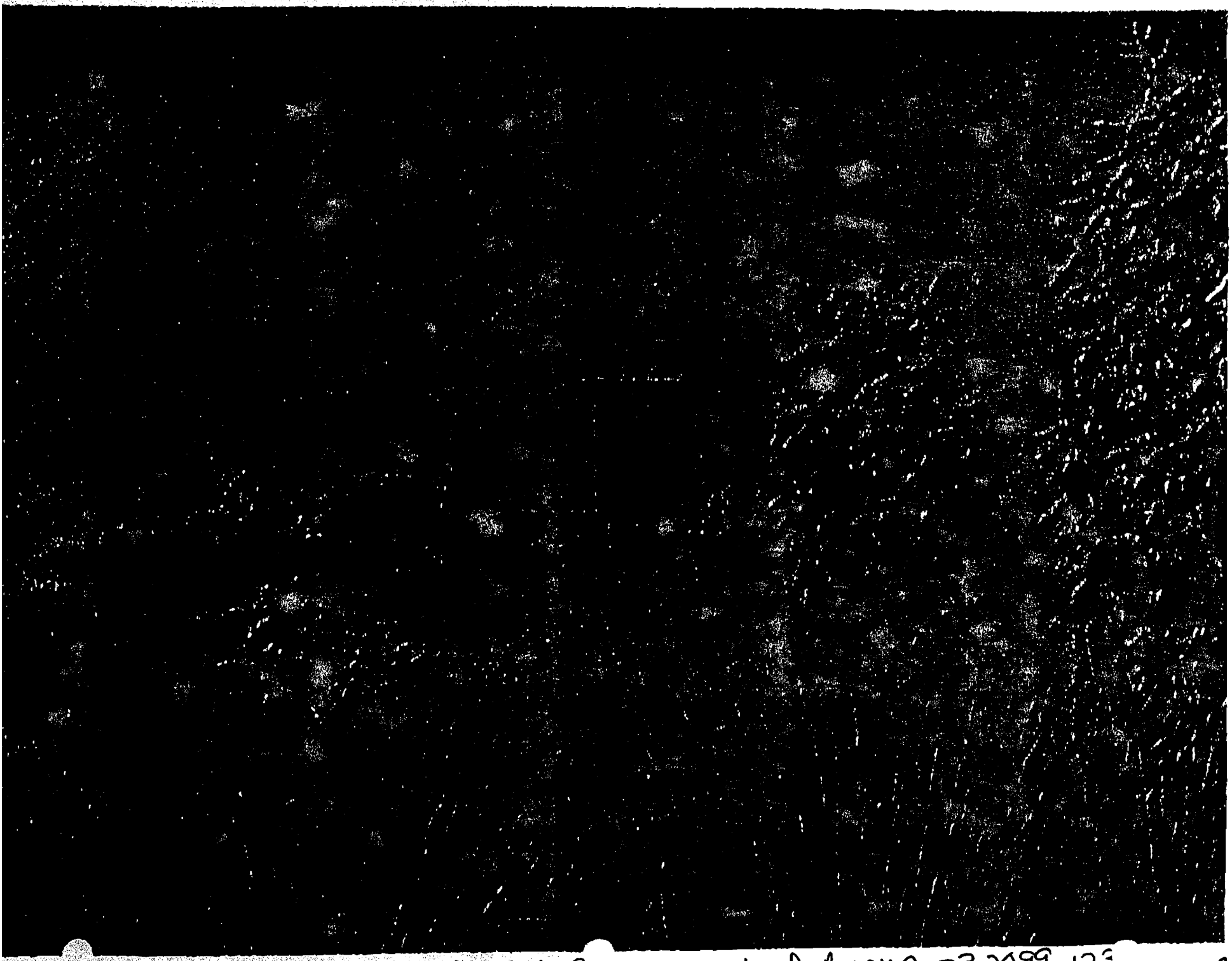
	Documents Reviewed and Copies Received	194.42 Monitoring Inspection	DOE Documents	
#	Document Title	Subject Matter	Source and Location	Copy
15	Delaware Basin Drilling Surveillance Program - Annual Report for October 1997 through September 1998	Provided by David Hughes during the demonstration of the drilling surveillance computer system and database. COB 194-K	DOE/WID Attachment D.4	Yes
16	Sample - raw data - GIS Field Data Sheets, Room Closure Measurements	Provided by Rey Carrasco during the demonstration of the geomechanical computer system and database. COB 194-L.1 to L.6	DOE/WID Attachment D.1	Yes
17	Sample - raw data - CVPT Field Data Checkprint Used as a QA check to verify that the data input into the database is corrected.	Provided by Rey Carrasco during the demonstration of the geomechanical computer system and database. COB 194-M	DOE/WID Attachment D.1	Yes
18	Long-Term Ground Control Plan for the Waste Isolation Pilot Plant.	Provided by Rey Carrasco during the demonstration of the geomechanical computer system and database. This report is an example of the results of the geomechanical monitoring program. COB 194-N	DOE/WID *Not included in this report.	No*
19	Geotechnical Analysis Report for July 1996 - June 1997	Provided by Rey Carrasco during the demonstration of the geomechanical computer system and database. This report is an example of the results of the geomechanical monitoring program. COB 194-P	DOE/WID Attachment D.1	Yes
20	WIPP Subsidence Monument Leveling Survey - 1998	Provided by Rey Carrasco during the demonstration of the geomechanical computer system and database. This report is an example of the results of the geomechanical monitoring program. COB 194-O	DOE/WID *Selected sample included. Attachment D.5	Yes*

	Documents Reviewed and Copies Received	194.42 Monitoring Inspection	DOE documents	
#	Document Title	Subject Matter	Source and Location	Copy
21	Computer printouts of water level measurements measured during the month of March 1999.	Provided by Stewart Jones as examples of the ongoing environmental monitoring program, in particular water levels in the Culebra. COB 194-Q.1 to Q.3	DOE/WID *Q3 - Selected sample included. Attachment D.2	Yes*
22	Actual field copies of raw data of water levels measured in March 1999.	Provided by Stewart Jones as examples of field measurements taken in and near the WIPP site. COB 194-R	DOE/WID Attachment D.2	Yes
23	Samples of signed quality assurance check prints of water level measurements during the month of March 1999.	Provided by Stewart Jones as examples of field measurements and QA review. COB 194-S.1 to S.2	DOE/WID *S2 - Selected sample included. Attachment D.2	Yes*
24	Waste Isolation Pilot Plant Site Environmental Report - Calendar Year 1997	Provided by Stewart Jones as an example of the results of the environmental monitoring program, in particular hydrological parameters. COB 194-T	DOE/WID *Selected sample included. Attachment D.2	Yes*

	Documents Reviewed and Copies Received	194.42 Monitoring Inspection	DOE Documents	
#	Document Title	Subject Matter	Source and Location	Copy
25	Subsidence Monitoring: WIPP Underground & Surface Surveying Program WP 09-ES.01, Revision 0	Printed from CD Rom, file: 09-es.01.doc. Demonstrates DOE's implementation of subsidence monitoring. COB 194-U	DOE/WID Attachment D.5	Yes
26	Waste Activity Monitoring: WIPP Waste Information System Program WP 05-WA.02, Revision 0	Printed from CD Rom, file: 05-wa02.doc. Demonstrates DOE's implementation of waste activity monitoring. COB 194-V	DOE/WID Attachment D.3	Yes
27	Hydrological Monitoring: Groundwater Surveillance Program Plan WP 02-1, Revision 3	Printed from CD Rom, file: 02-1.doc. Demonstrates DOE's implementation of hydrological monitoring. COB 194-W	DOE/WID Attachment D.2	Yes
28	Geomechanical Monitoring: WIPP Geotechnical Engineering Program Plan WP 07-01, Revision 2	Printed from CD Rom, file: 07-1.doc. Demonstrates DOE's implementation of geomechanical monitoring. COB 194-X	DOE/WID Attachment D.1	Yes

Attachment D.1

Geomechanical Documents Reviewed



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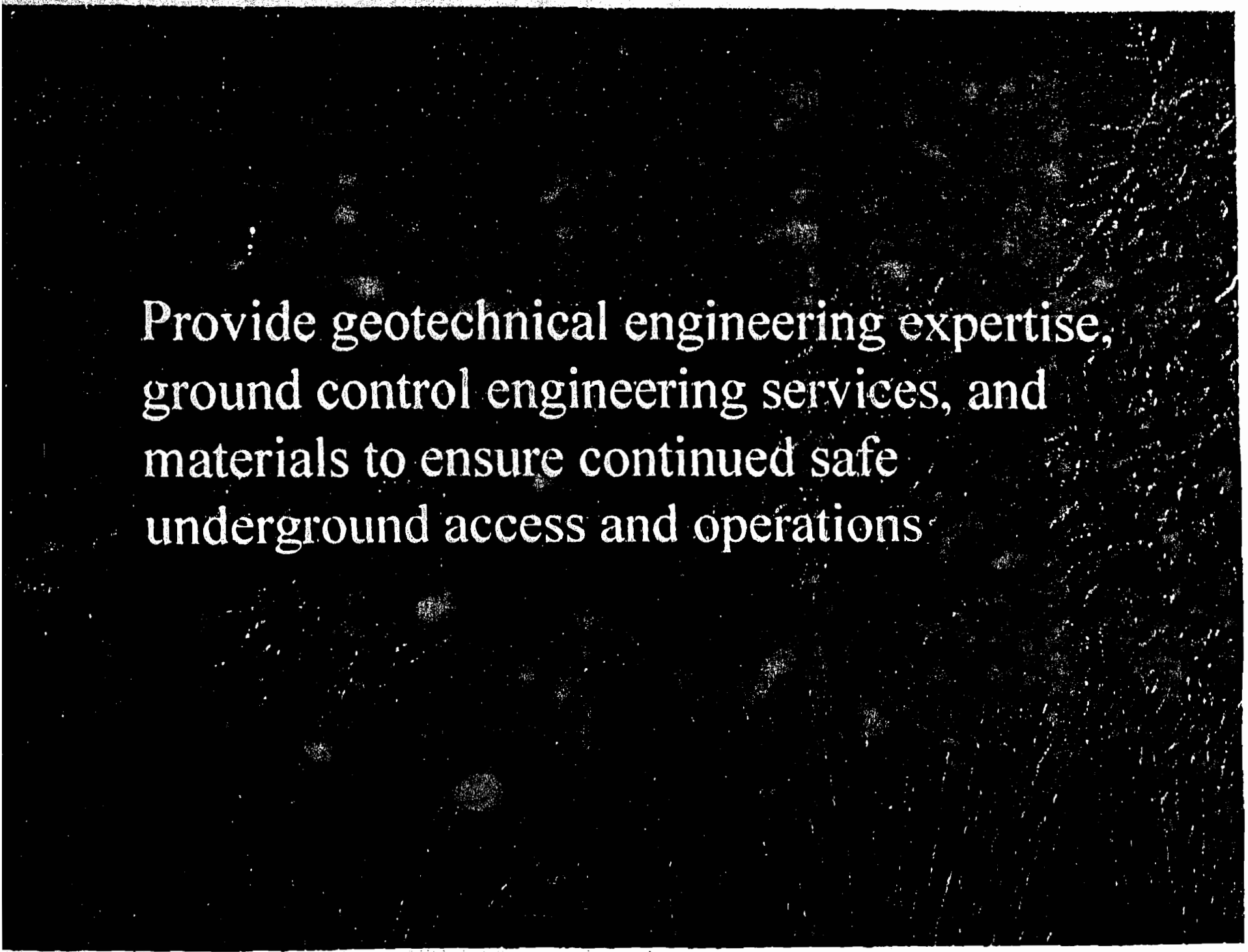
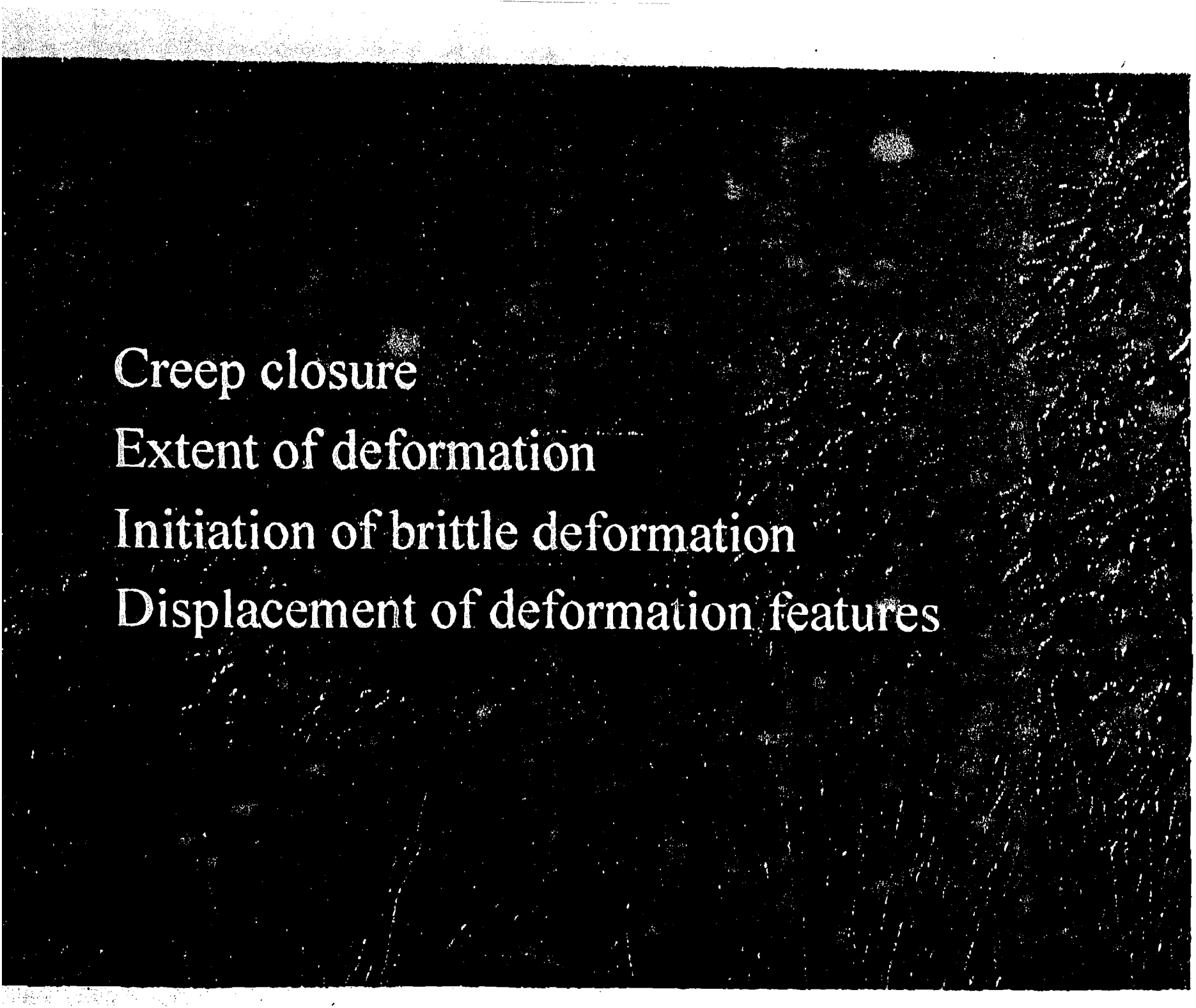
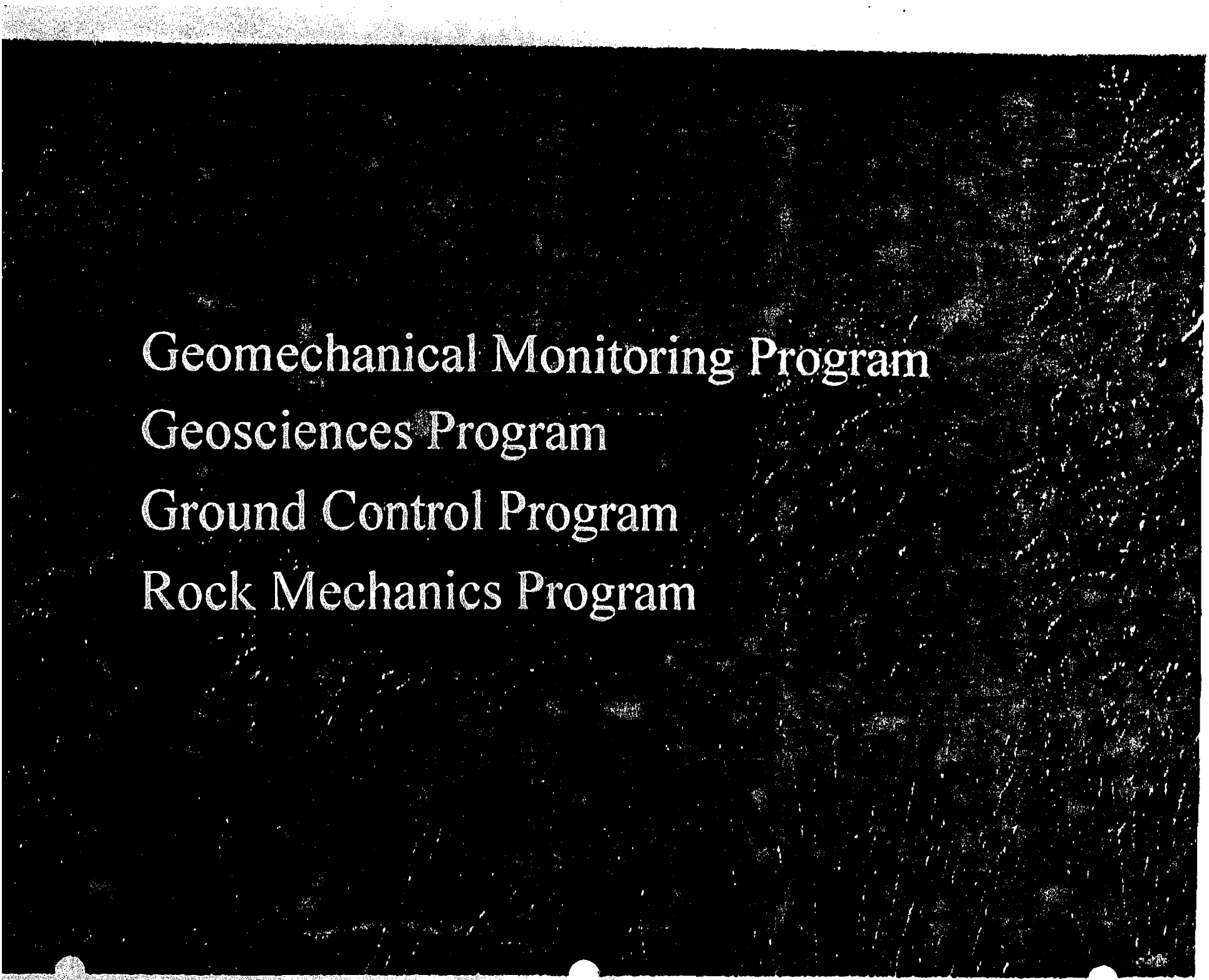

Provide geotechnical engineering expertise, ground control engineering services, and materials to ensure continued safe underground access and operations

- Initiated in 1983 to collect data for design validation of underground facility
- Currently plays a major role in determining deformation mechanisms surrounding the underground excavations
- Provides a method of validating modeling techniques utilized to predict and evaluate ground conditions


Creep closure
Extent of deformation
Initiation of brittle deformation
Displacement of deformation features

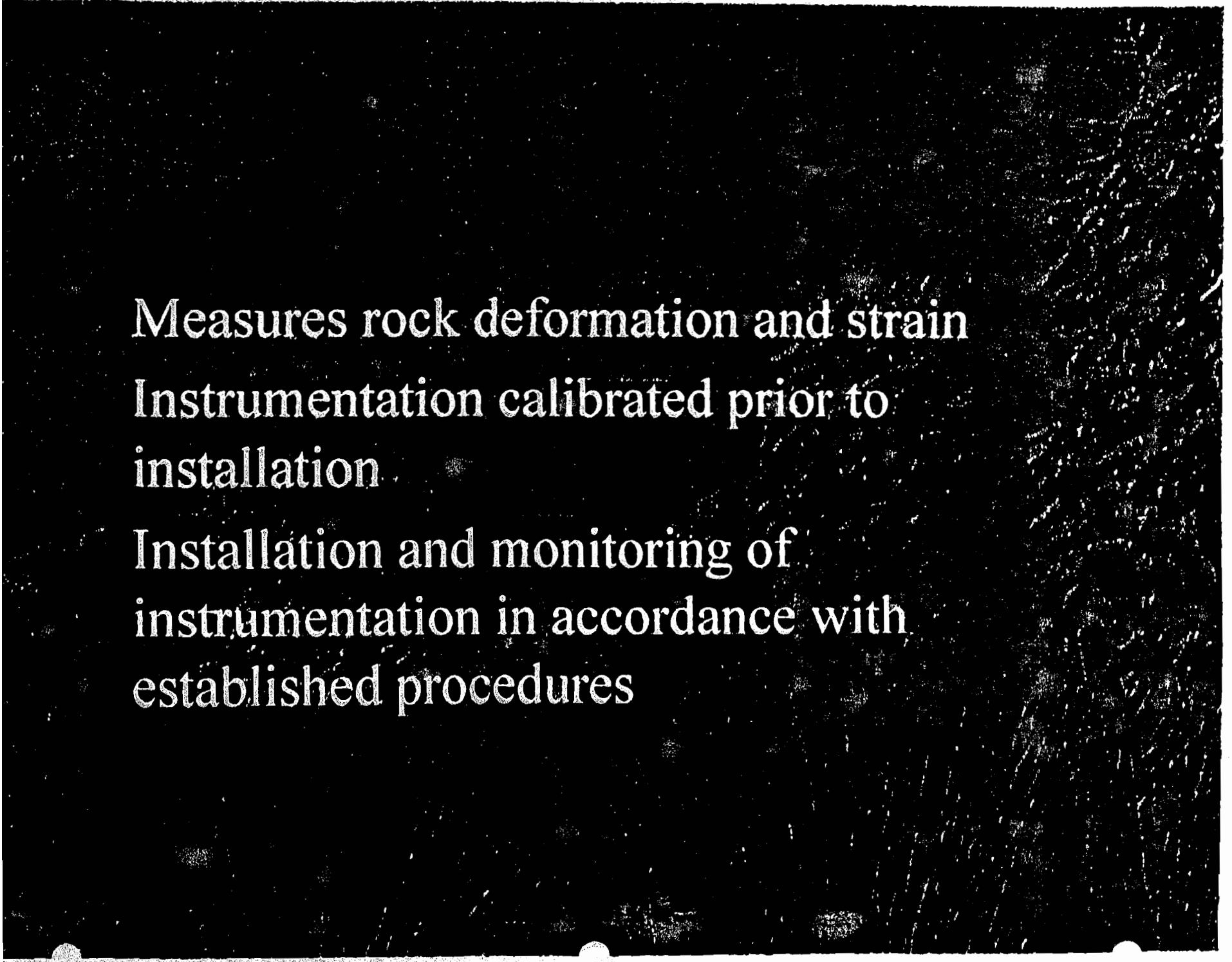

Geomechanical Monitoring Program
Geosciences Program
Ground Control Program
Rock Mechanics Program

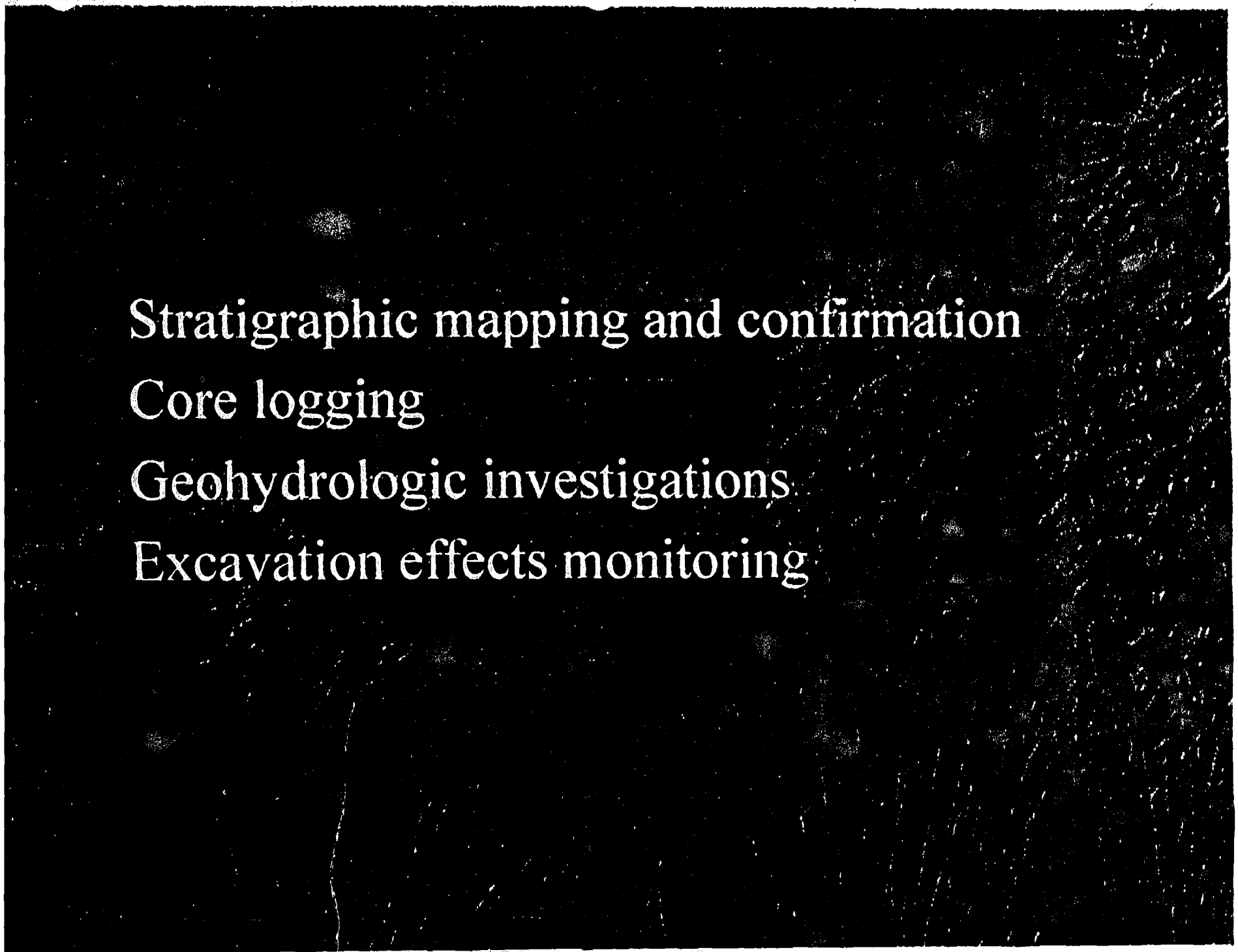
Instrumentation measures the geomechanical response of the shafts and underground openings

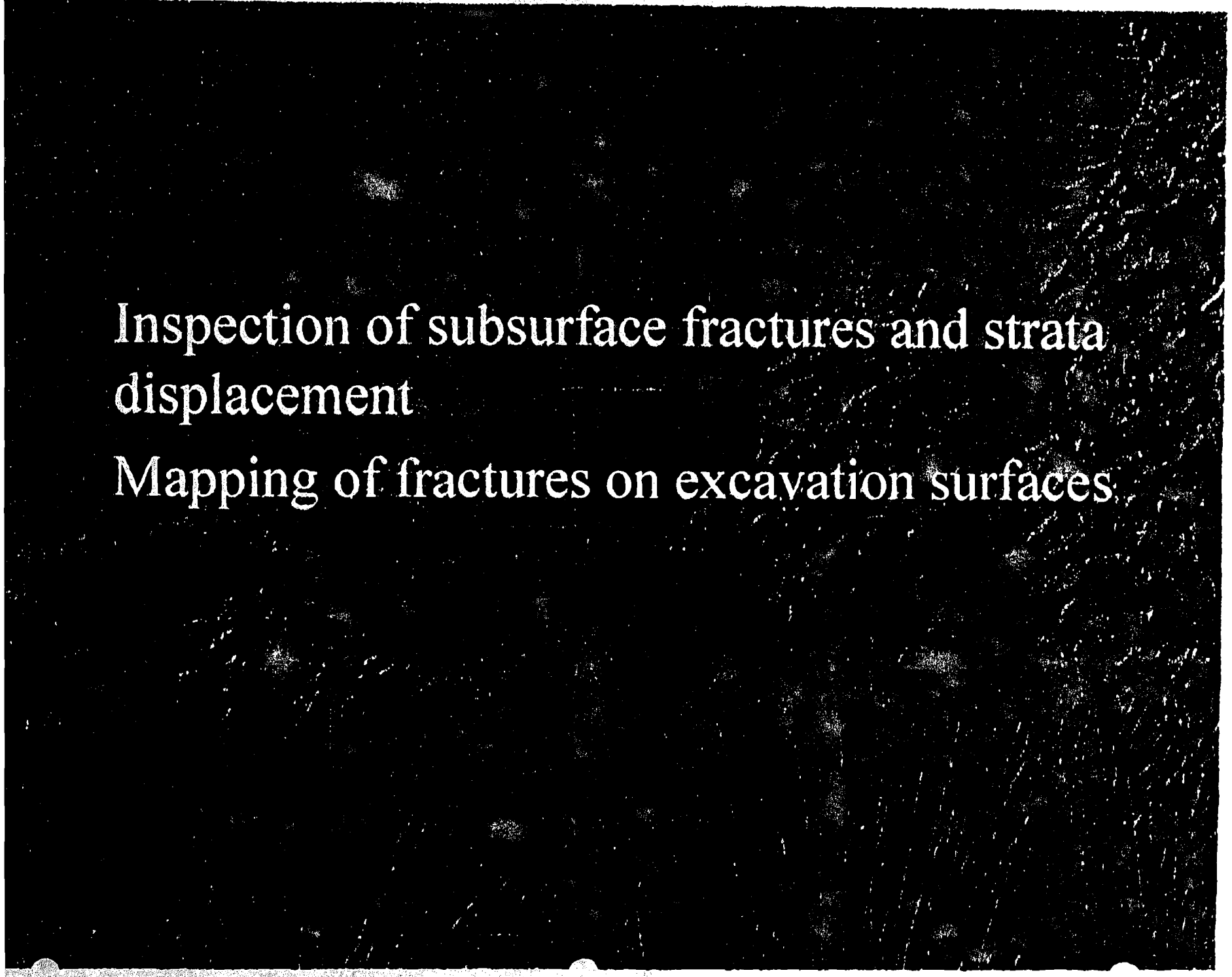
Manual or remote monitoring of instruments

Data verification prior to transfer to database

Interpretation of in-situ behavior of excavations


Measures rock deformation and strain
Instrumentation calibrated prior to installation
Installation and monitoring of instrumentation in accordance with established procedures


Stratigraphic mapping and confirmation
Core logging
Geohydrologic investigations
Excavation effects monitoring


Inspection of subsurface fractures and strata displacement
Mapping of fractures on excavation surfaces

Implement ground control support systems

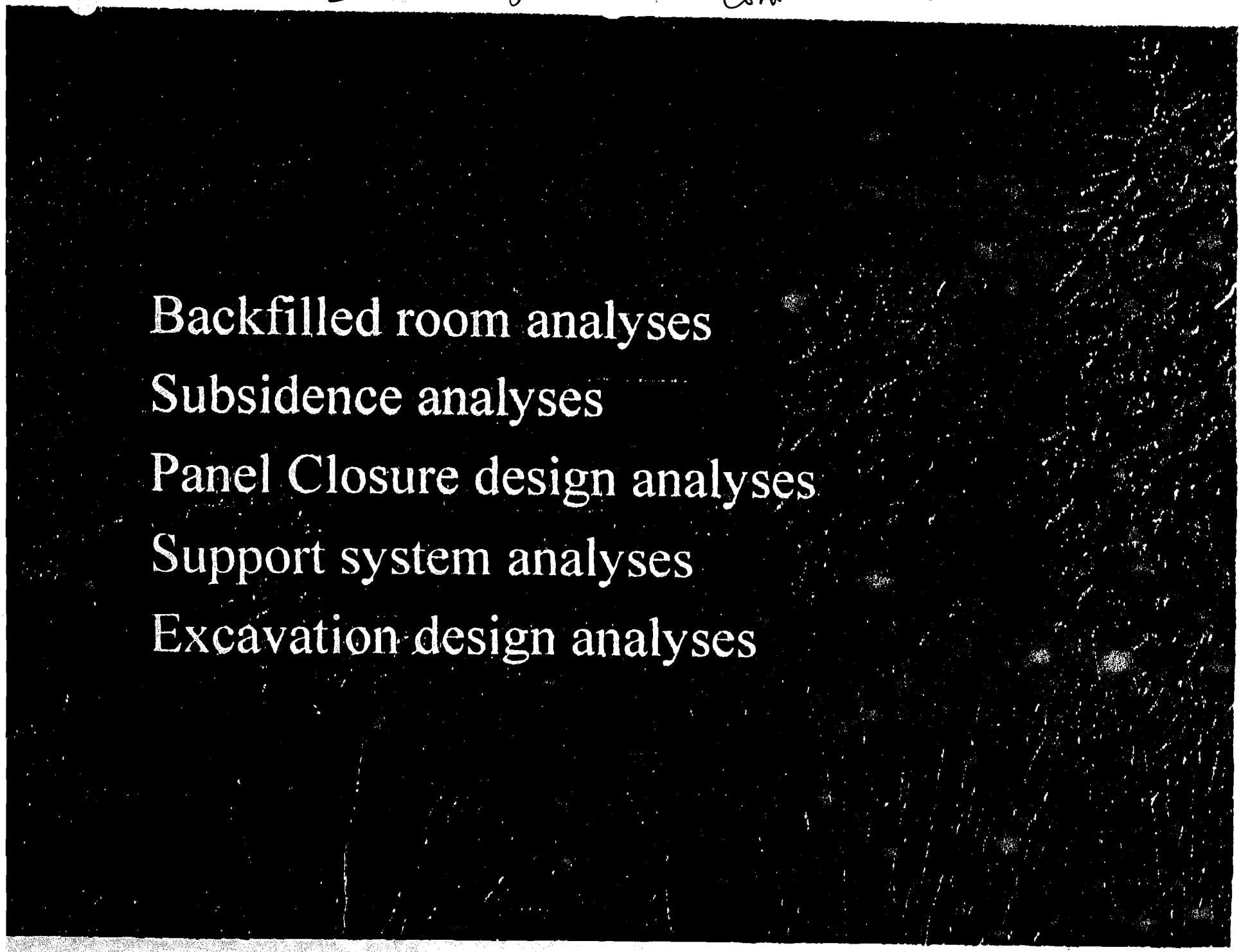
Evaluate the effect of excavation performance on effectiveness of support systems

Evaluate new ground support systems and techniques

Improve understanding of current conditions

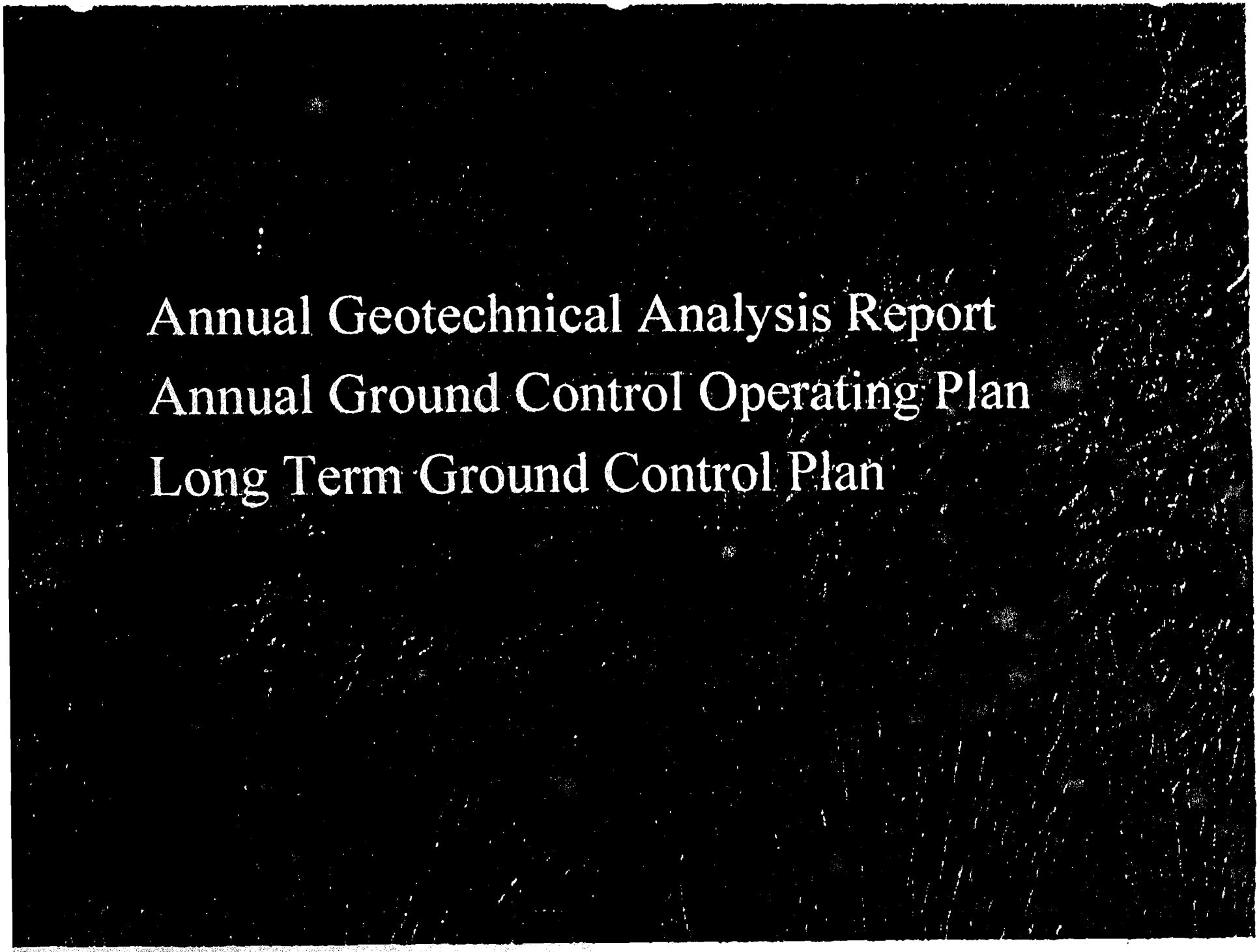
Compare design alternatives

Predict the future performance of excavations


Backfilled room analyses
Subsidence analyses
Panel Closure design analyses
Support system analyses
Excavation design analyses

Equipment and processes controlled under WP 13-1; WID Quality Assurance Program Discription

Geotechnical engineering field programs and investigations carried out in accordance with WP 7-1; Geotechnical Engineering Program Plan


Annual Geotechnical Analysis Report
Annual Ground Control Operating Plan
Long Term Ground Control Plan

Effective Date: 03/16/9

WP 07-01
Revision 2

WIPP Geotechnical Engineering Program Plan

Cognizant Section: Geotechnical Engineering

Approved By: S. J. Patchet

Cognizant Department: Engineering

Approved By: J. J. Garcia

TABLE OF CONTENTS

1.0 INTRODUCTION

This document defines the field programs and investigations to be carried out by the Waste Isolation Division (WID) Geotechnical Engineering Section. The geotechnical engineering programs are designed to provide scientific information necessary to establish a high level of understanding of site characteristics and to assess the stability and performance of the underground facility. Programs currently consist of the following activities:

- Geosciences
- Geomechanical Monitoring
- Rock Mechanics
- Ground Control

These programs will be implemented and controlled by this program plan.

1.1 Background

The programs listed in Section 2 will demonstrate the safe disposal of transuranic waste, both in the short-term (during the operational life of the facility) and in the long-term (following decommissioning), that will satisfy the appropriate federal regulations governing isolation of the waste. The data will increase confidence in the effectiveness and safety of the underground operations, validate the design, support site characterization and performance assessment activities, and support activities required for research and technological development.

Drivers for these programs include the Consultation and Cooperation Agreement with the state of New Mexico, which stipulates continuing studies of the site geology; the Environmental Protection Agency's standards for management of transuranic waste; the Resource Conservation and Recovery Act; and the Mine Safety and Health Administration. These programs implement the applicable portions of systems AUØØ and EMØØ System Design Description (SDD). The programs will also ensure that the facility operates safely and that data are available to make decisions for managing and performing engineering and operational activities.

Field activities will be organized into four programs that cover:

- Geosciences
- Data collection from geomechanical instrumentation
- Rock mechanics evaluation
- Ground control assessments

Each field program will be controlled by a program plan describing the general scope of the investigation, its methods, and quality assurance requirements.

1.2 Geosciences Program

The Geosciences Program will continue confirmation of site suitability based on field activities such as geologic mapping of the facility horizon excavations and logging of cores. These activities will be used to characterize, demonstrate the continuity of, and document the geology exposed in the underground excavations. The program also will maintain a storage facility for site-generated geologic samples and a local seismic monitoring system.

1.3 Geomechanical Monitoring Program

The Geomechanical Monitoring Program will provide data on the Waste Isolation Pilot Plant (WIPP) geotechnical performance design for design validation and the short-term and long-term behavior of underground openings, and routine evaluations of the safety and stability of excavations. Data on the stability and closure of underground excavations will be used to identify areas of potential instability and allow remedial actions to be taken.

Monitoring of geotechnical parameters will be performed using geomechanical instruments, including tape extensometer stations, convergence meters, borehole extensometers, piezometers, strain gauges, load cells, crack meters, and other instruments installed in the shafts and drifts of the WIPP facility.

1.4 Rock Mechanics Program

The Rock Mechanics Program will assess of the performance of the underground facility. Data from geomechanical monitoring and geosciences observations will be used to evaluate the current and future performance of the excavations. Numerical modeling and empirical methods will be used to evaluate the effects of proposed design changes and the long-term behavior of the underground facility.

1.5 Ground Control Program

The Ground Control Program will ensure that the underground is safe from any unexpected roof or rib falls. It will provide the experience necessary to design ground control systems for the host rock, to monitor ground control system performance through data and observations, and to allow projections to be made regarding future ground support requirements.

2.0 ADMINISTRATION

2.1 Organization

The WID organizational structure is described in the WID Quality Assurance Program Description (WP 13-1). Geotechnical Engineering reports to the Engineering Department senior manager.

2.2 Responsibilities

The Geotechnical Engineering manager and staff are responsible for achieving and maintaining quality in the geotechnical engineering programs.

2.3 Training and Qualifications

Personnel who perform specific tasks associated with geological and geotechnical data collection, engineering assessments, and quality assurance/quality control measures will be trained and qualified in the application of the specific requirements to complete their tasks. The minimum training requirements for engineering personnel are identified in the Engineering Technical Training Requirements Policy.

3.0 TECHNICAL PROGRAM DESCRIPTION

3.1 Geosciences Program

The Geosciences Program contains activities that continue confirmation of site suitability through surface and underground field investigations. These activities will generate data used in monitoring the repository and in rock mechanics studies. Information from the Geosciences Program will be used to document the existing geologic conditions and characteristics and to monitor for changes resulting from the excavations. Activities associated with this program will include geologic and fracture mapping, maintenance of a facility for the storage of geologic samples (the Core Library), seismic monitoring and evaluation, and other activities performed as needed. The program will describe the general scope of investigations, the methods, and program requirements. The plan will be updated periodically to reflect additions and changes to the program.

3.1.1 Background

The Los Medanos area has been studied since 1974 to assess site capability for isolation of radioactive waste. The present WIPP site was selected in 1976 and has been under continuous investigation since that time as a site for containment and isolation of transuranic radioactive waste. Because geology is the principal factor in the isolation of the waste from the accessible environment, the Geosciences Program provided important data for site characterization and was integral to the decision on the

design of the facility. Extensive geologic characterization of drifts and shafts was performed under the Site and Preliminary Design Validation Program for confirmation of site suitability. The program provided the basis for the decision to proceed with construction of the WIPP facility.

The Geotechnical Engineering Geosciences Program was developed to continue confirmation of site suitability based on field activities such as geologic mapping of the facility and near surface stratigraphic horizons, core logging, and geophysical surveys. These activities characterize, demonstrate the continuity of, and document the geology at the site. The program maintains a library of site-generated geologic samples and quarterly reporting of the results of local seismic monitoring. The program is also responsible for the collection of geologic and structural data and other section activities as required.

3.1.2 Purpose

The purpose of the Geosciences Program is to confirm the suitability of the site based on continuing field activities.

3.1.3 Scope

Site investigations will be performed as required, or as determined useful, for enhancement of the site geologic characterization knowledge base. Activities will include reconnaissance geologic mapping of new excavations, detailed geologic mapping, investigations of regional exposures, and geologic support to projects conducted by other site participants. The activities associated with the Geosciences Program are designed to:

- Provide additional site geological characterization based on geologic mapping of excavations and core logging
- Maintain a current data base on mineralogy, chemistry, and textural feature characteristics of the local geology
- Maintain a current level of knowledge on the geohydrology of the Salado and Rustler Formations based on geologic, hydrologic, and geochemical data
- Monitor the local seismicity using a series of surface-based seismographs. As part of this activity, analyses will be performed to determine if any correlation of seismic events with mining or petroleum recovery operations can be established

3.1.4 Methods

Routine tasks will be carried out according to approved WIPP procedures. Activities in

development or those not expected to be performed routinely will be performed in accordance with industry standards or individual program plans that supplement this program plan.

Routine Activities

- Seismic Monitoring - Seismic monitoring and evaluation will be carried out by the New Mexico Institute of Mining and Technology, a subcontractor to WID.

- Geologic Mapping - Geologic mapping will be performed in newly excavated areas and when the cognizant engineer or Geotechnical Engineering manager deems it necessary. The mapping results will be documented in the annual geotechnical analysis reports and appropriate topical reports.

  All drifts and rooms in which geologic mapping was not conducted will be visually inspected by the cognizant engineer, or designee, within three months of excavation to verify that the exposed rock units are laterally continuous and similar to those exposed in the mapped areas of the facility. Any unusual features will be reported in the annual geotechnical analysis reports.

- Fracture Mapping - Fracture mapping will be performed and carried out by the cognizant engineer, designee, or Geotechnical Engineering manager at locations selected in accordance with accepted industry practice. Observations from boreholes and excavated surfaces will be used in performance assessments of the underground facility.

- Core Library Operations - Geotechnical Engineering will maintain a repository for geologic samples that have been determined necessary for long-term storage. Approved WIPP procedures define the proper methods for maintaining the sample repository, the submittal of core to the Core Library, maintenance of the Core Storage Facility (inventory, handling, and distribution), authorization for access to view the core on-site, and authorization to remove samples from the library.

Other Activities of the Geosciences Program

Test plans will be developed for geoscience activities that are in a developmental stage or are not routinely performed. They will include or reference the appropriate procedures to ensure that all necessary steps for completion are carried out. The plans will detail specific plans that describe the activity, location, procedure, etc.

3.2 Geomechanical Monitoring Program

The Geomechanical Monitoring Program will monitor the geomechanical response of the underground openings after mining. It will also monitor geotechnical instruments

installed in the shafts and drifts of the WIPP facility. Geotechnical instrumentation installed in the shafts and underground includes tape extensometer points, convergence meters, borehole extensometers, piezometers, strain gages, load cells, and crack meters. The instrumentation is sensitive enough to detect small changes in rock displacements and rock stresses.

Information generated by this program will be documented in annual geotechnical analysis reports. The data will be documented more frequently as recommended by the cognizant engineer or manager. An assessment of convergence measurements and geotechnical observations will be made after each round of measurements. The results of this assessment will be distributed to affected underground operations, engineering, and safety managers.

This plan describes the general scope of the investigation, methods, and program requirements, and will be updated periodically to reflect additions and changes.

3.2.1 Background

The instrumentation system has provided data on the performance of the WIPP design for design validation and for projecting the long-term behavior of the underground openings, and routine evaluation of safety and excavation stability. From an operational standpoint, the geomechanical data allow the identification of areas of potential instability and for remedial action to be taken. To determine the long-term behavior of the repository, assessments will rely heavily on the extrapolation of in-situ data, taken over a period of years, to predict thousands of years of repository performance.

The engineering performance of the WIPP host rock is important in the assessment of the design of the operating facility and its long-term performance. Of significance are the time-dependent properties of the salt. Sandia National Laboratories has carried out extensive experimental work to establish an appropriate, constitutive relationship for salt that can predict its in-situ mechanical performance. To validate the adequacy of the facility design, field data from geomechanical instrumentation are used to determine actual mechanical performance of the shafts and excavations at the facility horizon.

3.2.2 Purpose

The purpose of the Geomechanical Monitoring Program is to determine the geomechanical performance of the underground excavations at WIPP. Data on stability and closure are needed for operational considerations and for performance assessment.

3.2.3 Scope

The activities associated with the Geotechnical Monitoring Program are designed to:

- Maintain and augment the geotechnical instrumentation system in the WIPP underground and upgrade the automatic data acquisition system as necessary
- Monitor geotechnical instrumentation on a regular basis and maintain a current data base of instrument readings
- Evaluate the geotechnical instrumentation data and prepare regular reports that document the data and analyses describing the stability and performance of underground openings
- Recommend corrective or preventive measures to ensure excavation stability and safe operation of the facility

3.2.4 Methods

The process by which geomechanical monitoring of an area is initiated may vary as part of operational excavation monitoring or research testing. Proper documentation and analysis is common to all. Installation and monitoring of the instruments will be governed by approved WIPP procedures. The instrumentation will be monitored remotely using data loggers or read manually. Routine tasks will be carried out according to approved WIPP procedures. Activities which are in development, or which are not expected to be performed routinely, will be performed in accordance with industry standards or individual program plans that supplement this program plan.

Data Acquisition

The remotely polled instruments are connected to a surface computer through a system of cables, termination boxes, and data loggers. The manually read instruments will be monitored using electronic read-out boxes and mechanical measuring devices. The data will be collected on a quarterly basis at a minimum, but more frequent readings may be collected as determined by the cognizant engineer or manager.

Geomechanical Data Logging System

The system consists of surface computers, modems, data loggers, and associated interconnecting cabling. The instrumentation is routed to local termination cabinets or accessor boxes at various locations in the underground. These contain the electronic hardware needed for multiplexing, signal conditioning, data conversion, and communicating with the surface computers, which are connected by a dedicated communications data link cable. The surface computers communicate through modems using a series of communication and data management software programs. The data from the instruments will be maintained in individual data bases for each instrument type.

Instrumentation

The instrumentation used at WIPP is widely accepted in the geotechnical and mining industry. Geomechanical instrumentation installed in the shafts and underground includes tape extensometer points, convergence meters, borehole extensometers, rockbolt load cells, pressure cells, crack meters, strain gauges, and piezometers. The instrumentation is sensitive to small changes in rock displacement and stress. The geomechanical instruments will be installed and monitored in accordance with approved procedures or written instructions. Instrument types, monitoring usage, and typical installation locations are listed in the following table.

GEOMECHANICAL MONITORING INSTRUMENTATION		
INSTRUMENT TYPE	**MONITORING USAGE**	**TYPICAL LOCATION**
Tape Extensometer	Manual monitoring of roof-to-floor closure and rib-to-rib closure	Shaft stations, access drifts, and disposal panels
Convergence Meter	Manual or remote monitoring of roof-to-floor closure and rib-to-rib closure	Areas of restricted access or with limited vehicular traffic
Multiple Point Borehole Extensometers	Fracture separation in the rock strata and deformation of the rock mass into the excavation	Shafts, shaft stations, access drifts, and disposal panels
Rockbolt Load Cells	Tensile loads in rockbolts	Selected roof support systems
Earth Pressure Cells	Pressure of the rock creep on the concrete shaft key and on selected roof support systems	Salt Handling Shaft, Waste Shaft, Exhaust Shaft and selected roof support components
Crack Meters	Displacement of a fracture or separation in the rock or between two anchorage points	Shaft brows and selected cable roof support components
Strain Gauges	Deformation of engineered materials (the shaft concrete liner and key and installed rock bolts) due to rock creep	Salt Handling Shaft, Waste Shaft, Exhaust Shaft, and selected roof support components
Piezometers	Groundwater (hydrostatic) pressure behind the shaft liners and keys	Salt Handling Shaft, Waste Shaft and Exhaust Shaft

Data Analysis and Dissemination of Data

The frequency of analyses of geomechanical data will be based on the requirements established in design documents and regulatory requirements, and as determined by the geomechanical instrumentation cognizant engineer. A comprehensive analysis of the data will be performed annually. Results of the analyses will be published in geotechnical analysis reports. Data may be released to external sources more

frequently with consent from the Department of Energy.

Assessments of the convergence measurements and other geotechnical observations will be performed after each round of complete measurements. Results will be distributed to affected underground operations, engineering, and safety groups. Data analyses may be performed on a more frequent basis, as recommended by the cognizant engineer or manager.

Calibration

Measurement and data collection equipment used to read the geotechnical instruments will be calibrated in accordance with approved WIPP procedures. Frequency of calibration will be based on manufacturer recommendations upon receipt of the measuring device at the WIPP site, or as determined by the cognizant engineer. Calibration records will be kept on file in Geotechnical Engineering.

Routine Activities

Maintenance will be performed as needed. When an instrument is damaged or erroneous readings are suspected, the instrument will be physically inspected and evaluated for repairs or replacement. If repair efforts are unsuccessful, that instrument will be documented as malfunctioning and monitoring discontinued until the instrument has been replaced or abandoned.

Inspections of the instrumentation and data logging components will be performed during monitoring activities. These inspections check the physical condition of the instrumentation, junction boxes, and cabling for damage, corrosion, and loose parts. Any unusual observations or deterioration will be documented on the Geotechnical Instrumentation System field data sheets and the cognizant engineer will be notified of existing conditions.

The inspection results and performance of the instrumentation and data logging components will be evaluated by comparing the monitoring results against previous readings. These evaluations will be used to determine whether the geomechanical instrumentation and data acquisition system are performing as anticipated.

Other Activities of the Geomechanical Monitoring Program

Test plans will be developed for geomechanical monitoring activities that are either in a developmental stage or not routinely performed. These plans will include or reference the appropriate procedures to ensure that all necessary steps to complete the activity are carried out and will detail specific plans that describe instrument characteristics, locations, procedures, etc. These activities may include the installation and monitoring of new instrument types to evaluate their adequacy for use in salt. Changes to the remote monitoring equipment and software routines will be documented in accordance with approved WIPP procedures.

3.3 Rock Mechanics Program

This program assesses the current and future performance of the underground facility. Its statistical and empirical data methods and numerical modeling codes, modified for use in salt rock, provide the process for analyzing data collected from geotechnical instruments and visual observations. The results follow approved WIPP procedures and will be published in annual geotechnical analysis reports, or more frequently as recommended by the cognizant engineer or manager.

This program plan describes the general scope, methods, and program requirements of investigations and will be updated periodically to reflect additions and changes.

3.3.1 Background

The Rock Mechanics Program assesses of the performance of the WIPP design for design validation and for projecting the long-term behavior of the underground openings and routine evaluation of safety and excavation stability. From an operational standpoint, these assessments will allow the identification of areas of potential instability and the application of remedial actions, if necessary. To validate the adequacy of the facility design, field data from geomechanical instrumentation will be used to determine actual mechanical performance of the shafts and excavations at the facility horizon.

Analytical methods, such as numerical modeling, will be used to determine the potential effects of mining new excavations, excavation sequence, and long-term behavior of the repository. The engineering performance of the WIPP host rock is important to assess the design of the operating facility and its long-term performance. Of significance are the time-dependent properties of the salt. Extensive experimental work and observations have been used to establish an appropriate, constitutive relationship for salt that is used to predict its in-situ mechanical performance. These assessments will rely heavily on the extrapolation of in-situ instrumentation data and field observations.

3.3.2 Purpose

The Rock Mechanics Program provides the capability to assess the geomechanical response of the surface and underground facility due to mining of the underground.

3.3.3 Scope

The activities associated with the Rock Mechanics Program are designed to:

- Assess the geotechnical performance of the underground excavations
- Assess the effectiveness of support systems installed to control areas of potentially unstable ground
- Assess the appropriateness of the current mine design and periodically evaluate the criteria
- Provide geotechnical recommendations for the development of mine design criteria based on analytical assessment of the performance of the existing excavations and from modeling of proposed design changes
- Project excavation performance based on new mining, ground control activities, and facility aging
- Predict the performance of underground excavations based on instrumentation data and supplemented by analytical studies
- Maintain a library of numerical modeling codes that include the state-of-the-art understanding of salt rock mechanics
- Provide recommendations or corrective/preventive measures to underground operations personnel based on the performance and expected usage of the underground facility

3.3.4 Methods

The processes by which rock mechanics activities are completed may vary. Evaluation of the geomechanical performance of the underground openings will use numerical analysis techniques commonly used in the mining and civil engineering industries. The use of these techniques will be governed by WIPP approved procedures for engineering calculations and computer software control.

Routine Activities

The following are routine activities of the Rock Mechanics Program:

- Geomechanical Data Assessment - Assessments of the instrument data and geologic observations will be performed periodically and reported in the annual geotechnical analysis reports and other more frequent topical reports. Complete data analyses will be performed at least once a year. The frequency of data analyses will be based on the geotechnical performance of the excavations and their operational use. The geotechnical data will be evaluated to determine whether conditions exist which warrant closer or, possibly, immediate attention from a ground control standpoint. Geotechnical assessments measure the stability of the openings with respect to operational safety and long-term performance.

- Support System Performance Evaluation - New support system technologies will be evaluated as they become available and will be used as they are proven. Several test sections of support systems have been installed and are being monitored. These systems are instrumented to monitor the performance of the system components. This instrumentation, in conjunction with nearby geomechanical instrumentation, allows assessments of the effectiveness of the support system to be performed.

- Numerical Modeling - Material modeling codes estimate of the performance of the salt rock material based on the material properties and loading conditions provided to the model. These models can be used to determine the potential effects of mining new excavations on the facility or the long-term effect of an excavation on nearby openings. The accuracy of the models can be improved by modifying the code to more accurately represent the actual physical conditions. These modifications may include mesh refinement and the use of input data that more accurately describe the physical properties of the host rock.

Other Activities of the Rock Mechanics Program

Test plans will be developed for rock mechanics activities that are in a developmental stage or are not routinely performed. These plans will include or reference the appropriate procedures to ensure that all necessary steps to complete the activity are carried out and will detail specific plans that describe the activity, location, procedure, etc.

These activities may include investigations of the geomechanical effect of new mining and mine design changes on the performance of the underground facility and subsidence effects. These investigations may require numerical modeling, materials laboratory testing, and field observations. The results will be used to incorporate the latest understanding of the host rock properties into the modeling codes and analytical techniques.

3.4 Ground Control Program

The Ground Control Program provides comprehensive evaluation of the ground conditions and effectiveness of installed support systems throughout the facility. The evaluations will be based on visual observations, analyses of geomechanical instrumentation data, fracture data acquired from observation boreholes, and rockbolt failure data. The design of new support systems will be based on the results of these evaluations.

Ground control issues have been addressed since excavation began at WIPP. Initially only minor spalls were observed. However, as the excavations aged and issues associated with the roof beam began to develop, most of the facility was pattern-bolted with mechanical anchor rockbolts. Because these bolts provide a basically rigid support system, they have a finite life and supplemental systems are required in areas scheduled for decades of use. The support systems must maintain many areas of the underground accessible for the projected life of the facility.

The information generated by this program will be documented in annual assessment reports. Assessment of the performance of the installed ground support systems are performed as recommended by the cognizant engineer or manager. The results of these assessments will be distributed to affected underground operations, engineering, and safety manager sections.

This program plan describes the general scope of the ground control activities, methods, and program requirements, and will be updated periodically to reflect additions and changes to the program.

3.4.1 Background

The operating life of sections of the underground facility may extend to approximately fifty years from the date of excavation. Over time, the strains associated with stress conditions around the excavation result in degradation of the surrounding rock. Safety concerns associated with deterioration of the roof necessitate monitoring, maintenance, and ground control mechanisms to ensure safe working conditions. Roof support systems are currently in place throughout the facility; however, because of creep closure, they may undergo severe stress, have a limited service life, and require periodic replacement.

Many options are currently available for ground control in the mining industry. Technologies used in potash and salt mines are the most applicable to WIPP because of the similar behavior of the rock. A comprehensive testing and evaluation program has been used to determine which ground support components and/or systems are most applicable to specific project requirements. This program consists of many aspects that include continuous visual inspections of the underground opening, extensive geomechanical monitoring, numerical modeling, analysis of rockbolt failures, implementation of ground control procedures, and comprehensive in-situ and laboratory testing, and evaluation of ground support components and systems.

The excavations vary in geometry, geology, age, and operational use. These differences affect the selection of ground control measures, but the ability of the salt to creep or flow with time has the greatest impact on selection of support systems. Salt creep exerts strong forces, both vertical and horizontal, on any control mechanism. During the time that the underground has been active, a variety of ground control issues have been encountered ranging from minor spalling to roof falls.

3.4.2 Purpose

The Ground Control Program provides the strategies for development and selection of the most applicable and efficient means of maintaining and monitoring the ground conditions of the WIPP underground to ensure safe and operational conditions. The selection of ground control fixtures is in accordance with 30 CFR □ 57, Subpart B, "Ground Control."

3.4.3 Scope

The program is continually evolving. Current associated activities include:

- Addressing ground control concerns and design and implementation of ground support systems on a case-by-case basis
- Installing and monitoring of small-scale and full-scale in-situ support systems for evaluation
- Identifying and/or developing new ground control technologies that have application to WIPP conditions
- Documenting and evaluating ground support system component failure
- Evaluating the effects of new mining and mine design changes on the effectiveness of installed ground support systems, proposed installations, and the stability of the excavation

3.4.4 Methods

Thorough evaluations of the ground conditions and support system performance throughout the facility will be performed annually. Some areas may be evaluated more frequently as conditions warrant. These evaluations will provide information necessary to address the near-term ground control needs and for long-term ground control planning.

Three basic options are available to address unstable ground conditions: (1) support

the ground, (2) remove the ground, or (3) discontinue access. The first two options are engineering alternatives while the third option is an administrative decision. The ground control design criteria are based on long-term objectives, experience, performance of existing systems, laboratory and in-situ tests of selected ground control components and/or systems, numerical analysis, and site-specific geotechnical data. These criteria may be modified to accommodate technological advances, geologic conditions, or operational requirements.

Routine Activities

Ground support systems will be installed in accordance with approved written instructions. Monitoring of the geotechnical instruments that monitor the performance of the support systems will be performed routinely and carried out according to approved WIPP procedures.

Other Activities of the Ground Control Program

Activities which are in development, or which are not expected to be performed routinely, will be performed in accordance with industry standards or individual program plans that supplement this program plan.

4.0 QUALITY ASSURANCE

The WIPP Geotechnical Engineering programs are governed by the WID Quality Assurance Program Description. Steps to ensure quality will be incorporated, as needed, in the technical procedures used for geotechnical engineering activities. The Geotechnical Engineering manger, or assigned designee, is responsible for developing and maintaining this program plan and associated procedures.

4.1 Design Control

Items and processes will be designed using sound engineering/scientific principles and appropriate standards. Design work, including changes, will incorporate appropriate requirements such as general design criteria and design basis. Design interfaces will be identified and controlled. The adequacy of products will be verified by individuals or groups other than those who performed the work. Verification work will be completed before approval and implementation of the design.

4.2 Procurement

Procurement will be carried out in accordance with the appropriate policies and procedures. Technical requirements and services will be developed and specified in procurement documents. If deemed necessary, these documents will require suppliers to have an adequate quality assurance program to ensure that required characteristics are attained.

4.3 Instructions, Procedures and Drawings

Quality-affecting activities performed by, or on behalf of, the geotechnical engineering programs will be performed in accordance with written plans or approved procedures. WIPP general procedures will be used for procurement, document control, and quality assurance.

Technical procedures will be developed for routine quality-affecting functions. The procedures will include in-process and final quality controls and documentation requirements. The procedures will be as detailed as required and include, when applicable, quantitative or qualitative acceptance criteria to determine that activities have been satisfactorily accomplished. Procedures will be developed in accordance with existing WIPP procedures.

4.4 Document Control

Documents that prescribe processes, specify requirements, or establish design will be prepared, approved, issued, and controlled. Controls will ensure that the latest approved versions of procedures are used in performing geotechnical functions, and that obsolete materials are removed from work areas. The Geotechnical Engineering manager will identify the individuals responsible for the preparation, review, and approval of geotechnical engineering controlled documents.

4.5 Control of Purchased Material, Equipment, and Services

Measures will be taken, in accordance with current WIPP procurement policies and procedures, to ensure that procured items and services conform to specified requirements. These measures will generally include one or more of the following:

- Evaluation of the supplier's capability to provide items or services, in accordance with requirements, including the previous record in providing similar products or services satisfactorily
- Evaluation of objective evidence of conformance, such as supplier submittals
- Examination and testing of items or services upon delivery

If it is determined that additional measures are required to ensure quality in a specific procurement, additional steps may be included in procurement documents and implemented by Geotechnical Engineering personnel and/or the Quality and Regulatory Assurance Department. These additional assurances may include source inspection and audits or surveillance at the suppliers' facilities.

4.6 Identification and Control of Items

Measures will be used to ensure that only correct and accepted items are used at WIPP. All items that potentially affect the quality of the geotechnical engineering programs will be identified and controlled to ensure traceability and prevent the use of incorrect or defective items.

4.7 Test Control

Testing or experimental/monitoring activities will be in accordance with written plans or procedures that contain the following provisions, as applicable:

- Purpose, scope and/or definition
- Prerequisites such as calibrated instrumentation and supporting data; adequate test equipment and instrumentation, including accuracy requirements; completeness of item to be tested; suitable and controlled environmental conditions; and provisions for data collection and storage
- Instructions for performing the test
- Any mandatory inspection and/or hold points to be witnessed by WID or other designated representatives
- Acceptance and rejection criteria
- Methods of documenting or recording test data
- Requirements for qualified personnel
- Evaluation of test results by authorized personnel

Test or experimental/monitoring procedures prepared by other project participants (e.g., Sandia National Laboratories) used as WID procurement documents will be reviewed to ensure that the documents are complete and the tests described by the documents are adequate to determine that the involved equipment, systems, or structures are operationally acceptable.

4.8 Software Requirements

Computer program procurement, design, and testing activities that effect quality-related activities performed by WID or its suppliers will be accomplished in accordance with approved procedures (WP 16-1, WIPP Computer Protection Plan).

Test requirements and acceptance criteria will be specified, documented, and reviewed and will be based upon applicable software requirement, design, or other pertinent technical documents. Required tests, including verification, hardware integration, and in-use tests, will be controlled.

Testing of software will, at a minimum, verify the capability of the computer program to produce valid results for test problems encompassing the range of permitted usage defined by the program documentation. Testing will also be designed to identify and eliminate any serious defect that could, for example, cause a crash.

Depending on the complexity of the computer program being tested, requirements may range from a single test of the completed computer program to a series of tests performed at various stages of computer program development to verify correct translation between stages and proper working of individual modules. This will be followed by an overall computer program test.

Any software to be developed on site (by WID personnel or others) (i.e., noncommercial software) will follow the requirements of NQA-2.7, and shall include, at a minimum, a requirements document, a design document, a validation and verification plan, a software quality assurance plan, a testing plan and procedures, a configuration management plan, and appropriate user manuals. These will be reviewed and approved by appropriate WID personnel.

Regardless of the number of stages of testing performed, verification testing and validation will be of sufficient scope and depth to establish that software functional test requirements are satisfied and that the software produces a valid result for its intended function.

4.9 Control of Monitoring and Data Collection Equipment

Monitoring and data collection equipment will be controlled and calibrated in accordance with applicable WIPP controlled procedures. Results of calibrations, maintenance, and repair will be documented. Calibration records will identify the reference standard and the relationship to national standards or nationally accepted measurement systems.

Calibration reports and operability test data will be maintained by Geotechnical Engineering. Any out-of-tolerance condition will be evaluated for potential impact on the validity of data. Impact evaluation and corrective actions will be initiated per specific Geotechnical Engineering instructions.

4.10 Handling, Storage, and Shipping

Handling, storage, and shipping of items will be coordinated in accordance with established procedures or other specific documents. Geotechnical Engineering is responsible for storing, handling, and shipping rock core and other geologic samples.

4.11 Control of Nonconforming Conditions/Items

Conditions adverse to quality will be documented and classified in regard to their significance. Corrective action will be taken accordingly.

Equipment that does not conform to specified requirements will be controlled to prevent its use. Faulty items will be tagged and segregated. Repaired equipment will be subject to the original acceptance inspections and tests prior to use.

4.12 Corrective Actions

Conditions adverse to acceptable quality will be documented and reported in accordance with corrective action procedures and corrected as soon as practical. Immediate action will be taken to control work, and its results, performed under conditions adverse to acceptable quality in order to prevent degradation in quality.

The Geotechnical Engineering manager, or designee, will investigate any deficiencies in activities in accordance with approved procedures.

4.13 Records Management

Identification, preparation, collection, storage, maintenance, disposition, and permanent storage of records will be in accordance with approved WIPP procedures.

Generation of records will accurately reflect completed work and facility conditions and will comply with statutory or contractual requirements. The Geotechnical Engineering Records and Inventory and Disposition Schedule describes the classification and disposition for all records generated by the group. While in their custody, the records will be protected from loss and damage in accordance with approved WIPP procedures and they will coordinate with Project Records Services (PRS) for transfer of quality records to PRS. They are also responsible for the Core Library in the Core Storage Building where records will be maintained of all Core Library activities, including additions, removal of any material, any tests performed on the core, a record of people who examine the core on site, and any other alterations made to the core.

4.14 Audits and Independent Assessments

Planned periodic assessments will be conducted to measure management and item

quality and process effectiveness, and to promote improvement. The organization performing independent assessments will have sufficient authority and freedom to carry out its responsibilities. Persons conducting assessments will be technically qualified and knowledgeable of the items and processes to be assessed.

4.15 Data Reduction and Verification

Computer programs, commercial data processing applications, and manual calculations that collect or manipulate/reduce data will be verified. Verification must be performed before the presentation of final results or their use in subsequent activities. If it becomes necessary to present or use unchecked results, transmittals and subsequent calculations will be marked "preliminary" until such time that the results are verified and determined to be correct.

5.0 REFERENCES

Title 30 CFR □ 57, Subpart B, "Ground Control"
Title 40 CFR □ 194, Section 42, "Monitoring"
WP 13-1, Quality Assurance Program Description
WP 16-1, WIPP Computer Protection Plan

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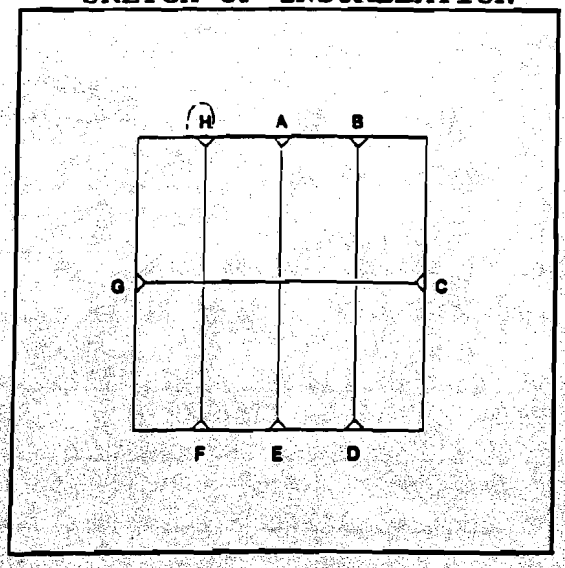

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CHECK DATE 4/20/99

COMMENTS

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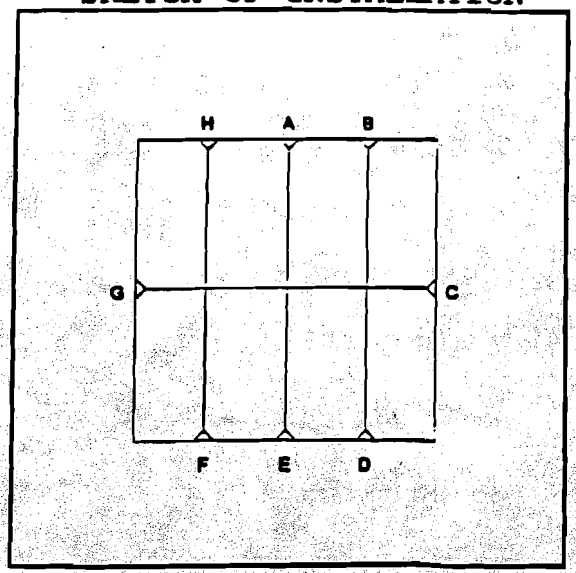

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CHECK DATE 4/20/99

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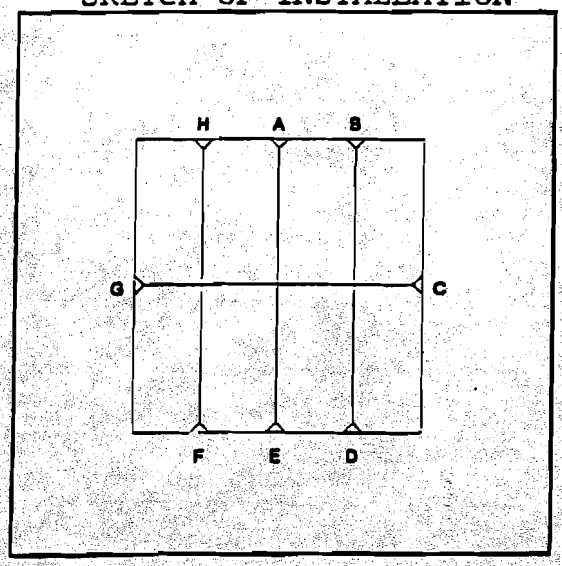

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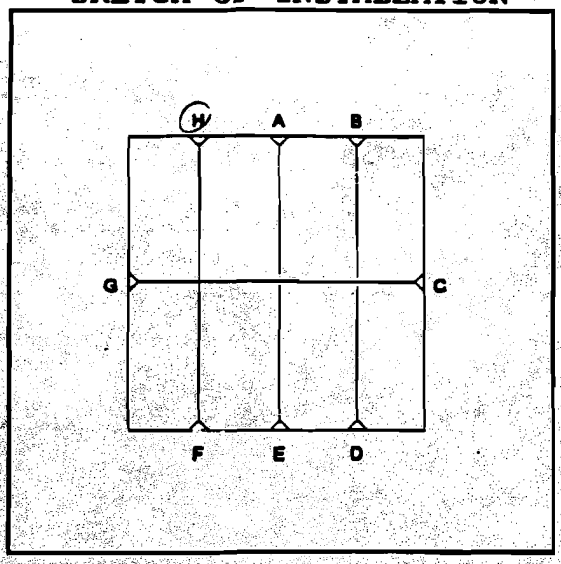

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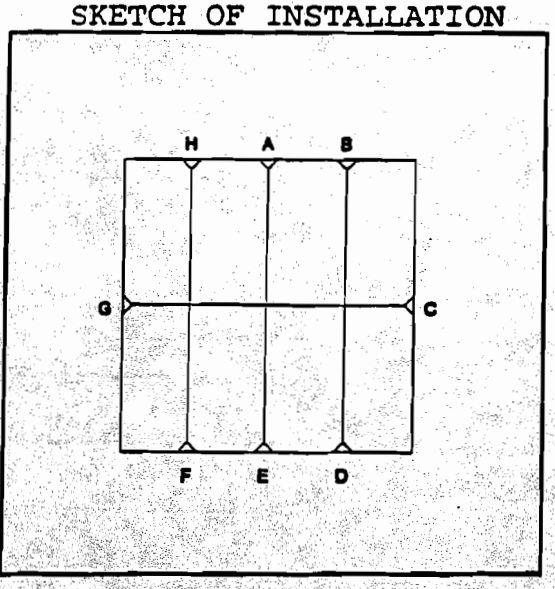

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	C-G	30'4" ± 0.368	16735
	H-F	11'4" ± 1.662	16734

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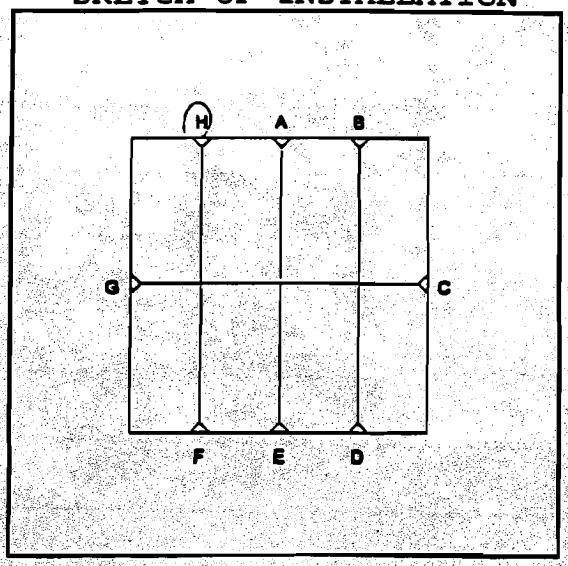

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Time: 9:13 AM Records Printed: 104 Checked By

DOE/WIPP 98-3118

Geotechnical Analysis Report for July 1996 – June 1997

September 1998

Waste Isolation Pilot Plant

Table of Contents

1.0 Introduction

This Geotechnical Analysis Report (GAR) interprets and presents the geotechnical data from the underground excavations at the Waste Isolation Pilot Plant (WIPP). The data, used to characterize conditions, assess design assumptions, and clarify and evaluate the performance of the underground excavations during operations, are obtained as part of a regular monitoring program.

GARs have been available to the public since 1983. During the Site and Preliminary Design Validation (SPDV) Program, the architect/engineer for the project produced these reports on a quarterly basis to document the geomechanical performance during and immediately after construction of the underground facility. Since the completion of the construction phase of the project in 1987, the reports have been prepared annually by the management and operating contractor for the facility. This report describes the performance and conditions of selected areas from July 1, 1996, to June 30, 1997. This report is formatted into nine chapters. The remainder of Chapter 1.0 provides background information on the WIPP site, its mission, and the purpose and scope of the geomechanical monitoring program. Chapter 2.0 describes the local and regional geology of the WIPP site. Chapters 3.0 and 4.0 describe the geomechanical instrumentation located in the facility shafts and shaft stations and the results of the monitoring and interpretation of this instrumentation. Chapters 5.0, 6.0, and 7.0 present the results of geomechanical instrumentation monitoring in the three main portions of the WIPP underground facility; the Northern Experimental Area, the access drifts, and the Waste Disposal Area. Chapter 8.0 discusses the activities included in the Geosciences Program, which includes geologic core mapping, fracture mapping, and borehole observations. The final chapter, Chapter 9.0, summarizes the results of the geomechanical instrumentation monitoring and compares the current excavation performance to the system design requirements.

1.1 Location and Description

The WIPP is located in southeastern New Mexico, 42 kilometers (km) (26 miles) east of Carlsbad (Figure 1-1). The surface facilities were built on the flat to gently rolling hills that are characteristic of the Los Medaños area. The underground facility is being excavated approximately 655 meters (m) (2,150 feet [ft]) beneath the surface, in the Salado Formation. Figure 1-2 shows a plan view of the underground facility at the WIPP site as it is currently.

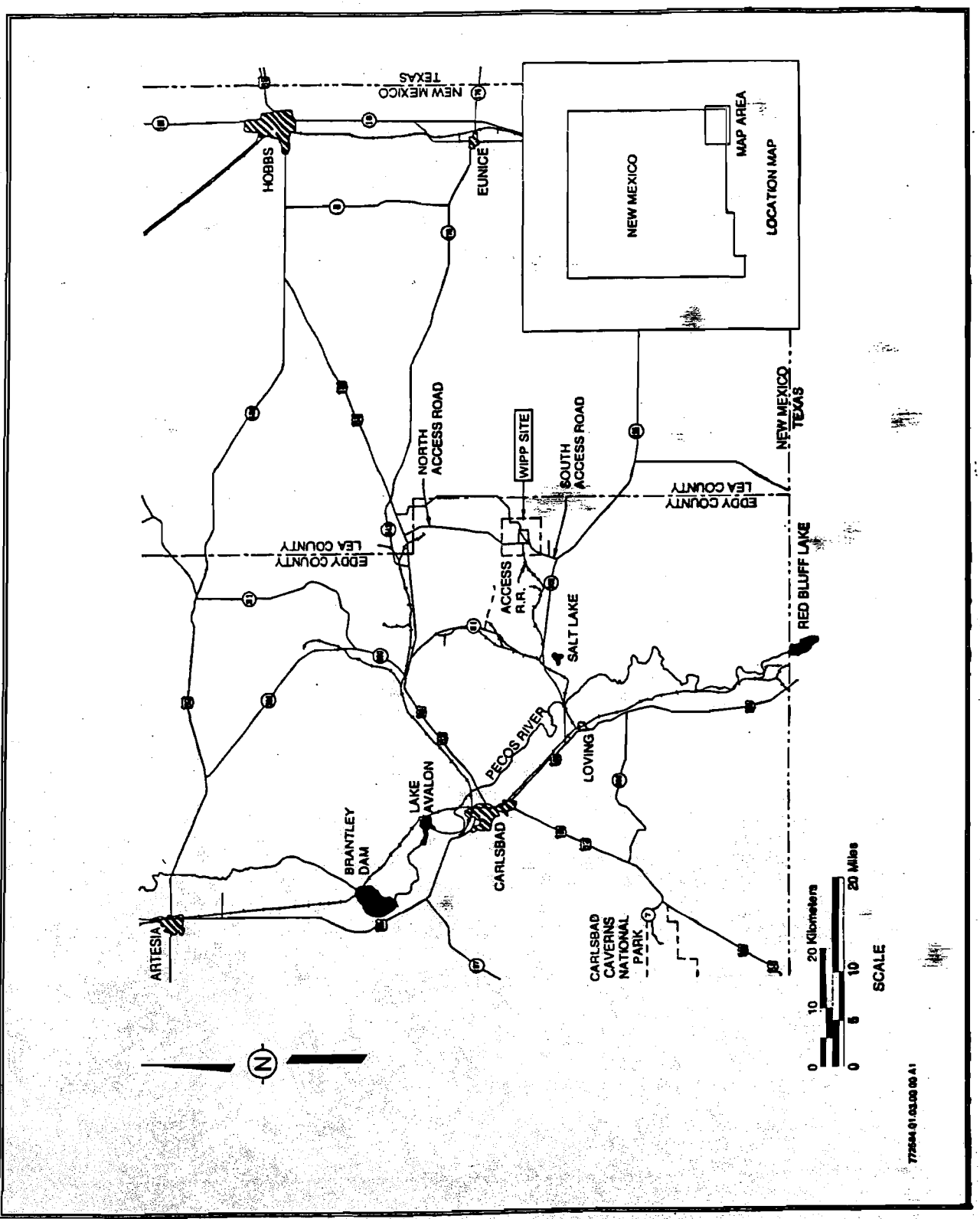


Figure 1-1
General Location of the WIPP Facility

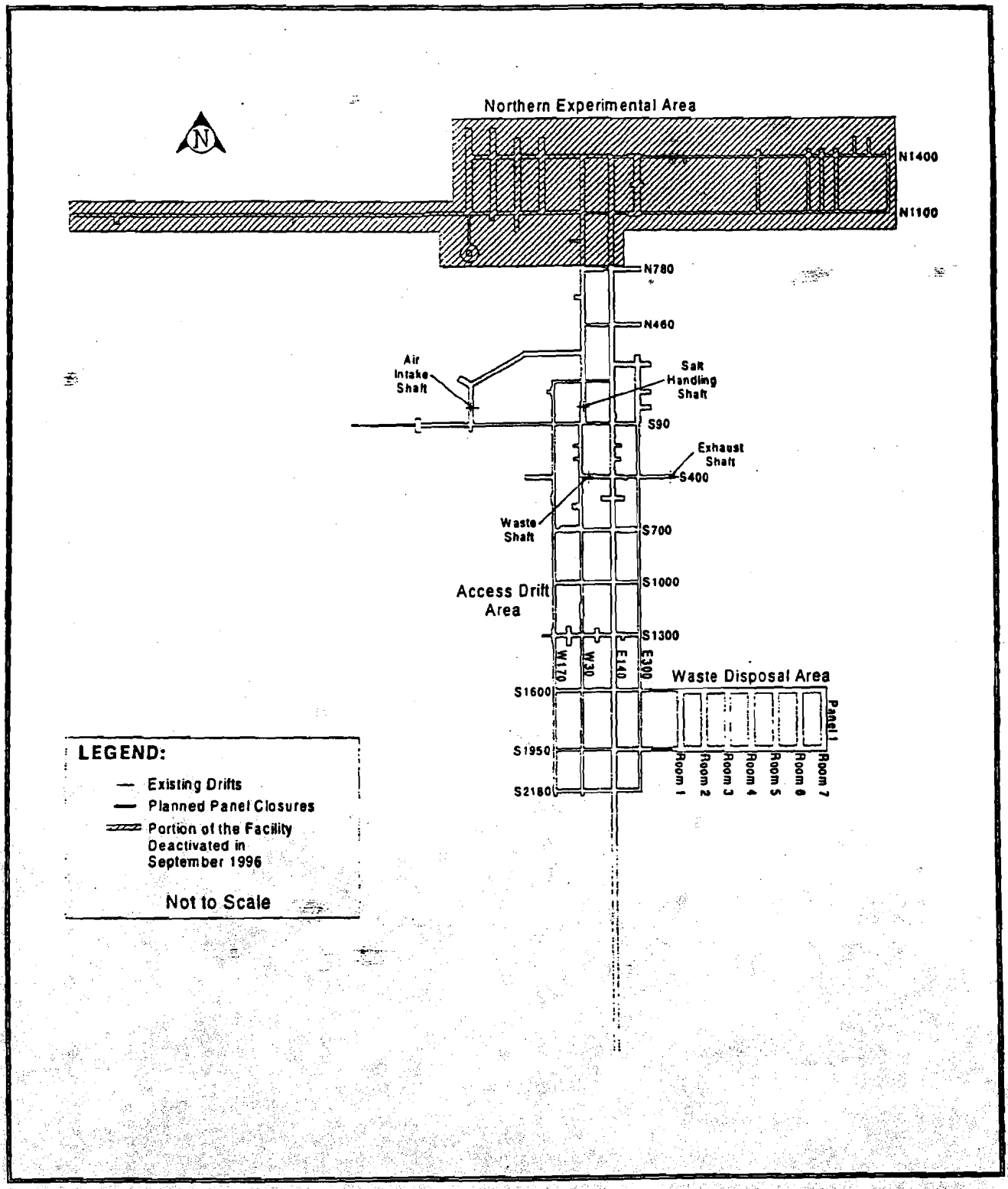


Figure 1-2
Schematic of Current Underground Facility

9.0 Summary

At the beginning of the WIPP project, criteria were developed that addressed the requirements for the design of the WIPP (DOE, 1984). These criteria, in the form of design requirements, covered all aspects of the mined facility and its operation as a pilot plant for the demonstration of technical and operational methods for permanent disposal of CH- and RH-TRU waste. As the WIPP developed and the focus moved toward the permanent disposal of TRU waste, these design requirements were reassessed and replaced in 1994 by a new set of requirements called system design descriptions (SDD). Table 9-1 shows the comparison of these SDDs with conditions actually observed in the underground from July 1996 to June 1997.

Fracture development in the roof is primarily caused by the concentration of compressive stresses in the roof beam and is influenced by the size and shape of the excavation and the stratigraphy in the immediate vicinity of the opening. Pillar deformations induce lateral compressive stresses into the immediate roof and floor. With time the buildup of stress causes differential movement along stratigraphic boundaries. This differential movement is identified as offsets in observation boreholes and is indicated by bending deformation in failed rockbolts. Large strains associated with lateral movements in the roof can induce fracturing in the roof, which is frequently seen near the ribs. This scenario of roof deterioration, combining a buildup of compressive stresses over time, horizontal offsetting, and large strains associated with lateral movements, is substantiated by observations of similar roof deterioration in SPDV Room 1, SPDV Room 2, and the E140 drift between S1000 and S1950.

Major modifications to the underground during this reporting period consisted of roof beam removal in the E140 drift in the area of S1000 to S1300. The decision to remove the beam came as a result of operational scheduling and convenience as well as observations of roof beam deterioration. Observations included high expansion rates across clay G found from extensometer data, visual observation of fracturing within the immediate roof, and an increasing number of bolt failures occurring in the area. Although the roof beam could have been maintained through roof control measures, it was also determined that operationally it was an appropriate and convenient time to remove the roof beam. Data from convergence point arrays located in the E140 drift between S1000 and S1300, which were installed after the roof beam was removed, indicate the vertical closure rate after roof beam removal is constant at approximately 4 cm/yr (1.5 in/yr). Data from convergence point arrays in the E140 drift between S1300 and S1950 show a relatively constant vertical closure rate since the removal of the roof

Table 9-1
Comparison of Excavation Performance to System Design Descriptions

System Design Description	Requirement	Comments
SDD-UH00, Underground Hoisting, Section 2.1.2.6.3	"The lining shall be designed for a hydrostatic pressure. . . ."	Water pressure observed on piezometers located behind the shaft keys in the Waste Shaft and the Exhaust Shaft remains below design levels. Piezometers located in the Salt Handling Shaft were not functioning during this reporting period. Historic data indicate water pressures in the Salt Handling Shaft to be below design levels. The Salt Handling Shaft liner continues to resist water inflow into the shaft. Efforts are underway to determine if the piezometers in the Salt Handling Shaft can be repaired or replaced.
Section 2.1.2.6.4	"The key shall be designed to resist the lateral pressure generated by salt creep."	Geomechanical data from the Waste Shaft indicate that the shaft is structurally stable. Extensometers located in the Salt Handling Shaft and the Exhaust Shaft were not functioning during this reporting period. Historic data indicate that closure of all the shafts remains within design requirements. Visual inspections of the shaft keys indicate they are performing as designed.
Section 2.1.2.8	"The key shall be designed to retain the rock formation and will be provided with chemical seal rings and a water collection ring with drains to prevent water from flowing down the unlined shaft from the lining above."	The small amount of groundwater inflow into the shafts is effectively controlled through grouting. Seepage into the Exhaust Shaft is minimal and the source and content of such seepage are being characterized (Intera, 1997, IT, 1997).

Table 9-1 (Continued)
Comparison of Excavation Performance to System Design Descriptions

System Design Description	Requirement	Comments
SDD-AU00, Underground Facilities and Equipment, Section 2.2.1.2, Underground Disposal Facilities	"The underground waste disposal facilities shall be designed to provide space and adequate access for the underground equipment and temporary storage space to support underground operations."	Geomechanical instrument data and visual observations indicate that the current design provides adequate access and storage space.
Section 2.2.1.2, Underground Disposal Facilities (Continued)	"The underground waste disposal facilities shall be designed to provide the capability of retrieving the emplaced CH and RH TRU waste."	retrievability is no longer necessary.
Section 2.2.1.3, Underground Shaft Pillar Facilities	"Entries and sub-entries to the underground disposal area and the experimental areas shall be provided and sized for personnel safety, adequate air flow, and space for equipment."	Deformation of excavation remains within the required limits. The northern portion of the underground from approximately N800 was deactivated during this reporting period because the area is no longer needed for experimental purposes. This area is no longer accessible. Approximately 1.5 meters (5 feet) of roof, up to clay G, was removed in the E140 drift from S1000 to S1300.
SDD-EM00, Environmental Monitoring, Section 2.2.5.1	"Geomechanical instrumentation shall be provided to measure the cumulative deformation of the rock mass surrounding mined drifts. . . ."	Geotechnical instrumentation is operated and maintained to meet this requirement. Additional geotechnical instruments were installed in various parts of the WIPP underground (including the E140 drift, Room 7, Panel 1, and SPDV Room 4) during this reporting period. Geotechnical experts agree that the monitoring program at the WIPP has been proven adequate, specifically with regard to the instrumentation in Room 1, Panel 1 (DOE, 1991b).

beam, despite the fact that the rate in some areas is approximately 5 cm/yr (2 in/yr). These rates and visual observations indicate a more stable roof beam in the E140 drift between S1000 and S1950. In order to monitor the response of the new roof beam, 14 convergence point arrays have been installed in the E140 drift between S1000 and S1950 since the roof beam was removed.

The in situ performance of the excavations generally continues to satisfy the appropriate design criteria, although specific areas are being identified where deterioration resulting from aging

Attachment D.2

Hydrological

Documents

Environmental Monitoring

40 CFR 194

Stewart Jones

Westinghouse Waste Isolation Division

Environmental Monitoring Manager

COB 194E ChuckByrum 032499, 1231

E

Ground water level measurements

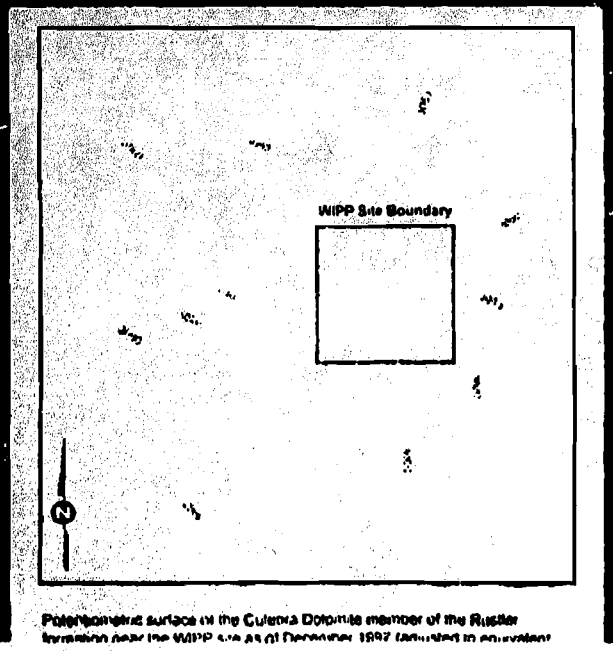
Potentiometric elevation mapping to determine flow gradient

Sampling to characterize the Culebra groundwater

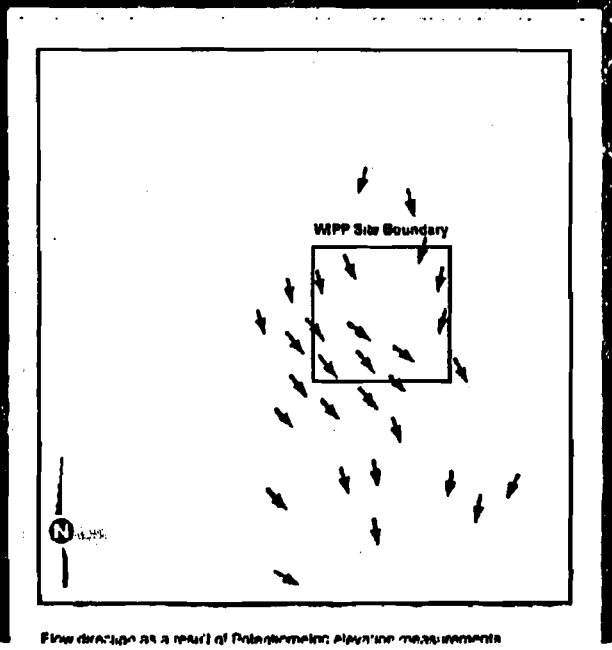
Culebra groundwater level measurements determine groundwater flow

Upon review of groundwater level results, potentiometric surface elevations are plotted

From potentiometic elevations, flow direction is determined



Potentiometric surface in the Culebra Dolomite member of the Rustler formation near the WIPP site as of December 1997 (adjusted to equivalent



Flow direction as a result of potentiometric elevation measurements

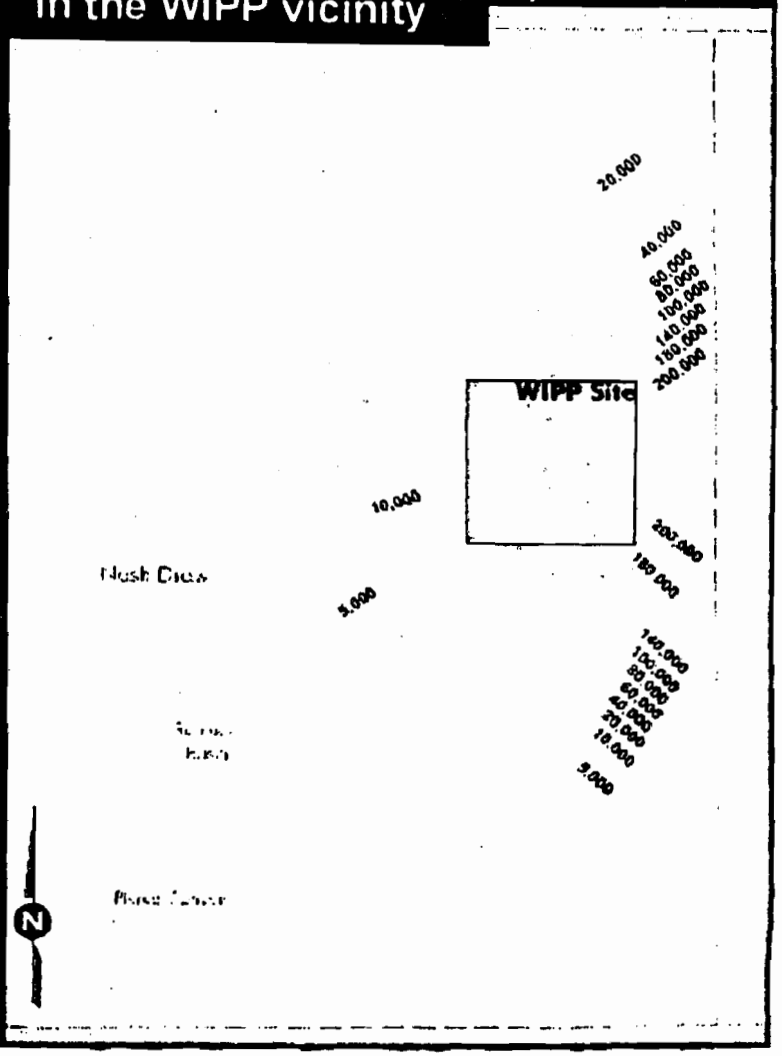
Analysis of Culebra groundwater to measure physical characteristics

- Dissolved minerals consist of sodium, chloride, calcium, magnesium, sulfates, and potassium

Total dissolved solids

These values are greater to the east and decrease going west toward Nash Draw as transmissivity values increase

Gradient TDS values in the WIPP vicinity



Effective Date: 3/12

WP 02-1
Revision 3

Groundwater Surveillance Program Plan

Cognizant Section: Environmental Monitoring

Approved By: Signature on file D. R. Kump

Cognizant Department: ESH

Approved By: Signature on file C. F. Wu

WP 02-1 Rev. 3
GROUNDWATER SURVEILLANCE PROGRAM PLAN

TABLE OF CONTENTS

WP 02-1 Rev. 3
GROUNDWATER SURVEILLANCE PROGRAM PLAN

1.0 INTRODUCTION

This is the controlling document for the Waste Isolation Pilot Plant (WIPP) Groundwater Surveillance Program (GSP). The GSP is administered as part of the WIPP Environmental Monitoring Program by the Environmental Monitoring (EM) Section of the Environment, Safety and Health (ES&H) Department.

2.0 REFERENCES

DOE Order 5400.1, General Environmental Protection Program

DOE/EH 0173T, Environmental Regulatory Guide for Radiological Effluent Monitoring and Environmental Surveillance

Groundwater Protection Management Program Plan

WP 02-3, Environmental Procedures Manual

WP 10-AD, WIPP Maintenance Administrative Procedures Manual

WP 12-1, Waste Isolation Pilot Plant Safety Manual

WP 12-107, Hazard Communication Program

WP 13-1, WID Quality Assurance Program Description

WP 15-6, Purchasing Policies and Procedures Manual

WP 15-PR, Records Management Plan

3.0 RESPONSIBILITIES

The overall organizational structure of the Westinghouse WID is described in Part I, Section 1 of the Quality Assurance Program Description (QAPD). The GSP is the responsibility of the ES&H Department. The GSP is conducted by the EM Section of this department.

The EM manager assumes responsibility for the overall design and implementation of the GSP including the following areas:

- Development and approval of specific procedures for the conduct of all GSP activities.

- Establishment of minimum qualification criteria and training requirements for all program personnel.
- Review and approval of programmatic reports.
- Oversight of appropriate levels of cooperation and consultation between the EM Section and the state of New Mexico regarding environmental monitoring.
- Preparation of the QA section of the GSP Plan.

The EM manager and staff are responsible for achieving and maintaining quality in the GSP. Job descriptions will be maintained for the EM manager, professional, technical, and administrative staff positions. All GSP data shall be reviewed and approved by the EM manager, or designee, prior to release.

The EM manager appoints a GSP Team Leader (TL), assigning the following responsibilities to the TL:

- Direct GSP per written approved procedures.
- Initiate review of programmatic plans and procedures.
- Review and evaluate sample data.
- Prepare and review programmatic reports.
- Assure that appropriate samples are collected and analyzed.
- Assure that adequate technical support is provided to the Quality and Regulatory Assurance (Q&RA) Department, when required during audits of vendor facilities.

The EM manager designates one or more scientists, engineers, or technicians who will be responsible for the following items:

- Collection and subsequent distribution of samples.
- Preparation and maintenance of appropriate data sheets and sample tracking documentation.
- Monitoring of equipment operability status.
- Reporting of equipment malfunctions.
- Reporting of nonconformance to the TL or EM manager.

- Overseeing of quality control checks of data.
- Conducting field activities in accordance with written procedures.

The Q&RA manager provides independent oversight of the GSP, via the assigned cognizant Q&RA engineer, to verify that quality objectives are defined and achieved. The Q&RA manager ensures objective, independent assessments of GSP quality performance. The Q&RA manager has been delegated authority and given organizational freedom by the WID General Manager to access work areas, identify quality problems, initiate or recommend corrective actions, verify implementation of corrective actions, and ensure that work is controlled or stopped until adequate disposition of an unsatisfactory condition has been implemented.

The EM manager assures that basic qualifications for GSP personnel are carried out in accordance with Section 2 of the QAPD.

The EM manager assures that position descriptions for assigned GSP personnel are adequately prepared. Each position description will include position purpose, principal responsibilities, nature of work, and scope.

The EM manager and/or TL assures that training is performed on an individual basis to maintain an acceptable level of proficiency by all new or temporary GSP staff and by all permanent GSP staff.

New GSP employees are required to review pertinent program documentation, become familiar with applicable procedures, and complete appropriate qualifications prior to undertaking any unsupervised GSP task. To become qualified to perform a specific task or series of tasks, an employee must demonstrate subject knowledge and practical skills and become certified in performing the task(s) by a board-certified subject matter expert (SME). Employees who have not completed the appropriate qualification card will not be allowed to conduct unsupervised GSP activities.

The EM manager, TL, or task SME may determine the need for retraining of GSP personnel. Retraining may be noted by Q&RA during any surveillance or audit or during a periodic review initiated by the EM manager, TL, or SME.

The EM manager assures that documents detailing all staff training are current and properly filed. Copies of training records shall be on file in the WID Technical Training Section.

4.0 GSP QUALITY ASSURANCE PLAN

4.1 Introduction

This section is the quality assurance (QA) plan for the WIPP GSP. The objective of this QA plan is to establish the specific QA requirements associated with the GSP. The GSP currently consists of two activities: the Water Quality Sampling Program (WQSP) and the Water Level Monitoring Program (WLMP). Technical implementation of each specific activity is controlled by an individual program plan and unique operating procedures. The GSP provides a mechanism for addressing the following:

4.1.1 Department of Energy (DOE) Order 5400.1

Chapter 3 of the DOE Order 5400.1, General Environmental Protection Program, states that "... all Department of Energy (DOE) sites will conduct a groundwater protection management program." The order requires each DOE site to provide for the design and implementation of a groundwater monitoring effort that supports resource management and complies with applicable environmental laws and regulations.

4.1.2 DOE/EH 0173T

DOE/EH 0173T, Environmental Regulatory Guide for Radiological Effluent Monitoring and Environmental Surveillance, states that:

> It is the policy of DOE to conduct effluent monitoring and environmental surveillance programs that are adequate to determine whether the public and the environment are adequately protected during DOE operations and whether operations are in compliance with DOE and other applicable Federal, State, and local radiation standards and requirements. It is also DOE policy that Departmental monitoring and surveillance programs be capable of detecting and quantifying unplanned releases and meet high standards of quality and credibility. It is DOE's objective that all DOE operations properly and accurately measure radionuclides in their effluent and in ambient environmental media.

4.1.3 Resource Conservation and Recovery Act (RCRA)

By virtue of a Groundwater Monitoring Waiver, prepared under 40 CFR 265, the WIPP Project is not required to monitor groundwater to comply with the U.S. Environmental Protection Agency (EPA) RCRA. The WIPP GSP provides a basis for future compliance to the RCRA, as well as any other groundwater protection-related regulations, should the need arise.

4.1.4 Final Environmental Impact Statement (FEIS) Commitments

Section J.2.2 of the FEIS states that "...long-term groundwater sampling and water level monitoring will be conducted as part of the WIPP Environmental Monitoring Program."

4.1.5 Future Land Use Decisions

Data collected from the program will aid in making future groundwater-land use decisions (i.e., designing long term and passive institutional controls for the site).

This QA plan is driven by, and is supplemental to, both the WID QAPD, WP 13-1, and implementing WIPP Q&RA procedures.

4.2 GSP Quality Assurance Requirements

The following specific Q&RA requirements are unique to the GSP.

4.2.2 Quality Assurance Program

This plan is governed by the following documents: WP 13-1, WID Quality Assurance Program Description; and WP 02-3, Environmental Procedures Manual. Steps to ensure quality are incorporated, as needed, in the technical procedures used for groundwater surveillance activities. The EM manager or assigned designee is responsible for developing and maintaining this QA plan and groundwater surveillance procedures.

In accordance with the WID QAPD, Part I, Section 1, groundwater surveillance data activities are classified as Quality Code II.

4.2.3 Design Control

The design control requirements used by Westinghouse at the WID are described in Part II, Section 6 of the QAPD. The GSP will adhere to all applicable portions of these requirements when performing design activities.

4.2.4 Procurement Document Control

Procurement is carried out in accordance with WID procurement policies and procedures, as outlined in Part II, Section 7 of the QAPD, and WP 15-6, Purchasing Policies and Procedures Manual. Both documents require specification of a quality code and design class and concurrence by the Q&RA Department with procurement documents. Technical requirements for procured items and services are developed and specified in procurement documents. If deemed necessary to ensure attainment of the required characteristics, procurement documents may require suppliers to have an adequate QA program.

4.2.5 Instructions, Procedures, and Drawings

Provisions and responsibilities for the preparation and use of instructions and procedures at the WIPP are outlined in Part II, Section 4 of the QAPD. Quality-affecting activities performed by or on behalf of groundwater surveillance are required to be performed in accordance with documented and approved procedures.

Technical procedures have been developed for each quality-affecting function performed for groundwater surveillance. The technical procedures unique to the GSP are contained in the procedures section of this manual. The procedures are as detailed as required and include, when applicable, quantitative or qualitative acceptance criteria to determine that activities have been satisfactorily accomplished.

Procedure requirements are in accordance with Section 4 of WP 13-1. Procedures will be prepared in accordance with applicable technical writer's guides.

4.2.6 Document Control

Requirements for the control of documents are outlined in Part II, Section 4 of the WID QAPD. Controls ensure that the latest approved versions of procedures are used in performing groundwater surveillance functions and that obsolete materials are removed from work areas.

4.2.7 Control of Purchased Material, Equipment and Services

WIPP policy requirements and associated responsibilities for the control of purchased material, equipment, and services are outlined in Part II, Section 7 of the QAPD. In accordance with current WIPP procurement policies and procedures, measures will be taken to ensure that procured items and services conform to specified requirements. These measures will include one or more of the following:

- An evaluation of the supplier's capability to provide items or services in accordance with the requirements, including the history of providing similar products or services satisfactorily.
- An evaluation of objective evidence of conformance, such as supplier submittal (i.e., QA plan).
- An examination and testing of items or services upon delivery.

If it is determined that additional measures are required to ensure quality in a specific procurement, additional steps may be provided in procurement documents and implemented by groundwater surveillance staff and/or the Q&RA Department. These additional assurances may include source inspection and audits or surveillance at the

supplier's facilities.

4.2.8 Identification and Control of Items

Measures to ensure that only correct and accepted items are used at the WIPP are outlined in Part II, Section 8 of the QAPD. All items that potentially affect the quality of the GSP are uniquely identified and controlled to ensure that only accepted items are used.

Equipment is administered in accordance with WP 10-AD, WIPP Maintenance Administrative Procedures Manual. Calibration reports test data are maintained by the EM Department. Any "out-of-tolerance" condition is evaluated for potential impact on the validity of data. Impact evaluation and corrective actions are initiated per specific GSP instructions.

4.2.9 Control of Processes

All process control requirements of the QAPD are met by the GSP.

4.2.10 Inspection/Surveillance

Inspection and surveillance activities are conducted as outlined in Part II, Section 10 of the QAPD. The Q&RA Department is responsible for performing the applicable inspections and surveillance on the scope of work. Performance checks are performed by groundwater surveillance personnel as specified by the appropriate procedures, and by WID metrology laboratory personnel. Performance checks for the GSP are designed to determine the acceptability of purchased items and to assess degradation that occurs during use.

4.2.11 Test Control

Part II, Section 8 of the WID QAPD outlines the requirements and responsibilities of the WID for the control of tests. Tests to be performed for the GSP fall into two general categories: tests of items upon receipt and in service, and operability checks of equipment.

All tests are performed in accordance with documented and approved plans and/or procedures. Testing or experimental/monitoring plans or procedures contain the following provisions as applicable:

- Scope and/or definition or scope.
- Prerequisites such as calibrated instrumentation and supporting data; adequate test equipment and instrumentation, including accuracy requirements; completeness of item to be tested; suitable and controlled

environmental conditions; and provisions for data collection and storage.

- Instructions for performing the test.
- Mandatory inspection and/or hold points to be witnessed by the WID or other designated representatives.
- Acceptance and rejection criteria.
- Methods of documenting or recording test data.
- Requirements for qualified personnel.
- Evaluation of test results by authorized personnel.

4.2.12 Control of Monitoring and Data Collection Equipment

Monitoring and Data Collection (M&DC) equipment is controlled and calibrated according WP 10-AD, WIPP Maintenance Administrative Procedures Manual, to ensure continued accuracy of groundwater surveillance data. Results of calibrations, maintenance, and repair are documented. Calibration records identify the reference standard and the relationship to national standards or nationally accepted measurement systems. Records are maintained to track uses of M&DC equipment. If M&DC equipment is found to be out of tolerance, the equipment is tagged and its use ceased until corrections are made. An evaluation shall be approved by the EM manager and corrective measures will be taken, as needed.

4.2.13 Handling, Storage, and Shipping

Handling, storage, packaging, and shipping of groundwater samples are controlled in accordance with WP 10-AD, WIPP Maintenance Administrative Procedures Manual. Proper documentation is prepared and maintained for each sample to minimize damage, loss, deterioration, and extraneous exposures.

4.2.14 Inspection and Acceptance Testing

Measures used by the WID to ensure that required inspections and tests performed are outlined in Part II, Section 8 of the WID QAPD. Controls are implemented in accordance with documented procedures to ensure that items are not used prior to passing required inspections and tests. The status is identified on the items or on documents traceable to the items. Items that have not been accepted are identified as such and stored separately from accepted items. The operating status of equipment is identified on the equipment or on the equipment list. Faulty equipment is tagged and, if practicable, physically segregated from the work area.

4.2.15 Control of Nonconforming Conditions

Part II, Section 8 of the WID QAPD describes the system used at the WIPP for ensuring that appropriate measures are established to control nonconforming conditions. Nonconforming conditions connected to the GSP are identified in and controlled by documented procedures. Equipment that does not conform to specified requirements is controlled to prevent use. The disposition of defective items is documented on records traceable to the affected items. Prior to final disposition, faulty items are tagged and segregated. Repaired equipment is subject to the original acceptance inspections and tests prior to use.

4.2.16 Corrective Action

Requirements for the development and implementation of a system to determine, document, and initiate appropriate corrective actions after encountering conditions adverse to quality at the WIPP are outlined in Part I, Section 3 of the QAPD. Conditions adverse to acceptable quality are documented and reported in accordance with corrective action procedures and corrected as soon as practical. Immediate action will be taken to control work performed under conditions adverse to acceptable quality, and its results, to prevent degradation in quality.

The EM manager or designee investigates any deficiencies in groundwater surveillance activities to determine if there is an underlying root cause. All such actions are documented and reported to the Q&RA Department.

4.2.17 Quality Assurance Records

Part I, Section 4 of the QAPD outlines the policy used at the WIPP regarding identification, preparation, collection, storage, maintenance, disposition, and permanent storage of QA records. The EM manager or designee is responsible for the preparation and distribution of records in accordance with appropriate DOE Orders, policies, and directives.

Records to be generated in the GSP are specified by procedure. QA records are identified. This is the basis for the labeling of records as "QA" on the EM Records Inventory and Disposition Schedule (RIDS).

QA records document the results of the GSP implementing procedures and are sufficient to demonstrate that all quality-related aspects are valid. The records will be identifiable, legible, and retrievable in accordance with WP 15-PR, WID Records Management Plan, and QA record procedures.

While in the custody of the GSP group, the records shall be stored in a UL listed, one-hour fire-resistant cabinet. The EM manager shall coordinate with WIPP Project Records Services (PRS) for both periodic and perpetual transfer of records to PRS.

4.2.18 Assessments

Provisions and responsibilities for assessments are outlined in Part III, Sections 9 and 10, of the QAPD. Periodic, independent assessments of the GSP shall be scheduled, planned, and performed to verify that work is performed in accordance with specified requirements. The Independent Assessment Section has the responsibility and oversight authority for appraising GSP activities for compliance with applicable environmental statutes. Assessment teams will not include members of the GSP staff. Assessments are performed in accordance with applicable assessment procedures.

5.0 GSP WATER QUALITY SAMPLING PLAN

5.1 Scope

This section of the WIPP GSP Plan serves as the controlling document for the WQSP. The WQSP is a subprogram of the GSP.

The WQSP was initiated in January 1985. The objective of the program is to collect representative and reproducible groundwater samples from water-bearing zones in the area of the WIPP site. The purpose of the program is to provide defensible data for meeting the requirements of site characterization, performance assessment, regulatory compliance, and permitting. A program plan that defined the basic structure and operational activities of the program was initially developed by Colton and Morse (1985). The program plan was replaced in 1987 by WP 07-2, Waste Isolation Pilot Plant Water Quality Sampling Manual. In 1991 the WQSP manual was replaced by WP 02-1, Waste Isolation Pilot Plant Groundwater Monitoring Program Plan and Procedures Manual.

5.1.1 General

From 1984 to 1990, the WQSP was designed to characterize the physical and chemical characteristics of representative groundwater samples occurring within and immediately surrounding the WIPP site. Various wells were serially sampled, three times each, to determine the representative character of the groundwater present at each location. Data collected were supplied to the ES&H Department and used to develop a baseline of water quality data as part of the Radiological Baseline Program. A nonradiological database was developed to support the background water quality characterization report. Data were also supplied to and used by Sandia National Laboratories (SNL) for site characterization and performance assessment. By the close of 1990, the groundwater of interest had been characterized, and the objective of the program shifted from characterization to surveillance.

On October 1, 1988, the ES&H Department assumed responsibility for the WQSP. Water quality sampling activities were coordinated with the Environmental Monitoring

Program.

Collection of groundwater quality data continues to assist the DOE in meeting performance assessment, regulatory compliance, and permitting requirements. The data also provide:

- Radiological and nonradiological water quality input to the WIPP Environmental Monitoring Program.
- A means to comply with future groundwater inventory and monitoring regulations.
- Input for making land-use decisions (i.e., designing long-term active and passive institutional controls for the site).

Groundwater exists both above and below the WIPP repository, but no hydrologic continuity exists between the repository and the groundwater. Groundwater below the repository occurring in the sandstones of the Delaware Mountain Group (Powers, et al., 1978) is isolated by bedded salt deposits in the lower part of the Salado Formation and in the underlying Castile Formation. Groundwater below the repository is not being monitored as part of this program.

Groundwater above the repository is being monitored. Groundwater exists in both the Dewey Lake Formation and the Rustler Formation. Zones monitored for background characterization within the Rustler are the Culebra and the Magenta members. These zones appear to be dolomite units isolated from one another by impermeable units. With the exception of excavated shafts at WIPP, these zones are isolated from the repository excavations by bedded salt deposits in the upper two thirds of the Salado Formation.

Postbackground surveillance is focused on the Culebra because it is the primary flow path within the Rustler formation. Databases are maintained for the Magenta so that if the need arises surveillance of the Magenta can be resumed.

The Culebra is areally persistent, but quantity and quality of water vary considerably from place to place. The dolomite is vuggy, fractured, and commonly associated with anhydride (Lambert and Mercer, 1977). The Culebra has a low hydraulic conductivity. It is a fractured unit that is best modeled as a dual-porosity media. Water yields are small and saline (Powers et al., 1978).

The Magenta is finely crystalline and dense. Like the Culebra, the Magenta has a low hydraulic conductivity through fractures and contains limited amounts of poor quality water (Powers et al., 1978).

The Dewey Lake Redbeds consist of orange-red silt stone, mud stone, and some

sandstone. The Dewey Lake Redbeds do not form an aquifer, but some permeable sand lenses are present and those yield limited quantities of fresh water to a few private wells in the area around the WIPP site (Powers et al., 1978). One such sand lens has been identified within the WIPP boundary and is scheduled for surveillance as part of the WQSP.

5.2 Surveillance Well Construction

Many of the WIPP surveillance wells were drilled and completed prior to 1980. As the WIPP Project progressed, additional monitoring wells were completed in the vicinity of the site. Drilling of the bulk of WIPP surveillance wells began in 1976 and continued into 1988.

In general, all of these wells were drilled as part of the geologic site characterization and resource evaluation programs. Most WIPP surveillance wells were drilled and completed using oil field techniques. Surveillance wells at the site have been completed, generally, using two types of installations. One installation requires drilling the well to some depth below the base of the Culebra and then casing the well to the bottom of the hole. The interval of the Culebra or Magenta is then perforated to allow access to the formation for testing or sampling purposes. The second type of installation consists of drilling the hole to a depth just above the top of the Culebra, installing well casing to the bottom of the drilled hole, and coring or drilling through the Culebra interval, leaving the Culebra interval open to the formation.

These types of well completions presented problems in collecting undisturbed and representative samples from the water-bearing units. The open-hole completions have, in some cases, resulted in sediments below the Culebra being exposed in the sampling interval. In some cases, these sediments are rich in halite or other evaporite minerals, causing the water chemistry in the well bore and the water-bearing unit surrounding the well to be altered. Often, during drilling and completion of surveillance wells, fluids containing fresh water, saturated brine, and drilling fluids containing petroleum products have been introduced into the well bore. In some cases, these fluids were left standing in the well bore for extended periods of time, resulting in contamination of the surrounding formation (Crawley 1988).

Standard oil field steel well casings have been used during completion of the WIPP surveillance wells. This type of casing is easily corroded by the brackish to brine water found in the WIPP area. Based on serial sampling results, it appears that the products of well casing corrosion migrate from the well bore into the formation, resulting in a halo or plume of groundwater with altered chemistry surrounding the surveillance wells. Obtaining a representative sample has required that the surveillance wells be pumped for long periods of time to remove the contamination.

Well drilling and completion techniques such as those described above are usually not used for installation of monitoring wells employed in RCRA or other groundwater

sampling programs, due to the likelihood of aquifer contamination. These practices required that the WQSP use extensive groundwater pumping in order to obtain uncontaminated water samples.

The difficulty in obtaining representative groundwater samples, due to the design of the wells used by the WQSP, necessitated the use of a serial sampling technique. Serial sampling and the associated equipment are discussed later in this section.

Seven observation wells were completed after the baseline was established using EPA recommended drilling methods and casing materials that have the potential to meet RCRA monitoring standards. Six of the wells were completed in the Culebra; one well in the Dewey Lake formation. Two years of sampling are scheduled prior to the anticipated receipt of waste. The data gathered from these wells will be compared to the existing database and the existing background data will be appended as appropriate.

The configuration of the seven new observation wells may well preclude the necessity to perform serial sampling. However, sampling of a portion of the older surveillance wells may be necessary in years to come. Therefore, a discussion of serial sampling techniques is included in this document.

5.3 Sampling Program Description

The WQSP has employed two types of sampling procedures at the WIPP: serial sampling and final sampling.

5.3.1 Serial Sampling

Serial sampling is the collection of sequential samples for the purpose of determining when the water chemistry stabilizes or reaches a steady state. Ideally, when the water chemistry stabilizes, it is assumed that the chemistry is representative of the native formation fluid, and a final sample is collected. However, in reality, serial sampling leads to the collection of water samples with reproducible chemistries which may or may not be representative of the undisturbed groundwater. The water samples may still be impacted by well construction practices and effects from the installation of downhole pumping and sampling equipment.

During the background characterization phase of the WQSP serial sample, field parameters were monitored on a daily basis. After completion of the background characterization phase, monitoring of serial sample parameters was modified by pumping each well for 48 hours prior to the start of serial sampling then comparing the serial sampling analysis results to the average last day serial sample results for previous sampling rounds. A 95 percent confidence interval was established for comparison standards.

The field analytical parameters found to be the most useful in identifying a steady state condition of the water chemistry include chloride, divalent cations (hardness), and alkalinity, which are analyzed by classic wet chemistry bench methods (titration). Total iron has also been found to be a useful indicator and is analyzed using spectrophotometric methods. Other serial sampling parameters analyzed in the field include measurement of pH, Eh, temperature, specific conductance, and specific gravity. Procedures for collection and analysis of serial samples are processed, approved, and maintained by the site documentation process.

5.3.2 Final Samples

Final groundwater samples are collected once evidence from serial sampling indicates that the pumped groundwater has reached a chemical steady state. Final samples are forwarded to a contract analytical laboratory for analysis.

Final samples are collected in the appropriate type of container for the specific analysis to be performed. For each parameter analyzed, a sufficient volume of sample is collected to satisfy the volume requirements of the analytical laboratory. This includes an additional volume of sample water necessary for maintaining quality control standards. All final samples are treated, handled, and preserved as required for the specific type of analysis to be performed. Details about sample collection, preservation, and volumes required for individual types of analyses are found in the applicable procedures generated, approved, and maintained by the site documentation process.

Splits of the final sample are provided to oversight agencies and WIPP stakeholders as requested by the DOE. A split of the sample is also placed in storage within the ES&H Environmental Sample storage area and held until final reports from the contract analytical laboratory have been evaluated and approved. When the final laboratory report has been approved the samples are removed from storage and destroyed.

Detailed protocols, in the form of procedures, assure that samples are collected in a consistent and repeatable fashion. Procedures applicable to water quality sampling are generated, approved, and maintained by the site documentation process.

The serial sampling process will probably not be needed with the wells completed specifically for water quality sampling. However, during the first two years of sampling, the wells will be serially sampled using an abbreviated method. It is anticipated that changes in the water chemistry from stagnated to representative will occur within the first 24 hours of the purging process. Whereas, this change usually occurred over a seven-day period with the old wells.

During the first two or three years of sampling, these wells will be serially sampled with the first sample being analyzed as soon as possible after the pump is turned on and daily there after for a period of four days or until the field parameters (chloride, divalent

cations, alkalinity and iron) stabilize. Eh, pH, and conductance will be monitored continuously by using a flow cell with ion-specific electrodes and a real-time readout. After two years of sampling data have been accumulated, a decision will be made to determine if the serial sampling process can be eliminated. If serial sampling is removed from the water quality sampling well protocol, the decision to collect samples will be based on the number of well bore volumes purged and the results of continuous monitoring of temperature Eh, pH, and conductance.

5.4 Groundwater Pumping and Sampling Systems

The water-bearing units at the WIPP are highly variable in their ability to yield water to surveillance wells. The Culebra, the most transmissive hydrologic unit in the WIPP area, exhibits transmissivities that range many orders of magnitude across the site area and has been the primary focus of the GSP. The Magenta has a lower transmissivity and yields very small quantities of water to wells. Because the water-yielding characteristics of the hydrologic units at the WIPP are variable, different types of pumping equipment are used during water quality sampling activities.

The groundwater pumping and sampling systems used to collect a groundwater sample are designed to provide continuous and adequate production of water so that a representative groundwater sample can be obtained. The wells used for water quality sampling vary in yield, depth, and pumping lift. These factors affect the duration of pumping as well as the equipment required at each well. Based upon expected yields, the wells monitored at WIPP can be divided into three categories according to flow rate: (1) high flow rate of 10 to 25 gallons per minute (gpm); (2) medium flow rate or 1 to 10 gpm; and (3) low flow rate of less than 1 gpm.

The high and medium flow rate wells may use a submersible pump-packer assembly. The low-volume wells may require a gas-driven piston pump-packer assembly. A discussion of the different pump-packer equipment is provided below.

The type of pumping and sampling system to be used in a well depends primarily on the aquifer characteristics and well construction. For example, if well construction is such that it yields contamination to the aquifer (i.e., metal casing) a packer is normally recommended to minimize purging time. If the aquifer yields adequate water to the well to be classified a high or medium production well, a submersible electric pump may be used. However, if the well is completed with the water-bearing unit uncased, a gas piston pump may be needed to minimize stress to the formation walls to prevent collapse of the formation.

Wells that are completed to water quality standards are cased and screened through the production interval with materials that do not yield contamination to the aquifer or allow the production interval to collapse under stress. An electric, submersible pump installation without the use of a packer is an acceptable installation in this instance.

The largest amount of discharge from the submersible pump takes place from a discharge pipe. In addition to this main discharge pipe a dedicated nylon sample line, running parallel to the discharge pipe, is also used. Flow through the pipe is regulated on the surface by a flow control valve and/or variable speed drive controller. Cumulative flow is measured using a totalizing flow meter. Flow from the discharge pipe is routed to a discharge tank for disposal.

The dedicated nylon sampling line is used to collect the water sample that will undergo analysis. By using a dedicated nylon sample line, the water is not contaminated by the metal discharge pipe. The sample line branches from the main discharge pipe a few inches above the pump. Flow from the sample line is routed into the sample collection area. Flow through the sample collection line is regulated by a flow-control valve. The sample line is insulated at the surface to minimize temperature fluctuations.

A gas-driven pump and sampling system can be used on any volume well. When used, the pump intake is set at a predetermined depth near or in the production zone. The pumping rate is adjusted to maintain the water level in the well above the pump intake.

The flow rate for gas driven pumps is controlled by regulating the air pressure on the pump intake or by a flow control valve. Water is continuously discharged into a water storage tank. Detailed protocol for assembling, installing, and controlling pumping and sampling systems is found in the procedures generated, approved, and maintained by the site documentation process

5.5 Pressure Monitoring Systems

Regardless of which pump is used when sampling a well that was drilled for the geologic site characterization and resource evaluation program, a packer is used to isolate the pump intake from contaminated well-bore fluid that exists in the well above the sampling zone. If the packer seal is not good, contaminated water from above the packer can leak into the formation water being sampled and bias analytical results. If the packer has a good seal the pressure above the inflated packer should remain constant.

Pressure above the packer is monitored using transducers and/or bubblers to verify that the seal on the packer is good. Pressure below the packer is monitored to ensure that water levels do not fall below the pump intake. Periodic checks of the pressures are conducted during field sampling to verify packer seal integrity. These field checks are recorded on Field Activity Log Forms.

Wells drilled to water-quality specifications do not require the installation of a packer because sample biases due to well construction deficiencies are not present. However, pressures will be monitored in the formation to maintain water level above the pump intake. Procedures governing the installation and use of pressure monitoring devices are generated, approved, and maintained by the site documentation process.

5.6 Sample Analysis

The mobile field laboratory provides a work place for conducting field sampling and analyses. The laboratory is positioned near the wellhead, is climate controlled, and contains the necessary equipment, reagents, glassware, and deionized water for conducting the various analyses.

Two types of water samples are collected: serial samples and final samples. Serial samples are taken at regular intervals and analyzed in the mobile laboratory for various physical and chemical parameters (called field parameters). The serial sample data are used to determine the chemical steady state conditions of the groundwater, as a direct function of the volume of the water being pumped from the well. Interpretation of the serial sampling data enables the TL to make a determination of when steady state conditions are attained in the pumped groundwater.

Final samples are collected when the serially sampled field parameters have achieved a steady state. If one or more of the field parameters do not stabilize, and there is reason to believe it will not, the TL may choose to collect the final sample regardless of this instability in the field parameter(s).

The objective of the serial sampling effort is to obtain representative water samples in a reproducible manner. By definition, a representative groundwater sample is a sample of undisturbed groundwater. A groundwater sample is considered to be representative of the undisturbed groundwater only if it is chemically identical to the undisturbed groundwater (i.e., completely unaltered by the effects of drilling, postdrilling processes and reactions, and sampling procedures). Obtaining a representative groundwater sample is a theoretical ideal. For example, the redox potential of the aquifer groundwater, Eh, is likely to change as a result of pressure decreases (gas loss) and contamination by atmospheric oxygen that occurs during the sampling process. The ratios between the different oxidation states of a multivariant element may change, and the total concentration of that element may also change during sampling due to precipitation.

To determine how close the pumped groundwater is to being representative, a comparison is made by monitoring the same selected field parameters which were used to initially define the background characteristics of the water. When these parameters appear stable, then the determination is made that the water sample is representative. Stability is usually defined as $\pm$ 5 percent of the average of preceding parameter measurements made on the final day of sampling for previous rounds.

When stability has been determined, a final sample is collected. The final sample is considered to be as representative a sample of the undisturbed groundwater as can possibly be obtained considering the analytical and technical means at hand.

5.6.1 Serial Samples

Serial samples are collected and analyzed in the mobile laboratory to detect and monitor the chemical variation of the groundwater as a function of the volume of water pumped. The purpose of implementing this rigorous serial sampling and analysis program is to ascertain when the pumped groundwater has reached a chemical steady state. Once serial sampling begins, the frequency at which serial samples are collected and analyzed is left to the discretion of the TL. The serial sampling frequency is based upon the site-specific conditions existing at each well, but usually is performed a minimum of three times during a sampling round.

The three field parameters of temperature, Eh, and pH are determined by either an "in-line" technique, using a self-contained flow cell, or an "off-line" technique, in which the samples are collected from a nylon sample line at atmospheric pressure. The iron, divalent cation, chloride, alkalinity, specific conductance, and specific gravity samples are collected from the nylon sample line at atmospheric pressure.

New polyethylene containers are used to collect the serial samples from the nylon sample line. Serial sampling water collected for solute and specific conductance determinations is filtered through a 0.45 μm filter membrane using a stainless steel, in-line filter holder. Filtered water is used to rinse the sample bottle prior to serial sample collection. Unfiltered groundwater is used when determining temperature, pH, Eh, and specific gravity. Sample bottles are properly identified and labeled.

The filtered sample collected for solute analyses is immediately analyzed for iron and alkalinity, as these two solution parameters are extremely sensitive to changes in the ambient water-sample pressure and temperature. The sample aliquot needed for the other chemical parameter analyses may be taken from a second filtered sample bottle. Temperature, pH, and Eh, when not measured in a flow cell, are measured at the approximate time of serial sample collection; these samples are collected from the unfiltered sample line.

Experience gained from the serial sampling of wells has shown that samples to be analyzed for chloride and divalent cations can be stored for one week prior to analysis with confidence that the analytical results will not be altered.

Upon completion of the collection of the final sample suite, the serial sample bottles accrued throughout the duration of the pumping of the well are discarded. No serial sample bottles will be reused for sampling purposes of any sort. However, serial samples may be archived for a period of time depending upon the need. Procedures for sample collection and analysis are generated, approved, and maintained by the site documentation process.

5.6.2 Final Samples

The final sample is collected once the pumped groundwater has achieved a chemically steady state. A serial sample is also collected and analyzed for each day of final sampling. Sample preservation, handling, and transportation methods are designed to maintain the integrity and representativeness of the final samples.

Prior to collecting the final samples, the collection team must consider the analyses to be performed so that proper shipping or storage containers can be assembled.

Final samples are sent to contract laboratories and analyzed for general chemistry, radionuclides, metals, and selected volatile organic compounds that are specific to the waste anticipated to arrive at WIPP. Gases and redox-couples were analyzed during the baseline study, but these data are not needed for environmental monitoring and are no longer obtained on a routine basis.

Water samples are collected at atmospheric pressure using either the filtered or unfiltered nylon sampling lines branching from the main sample line. The samples are collected in new and unused glass and plastic containers.

Before the final sample is taken, all plastic and glass containers are rinsed with the pumped groundwater, either filtered or unfiltered, dependent upon analysis protocol. When the rinsing procedure is completed, the final sample is collected.

5.7 Sample Preservation, Tracking, Packaging and Transportation

Many of the chemical constituents that are measured are not chemically stable and need to be preserved. Samples requiring acidification are treated with either high purity hydrochloric acid, nitric acid, or sulfuric acid (ULTREX or equivalent), depending upon the standard method of treatment required for the particular parameter suite.

The procedure used by the contract laboratory to which the samples are being sent prescribes the type and amount of preservative which should be used. This information is recorded on the Final Sample Checklist for use by field personnel when final samples are being collected.

The sample tracking system at WIPP uses uniquely numbered Chain of Custody Forms and Request for Analysis Forms. The primary consideration for storage or transportation is that samples must be analyzed within the prescribed holding times for the parameters of interest. Procedures for sample tracking and preservation are generated, approved, and maintained by the site documentation process.

The prescribed transport temperature for the organic samples is four degrees Celsius. This temperature must be maintained until the sample reaches the contracted laboratory.

Insulated shipping containers packaged with reusable blue ice are used to keep the

samples cool during transport to the contract laboratory. Hold times for specific analytical parameters require samples to be shipped by express air freight. The coolers are packaged to meet Department of Transportation and International Air Transportation Association commercial carrier regulations.

5.8 Quality Assurance, Records Management and Document Control

All aspects of quality assurance, records management, and control of documents generated as a result of WQSP are governed by the QAPD; WP 15-PR, Records Management Plan; and implementing procedures generated, approved, and maintained by the site documentation process.

A chemistry laboratory notebook is maintained in the mobile laboratory to record the overall conditions at the well, the analytical difficulties or problems experienced, and any information which may be pertinent to future interpretation and scientific use of the field data. The original notebook is kept in the field laboratory. A copy of the notes made for each sampling round is kept in a fire-resistant file cabinet.

All field data collected are organized into a data book. The typical field data book contains the following:

- A copy of all of the notes entered into the laboratory notebook concerning the sampling round.
- A copy of all chain of custody forms and request for analysis forms used to distribute the final samples.
- A copy of the completed final sample checklist.
- A copy of all standardization forms.
- A hard copy printout of all computer data entries.
- A copy of all of the Serial Sampling Report Forms submitted for the sampling round.
- A copy of all worksheets used to prepare the data for entry into the computer.
- A written summary report containing a description of the well completion data, a brief summary of serial sampling results, and general observations.
- A copy of all Field Sketch Plan Forms.
- A copy of all Field Activity Log Forms.

- A computer printout of all data logger information, if a data logger was used.
- Validated Check Print copies of all data sheets.

A contract laboratory data book is made for each contract laboratory used to analyze samples from a particular well. The contract laboratory data book contains at a minimum:

- A copy of the contract laboratory analytical report.
- A copy of the computer data generated.

Data collected as a result of WQSP activities are summarized and reported on an annual basis in the Site Environmental Report. Raw data are stored in fireproof cabinets in the EM Section for a period of two years and then turned over to PRS for storage in accordance with the RIDS.

5.9 Calibration Requirements

The equipment used to collect data for the WQSP is to be calibrated in accordance with WP 10-AD, WIPP Maintenance Administrative Procedures Manual. The metrology laboratory is responsible for calibrating needed equipment on schedule, in accordance with written procedures. The EM Section is responsible for maintaining current calibration records for each piece of equipment.

6.0 WATER LEVEL MONITORING PLAN

6.1 Scope

This section of the WIPP GSP serves as the controlling document for the WLMP. The WLMP is a subprogram of the GSP. The quality assurance activities of the WLMP are in strict accordance with the QAPD and the quality assurance implementing procedures specific to environmental monitoring are found in WP 02-3, Environmental Monitoring Procedures Manual.

Water level monitoring will continue through the postoperational phase of the WIPP. This plan addresses the activities of the WLMP during the preoperational and operational phases of the WIPP. Postoperational activity plans will be formulated at a later date and will address the objectives of water level monitoring as required at the time of decommissioning.

6.2 Introduction

This program will continue the collection and documentation of water level data initiated by the U.S. Geological Survey (Richey, 1987) and SNL (Stensrud et al., 1988) as part

of the WIPP Site Characterization Program.

As currently planned, water level measurements will be conducted using hydrologic test wells that were constructed for the site characterization and WQSP. These test wells are distributed geographically both within and surrounding the WIPP site. The frequency of measurement is subjectively defined by the need to record the dynamic nature of the potentiometric surface through time.

On October 1, 1988, the ES&H Department assumed responsibility for Groundwater Level Monitoring Activities. At that time a WLMP plan was still being developed. In June of 1989, an initial plan was finalized entitled WP 07-2, WIPP Water Level Monitoring Program Plan, IT Corp. (June 1989). WP 07-2 was subsequently replaced in 1990 by WP 02-1, Groundwater Monitoring Program Plan and Procedures Manual.

Collection of groundwater-level data assists the DOE in meeting performance assessment, regulatory compliance, and permitting requirements. These data also provide:

- Data collection as required by the Environmental Monitoring Plan.
- A means to fulfill commitments made in the FEIS.
- A means to comply with future groundwater inventory and monitoring regulations.
- Input for making land use decisions, (i.e., designing long-term active and passive institutional controls for the site).
- Assistance in understanding any changes to readings from the water-pressure transducers installed in each of the shafts to monitor water conditions behind the liners.
- An understanding of whether or not the horizontal and vertical gradients of flow are changing over time.

6.3 Objective

The objective of the WLMP is to extend the documented record of water-level fluctuations in the Culebra and Magenta members of the Rustler Formation in the vicinity of the WIPP facility. Water-level data will also be collected from wells completed in other water-bearing zones overlying and underlying the WIPP repository horizon when access to those zones is possible. This includes, but is not limited to, the Bell Canyon Formation, the Forty Niner member of the Rustler, the contact zone between the Rustler and Salado Formations, and the Dewey Lake Red Beds, when access to these zones is possible.

The scope of the program is subject to change depending upon the following:

- Data trends
- Performance assessment program needs
- Environmental Monitoring Program needs
- Regulatory compliance needs

Water level measurements will be taken monthly in at least one accessible completed interval at each available well pad. At well pads with two or more wells completed in the same interval, quarterly measurements will be taken in the redundant wells.

Water level monitoring will continue through the life of the WIPP Project. It may be deemed necessary to temporarily increase the frequency of monitoring to effectively document naturally occurring or artificial perturbations that may be imposed on the hydrologic systems at any point in time. This will be conducted in selected key wells by increasing the frequency of the manual water-level measurements or by monitoring water pressures with the aid of electronic pressure transducers and remote data-logging systems.

One of the postulated contaminate pathways to the biosphere in the event of a release is believed to be in the water-bearing zones of the Rustler Formation, more specifically, the Magenta and Culebra members. The Culebra is believed to be the more conductive of the two (Mercer, 1983) and has received the most attention in site characterization studies. Other water bearing zones in the vicinity of the WIPP site, in which a limited number of hydrologic test wells have been completed, include the Dewey Lake Red Beds, the Rustler/Salado Contact, the Forty Niner Member of the Rustler, and the Bell Canyon Formation. All of the above listed zones will be monitored as part of this program plan, subject to availability.

Water level fluctuations of confined water bearing units may result from a variety of hydrologic phenomena (Freeze and Cherry, 1979) and (Davis and DeWeist, 1966). These include:

- Changes in groundwater storage (e.g., groundwater recharge)
- Changes in atmospheric pressure
- Deformation of the water bearing zone (e.g., earthquakes and earth tides)
- Disturbances within or adjacent to a well (e.g., groundwater pumping and shaft construction)

Interpretation of water level measurements and corresponding fluctuations over time is complicated at the WIPP by spatial variation in fluid density both vertically in well bores and areally from well to well. To monitor the hydraulic gradients of the hydrologic flow systems at the WIPP accurately, actual water level measurements and the densities of the fluids in the well bores must be known. When both of these parameters are known, equivalent freshwater heads can be calculated. The concept of freshwater head is discussed in Lusczynski (1961) where the following definition is provided:

> Fresh water head at a given point in groundwater of variable density is defined as the water level in a well filled with fresh water from that point to a level high enough to balance the existing pressure at that point. Fresh water heads define hydraulic gradients along a horizontal.

A discussion explaining the calculation of freshwater heads from midformation depth at WIPP can be found in Haug, et al. (1987).

A Pressure Density Survey Program (PDSP) has been conducted to determine the actual variation in density gradients existing in the test wells. The PDSP measured the actual midformation pressures of the Culebra. Data from this program have identified those wells in which some adjustment to measured water level values must be accounted for in order to calculate the measured water levels accurately in terms of equivalent freshwater heads.

6.4 Field Methods

To obtain an accurate groundwater level measurement, a calibrated water level measuring device is lowered into a test well and the depth to water is recorded from a known reference point. When using an electrical conductance probe, the depth to water can be determined by reading the appropriate measurement markings on the embossed measuring tape when the alarm is activated at the surface. Specific procedures regarding the specific activities governing the Water Level Monitoring Program are generated, approved, and maintained by the site documentation process.

6.5 Records and Document Control

All incoming data will be processed in a timely manner to assure data integrity. The data management process for water level measurements begins with completion of the field data sheets. Date, time, tape measurement, equipment identification number, calibration due date, initial of the field personnel, and equipment/comments are recorded on the field data sheets. If, for some unexpected reason, a measurement is not possible (i.e., a test is under way that blocks entry to the well bore), then a notation as to why the measurement was not taken is recorded in the comment column. Personnel also use the comment column to report any security observations (i.e., well lock missing).

Data recorded on the field data sheets and submitted by field personnel are subject to guidelines outlined in WP 02-3, Environmental Procedures Manual. The data are entered onto a computerized worksheet. The worksheet calculates water level in both feet and meters relative to the top of casing and also relative to mean sea level.

A check print is made of the worksheet printout. The check print is used to verify that data taken in the field is properly reported on the database printout. A minimum of 10 percent of the spreadsheet calculations are randomly verified on the check print to ensure that calculations are being performed correctly. If errors are found, the worksheet is corrected. The data contained on the computerized worksheet are translated into a database file. A printout is made of the database file. The data each month are then compiled into report format and transmitted to the appropriate agencies as requested by the DOE.

A computerized database file is maintained for all groundwater level data. Monthly and quarterly data are appended into a yearly file. Upon verification that the yearly database is free of errors, it is appended into the project database file. A printed copy of the project database is maintained in the ES&H EM fire-resistant storage area current through December of the preceding year.

6.6 Reporting

Data collected from this program are reported in the Annual Site Environmental Report (ASER). The ASER includes all applicable information that may affect the comparison of water level data through time. This information will include but is not limited to:

- Well configuration changes that may have occurred from the time of the last measurement (i.e., plug installation and removal, packer removal and reinstallation, or both; and the type and quantity of fluids that may have been introduced into the test wells).
- Any pumping activities that may have taken place since publication of the last annual report (i.e., water quality sampling, hydraulic testing, and shaft installation or grouting activities).

6.7 Calibration Requirements

The equipment used in taking groundwater level measurements is to be calibrated in accordance with WP 10-AD, WIPP Maintenance Administrative Procedures Manual. The WID metrology laboratory is responsible for calibrating needed equipment on schedule, in accordance with written procedures. The EM Section is responsible for maintaining current calibration records for each piece of equipment.

WATER LEVEL MEASUREMENTS FOR THE MONTH OF MARCH 1999
COMMENTS AND OBSERVATIONS

1. All measurements were referenced to top of casing and adjusted to mean sea level.

2. Measurements were made with water level probe ZE0112 and ZE0122. The calibration recall date on this instrument is 01/15/99.

3. Well number D-268, packer pressure was observed to be 200 psi.

4. Well number Wipp-12, checked for H2S; result was negative.

5. Well numbers H-05, H-06, H-07, H-08, and H-09, have had tall grass and debris removed as well mesquite trimmed back to insure safety around well heads.

ORIGINAL

GWB 194 Q.1

Waterlevel Measurements
For
MARCH 1999

WELL NUMBER	ZONE	CASING ELEVATION ft amsl	DATE	TIME	DEPTH TO WATER	ADJUST TO TOC	ADJUSTED DEPTH TOC	ADJUSTED DEPTH METERS	WATER LEVEL ELEVATION	ELEVATION IN METERS
AEC-7	CUL	3657.25	03/10/99	07:00	619.44	0.98	618.46	188.51	3038.79	926.22
AEC-8	B/C	3537.10	03/08/99	11:43	537.58	0.00	537.58	163.85	2999.52	914.25
C-2505	SR	3413.05	03/10/99	11:53	44.89	0.00	44.89	13.68	3368.16	1026.62
C-2506	SR	3412.87	03/10/99	11:56	44.21	0.00	44.21	13.48	3368.66	1026.77
C-2507	SR	3410.01	03/10/99	12:01	45.66	0.00	45.66	13.92	3364.35	1025.45
CB-1	CUL	3328.38	03/09/99	13:14	360.27	0.00	360.27	109.81	2968.11	904.68
D-268	CUL	3280.70	03/09/99	15:39	275.45	0.75	274.70	83.73	3006.00	916.23
DOE-1	CUL	3466.04	03/10/99	11:23	491.63	0.00	491.63	149.85	2974.41	906.60
DOE-2	CUL	3419.09	03/10/99	08:10	360.67	0.00	360.67	109.93	3058.42	932.21
ERDA-9	CUL	3410.10	03/10/99	09:14	404.49	0.65	403.84	123.09	3006.26	916.31
H-01 (PIP)	CUL	3399.53	03/10/99	09:24	375.86	0.67	375.19	114.36	3024.34	921.82
H-01 (ANNULUS)	MAG	3399.53	03/10/99	09:29	170.13	0.67	169.46	51.65	3230.07	984.53
H-02a	CUL	3378.09	03/10/99	09:40	344.00	0.00	344.00	104.85	3034.09	924.79
H-02b1	MAG	3378.46	03/10/99	09:57	237.33	0.00	237.33	72.34	3141.13	957.42
H-02b2	CUL	3378.31	03/10/99	09:46	342.70	0.00	342.70	104.45	3035.61	925.25
H-02c	CUL	3378.41	03/10/99	09:51	342.98	0.00	342.98	104.54	3035.43	925.20
H-03b1	MAG	3390.64	03/16/99	12:21	240.12	0.00	240.12	73.19	3150.52	960.28
H-03b2	CUL	3390.03	03/16/99	12:24	393.20	0.00	393.20	119.85	2996.83	913.43
H-03b3	CUL	3388.67	03/16/99	12:31	391.62	0.00	391.62	119.37	2997.05	913.50
H-03d/49 (PIP)	49ER	3390.01	03/16/99	12:45	305.86	2.22	303.64	92.55	3086.37	940.73
H-03d/DL (PVC)	DL	3390.01	03/16/99	12:38	319.84	2.22	317.62	96.81	3072.39	936.46
H-04b	CUL	3333.35	03/10/99	10:21	333.33	0.00	333.33	101.60	3000.02	914.41
H-04c	MAG	3334.04	03/10/99	10:29	190.82	0.00	190.82	58.16	3143.22	958.05
H-05a	CUL	3506.24	03/10/99	07:50	475.60	0.00	475.60	144.96	3030.64	923.74
H-05b	CUL	3506.04	03/10/99	07:34	478.11	0.00	478.11	145.73	3027.93	922.91
H-05c	MAG	3506.04	03/10/99	07:43	349.45	0.00	349.45	106.51	3156.59	9[illegible]
H-06a	CUL	3348.11	03/10/99	08:33	296.94	0.00	296.94	90.51	3051.17	93[illegible]
H-06b	CUL	3348.25	03/10/99	08:43	297.24	0.00	297.24	90.60	3051.01	929.95
H-06c	MAG	3348.52	03/10/99	08:38	284.81	0.00	284.81	86.81	3063.71	933.82
H-07b1	CUL	3164.17	03/09/99	06:15	167.32	0.00	167.32	51.00	2996.85	913.44
H-07b2	CUL	3164.40	03/09/99	06:11	167.76	0.00	167.76	51.13	2996.64	913.38
H-08a	MAG	3432.99	03/09/99	07:18	405.59	0.00	405.59	123.62	3027.40	922.75
H-08c	RUS/SAL	3432.90	03/09/99	07:26	453.54	0.00	453.54	138.24	2979.36	908.11
H-09a	CUL	3406.68	03/09/99	08:03	415.50	0.00	415.50	126.64	2991.18	911.71
H-09b	CUL	3406.86	03/09/99	07:49	416.15	0.54	415.61	126.68	2991.25	911.73
H-09c	CUL	3407.30	03/09/99	07:56	416.10	0.00	416.10	126.83	2991.20	911.72
H-10a	MAG	3688.67	03/09/99	08:50	528.81	0.00	528.81	161.18	3159.86	963.13
H-10b	CUL	3689.47	03/09/99	09:00	695.25	0.00	695.25	211.91	2994.22	912.64
H-11b1	CUL	3411.62	03/09/99	10:45	432.19	0.00	432.19	131.73	2979.43	908.13
H-11b2	CUL	3411.64	03/09/99	11:04	432.23	0.00	432.23	131.74	2979.41	908.12
H-11b3	CUL	3412.42	03/09/99	11:14	433.05	0.00	433.05	131.99	2979.37	908.11
H-11b4	CUL	3410.89	03/09/99	10:28	427.88	0.00	427.88	130.42	2983.01	909.22
H-12	CUL	3427.19	03/09/99	09:49	457.39	0.00	457.39	139.41	2969.80	905.20
H-14	CUL	3347.11	03/10/99	10:08	338.56	0.00	338.56	103.19	3008.55	917.01
H-15	CUL	3481.63	03/10/99	11:36	520.75	0.00	520.75	158.72	2960.88	902.48
H-16 (PVC)	DL	3406.77	03/10/99	12:16	108.63	3.70	104.93	31.98	3301.84	1006.40
H-16 (PIP)	ULM	3406.77	03/10/99	12:20	366.94	3.89	363.05	110.66	3043.72	927.73
H-17	CUL	3385.31	03/09/99	12:45	425.55	0.00	425.55	129.71	2959.76	902.13
H-18	CUL	3414.21	03/09/99	14:33	354.96	0.00	354.96	108.19	3059.25	932.46
H-19b0	CUL	3418.38	03/09/99	13:34	430.72	0.00	430.72	131.28	2987.66	910.64
H-19b2	CUL	3419.01	03/09/99	13:48	432.00	0.00	432.00	131.67	2987.01	910.44
H-19b3	CUL	3419.09	03/09/99	14:16	432.24	0.00	432.24	131.75	2986.85	910.39
H-19b4	CUL	3419.03	03/09/99	14:02	431.49	0.00	431.49	131.52	2987.54	910.60
H-19b5	CUL	3418.63	03/09/99	13:56	431.68	0.00	431.68	131.58	2986.95	910.42
H-19b6	CUL	3419.07	03/09/99	14:10	432.08	0.00	432.08	131.70	2986.99	910.43
H-19b7	CUL	3418.99	03/09/99	13:42	432.28	0.00	432.28	131.76	2986.71	910.35
P-14	CUL	3361.06	03/08/99	14:07	316.31	0.00	316.31	96.41	3044.75	92[illegible]

ORIGINAL

CoB 1940.2

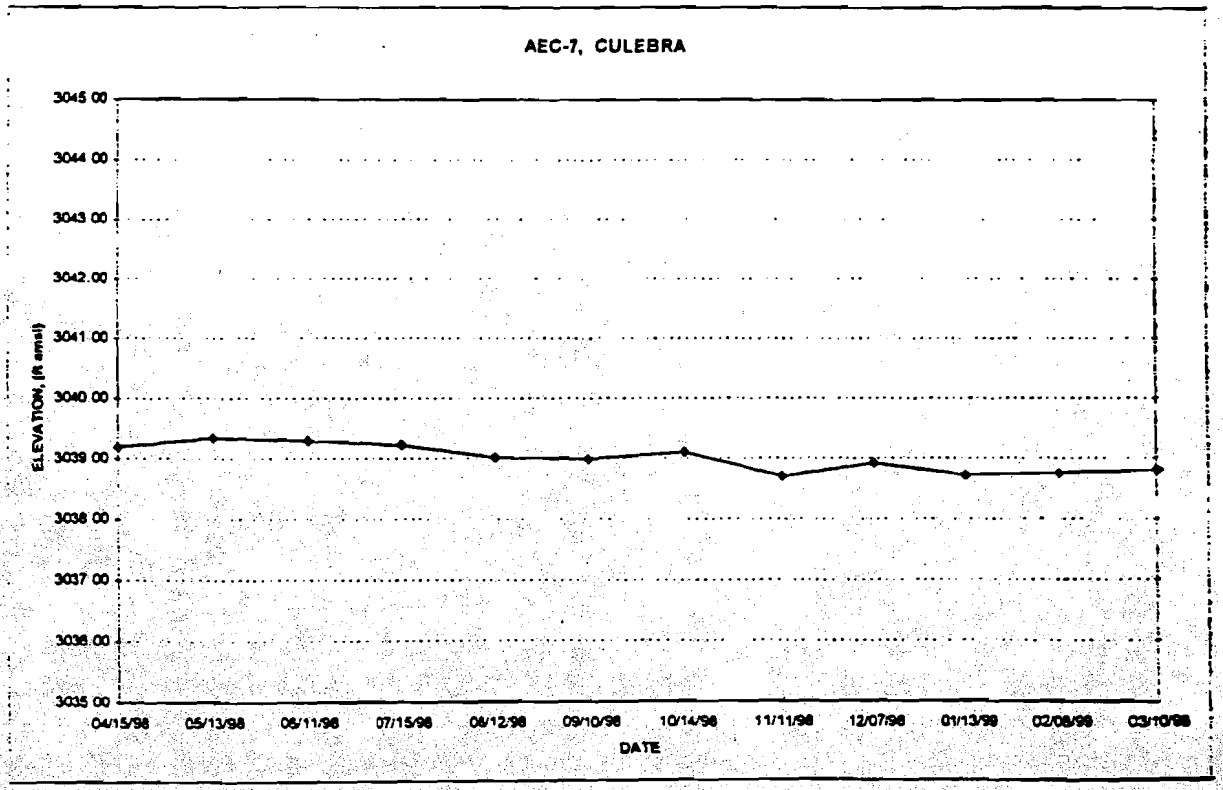
Waterlevel Measurements
For
MARCH 1999

WELL NUMBER	ZONE	CASING ELEVATION ft amsl	DATE	TIME	DEPTH TO WATER	ADJUST TO TOC	ADJUSTED DEPTH TOC	ADJUSTED DEPTH METERS	WATER LEVEL ELEVATION	ELEVATION IN METERS
P-15	CUL	3311.38	03/09/99	15:19	298.49	0.00	298.49	90.98	3012.89	918.33
P-17	CUL	3337.24	03/09/99	13:00	355.35	0.54	354.81	108.15	2982.43	909.04
P-18	CUL	3478.42	03/09/99	10:11	321.49	0.68	320.81	97.78	3157.61	962.44
WIPP-12	CUL	3472.06	03/08/99	13:15	440.32	0.00	440.32	134.21	3031.74	924.07
WIPP-13	CUL	3405.71	03/08/99	12:12	347.73	0.64	347.09	105.79	3058.62	932.27
WIPP-18	CUL	3458.76	03/08/99	13:13	426.01	0.00	426.01	129.85	3032.75	924.38
WIPP-19	CUL	3435.14	03/08/99	13:00	396.62	0.00	396.62	120.89	3038.52	926.14
WIPP-21	CUL	3418.96	03/08/99	12:30	404.78	0.00	404.78	123.38	3014.18	918.72
WIPP-22	CUL	3428.12	03/08/99	12:50	399.86	0.00	399.86	121.88	3028.26	923.01
WIPP-25 (PIP)	CUL	3214.39	03/08/99	09:15	156.34	0.42	155.92	47.52	3058.47	932.22
WIPP-25 (ANNULUS)	MAG	3214.39	03/08/99	09:21	156.68	0.00	156.68	47.76	3057.71	931.99
WIPP-26	CUL	3153.20	03/08/99	14:30	133.09	0.00	133.09	40.57	3020.11	920.53
WIPP-27 (PIP)	CUL	3178.98	03/08/99	06:00	99.00	0.42	98.58	30.05	3080.40	938.91
WIPP-28 (PIP)	RUS/SAL	3349.21	03/08/99	08:15	300.18	0.42	299.76	91.37	3049.45	929.47
WIPP-29	CUL	2978.26	03/08/99	14:58	11.42	0.00	11.42	3.48	2966.84	904.29
WIPP-30 (PIP)	CUL	3429.05	03/08/99	08:51	364.41	2.08	362.33	110.44	3066.72	934.74
WQSP-1	CUL	3419.20	03/08/99	13:49	366.26	0.21	366.05	111.57	3053.15	930.60
WQSP-2	CUL	3463.90	03/08/99	11:11	404.18	0.21	403.97	123.13	3059.93	932.67
WQSP-3	CUL	3480.30	03/08/99	13:26	466.70	0.21	466.49	142.19	3013.81	918.61
WQSP-4	CUL	3433.00	03/10/99	11:11	447.99	0.21	447.78	136.48	2985.22	909 90
WQSP-5	CUL	3384.40	03/10/99	11:02	383.75	0.21	383.54	116.90	3000.86	914.66
WQSP-6	CUL	3363.80	03/10/99	10:51	350.50	0.21	350.29	106.77	3013.51	918.52
WQSP-6a	DL	3364.70	03/10/99	10:55	165.86	0.18	165.68	50.50	3199.02	975.06

ORIGINAL

WATERLEVEL ELEVATION
UPDATE
MARCH 1999

WELL NUMBER	ZONE	CASING ELEVATION ft amsl	DATE	TIME	DEPTH TO WATER	ADJUST TO TOC	ADJUSTED DEPTH TOC	ADJUSTED DEPTH METERS	WATER LEVEL ELEVATION	ELEVATION IN METERS
AEC-7	CUL	3657.25	04/15/98	06:12	619.04	0.98	618.06	188.38	3039.19	926.35
AEC-7	CUL	3657.25	05/13/98	06:00	618.89	0.98	617.91	188.34	3039.34	926.39
AEC-7	CUL	3657.25	06/11/98	06:05	618.94	0.98	617.96	188.35	3039.29	926.38
AEC-7	CUL	3657.25	07/15/98	10:52	619.01	0.98	618.03	188.38	3039.22	926.35
AEC-7	CUL	3657.25	08/12/98	06:23	619.22	0.98	618.24	188.44	3039.01	926.29
AEC-7	CUL	3657.25	09/10/98	11:58	619.24	0.98	618.26	188.45	3038.99	926.28
AEC-7	CUL	3657.25	10/14/98	06:14	619.13	0.98	618.15	188.41	3039.10	926.32
AEC-7	CUL	3657.25	11/11/98	09:30	619.54	0.98	618.56	188.54	3038.69	926.19
AEC-7	CUL	3657.25	12/07/98	11:06	619.32	0.98	618.34	188.47	3038.91	926.26
AEC-7	CUL	3657.25	01/13/99	06:18	619.52	0.98	618.54	188.53	3038.71	926.20
AEC-7	CUL	3657.25	02/08/99	12:26	619.49	0.98	618.51	188.52	3038.74	926.21
AEC-7	CUL	3657.25	03/10/99	07:00	619.44	0.98	618.46	188.51	3038.79	926.22



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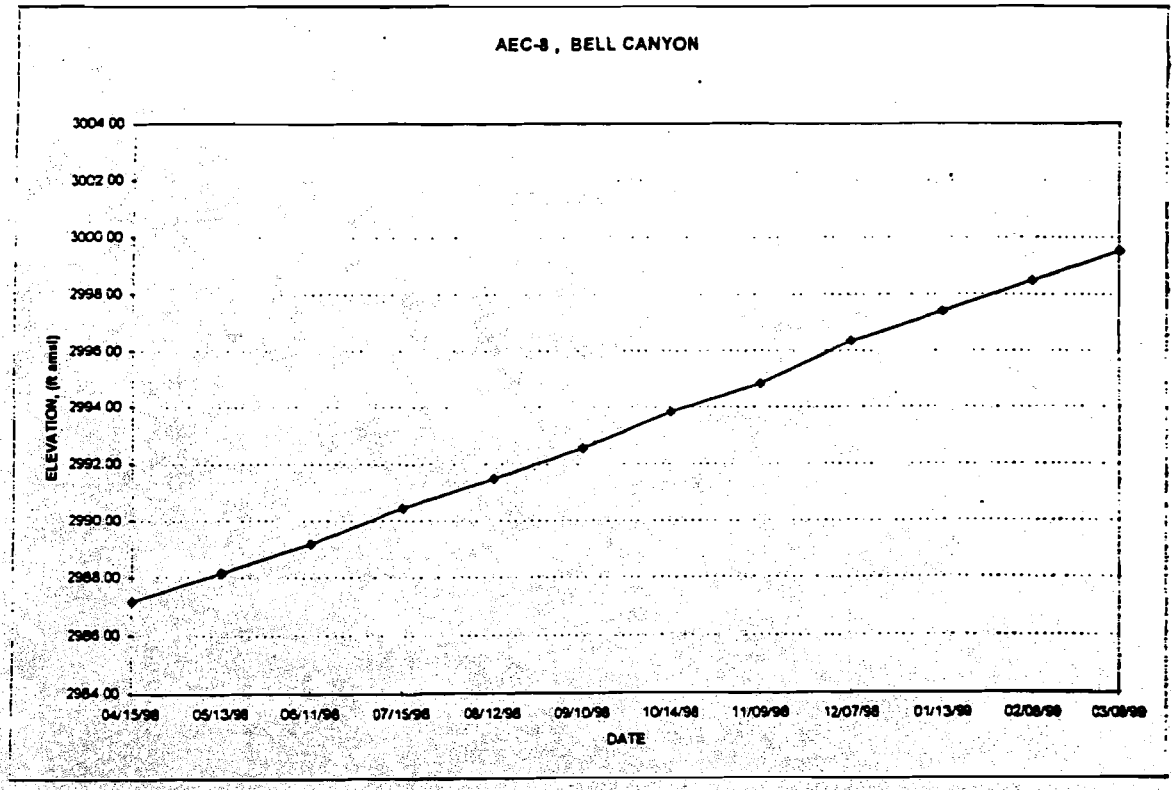
WATERLEVEL ELEVATION
UPDATE
MARCH 1999

WELL NUMBER	ZONE	CASING ELEVATION ft amsl	DATE	TIME	DEPTH TO WATER	ADJUST TO TOC	ADJUSTED DEPTH TOC	ADJUSTED DEPTH METERS	WATER LEVEL ELEVATION	ELEVATION IN METERS
AEC-8	B/C	3537.10	04/15/98	07:15	549.94	0.00	549.94	167.62	2987.16	910.49
AEC-8	B/C	3537.10	05/13/98	06:43	548.95	0.00	548.95	167.32	2988.15	910.79
AEC-8	B/C	3537.10	06/11/98	07:00	547.91	0.00	547.91	167.00	2989.19	911.11
AEC-8	B/C	3537.10	07/15/98	11:18	546.66	0.00	546.66	166.62	2990.44	911.49
AEC-8	B/C	3537.10	08/12/98	07:16	545.62	0.00	545.62	166.30	2991.48	911.80
AEC-8	B/C	3537.10	09/10/98	12:21	544.54	0.00	544.54	165.98	2992.56	912.13
AEC-8	B/C	3537.10	10/14/98	07:02	543.27	0.00	543.27	165.59	2993.83	912.52
AEC-8	B/C	3537.10	11/09/98	11:36	542.28	0.00	542.28	165.29	2994.82	912.82
AEC-8	B/C	3537.10	12/07/98	11:36	540.74	0.00	540.74	164.82	2996.36	913.29
AEC-8	B/C	3537.10	01/13/99	06:52	539.70	0.00	539.70	164.50	2997.40	913.61
AEC-8	B/C	3537.10	02/08/99	12:02	538.61	0.00	538.61	164.17	2998.49	913.94
AEC-8	B/C	3537.10	03/08/99	11:43	537.58	0.00	537.58	163.85	2999.52	914.25



ORIGINAL

Attachment 1 - Water Level Measurement Field Data Sheet

WATER LEVEL MEASUREMENT FIELD DATA SHEET

Well Number	Zone	Date	Time	Measurement in Feet	Adjt.	Initials	Instrument I. D. Number	Calibration Due Date	Comments
AEC-7	CUL	03-10-99	07:00	619.44	0.92	W.L.D.	ZE0122	12-28-99	
AEC-08	B/C	3/8/99	11:43	537.58	0.00	MB	ZE0122	12/28/99	
C-2505	SR	03-10-99	11:53	44.89	0.00	W.L.D	ZE0122	12-28-99	
C-2506	SR	03-10-99	11:56	44.21	0.00	W.L.D	ZE0122	12-28-99	
C-2507	SR	03-10-99	12:01	45.66	0.00	W.L.D.	ZE0122	12-28-99	
CB-1	CUL	03-09-99	13:14	360.27	0.00	W.L.D.	ZE0122	12-28-99	
D-268	CUL	03-09-99	15:39	275.45	0.75	W.L.D.	ZE0122	12-28-99	PACKER PSI-200
DOE-1	CUL	03-10-99	11:23	491.63	0.00	W.L.D	ZE0122	12-28-99	
DOE-2	CUL	03-10-99	08:10	360.67	0.00	W.L.D.	ZE0122	12-28-99	
EDRA-9	CUL	03-10-99	09:14	404.49	0.65	W.L.D	ZE0122	12-28-99	
H-01 (PIP)	CUL	03-10-99	09:24	375.86	0.67	W.L.D.	ZE0122	12-28-99	
H-01 (ANNULUS)	MAG	03-10-99	09:29	170.13	0.67	W.L.D.	ZE0122	12-28-99	
H-02a	CUL	03-10-99	09:40	344.00	0.00	W.L.D.	ZE0122	12-28-99	
H-02b1	MAG	03-10-99	09:57	237.33	0.00	W.L.D.	ZE0122	12-28-99	
H-02b2	CUL	03-10-99	09:46	342.70	0.00	W.L.D	ZE0122	12-28-99	
H-02c	CUL	03-10-99	09:51	342.98	0.00	W.L.D	ZE0122	12-28-99	

CB-1 194-R2

ORIGINAL

Attachment 1 - Water Level Measurement Field Data Sheet

Well Number	Zone	Date	Time	Measurement in Feet	Adjt.	Initials	Instrument I. D. Number	Calibration Due Date	Comments
H-03b1	MAG	03-16-99	12:21	240.12	0.00	W.L.D.	ZE0122	12-28-99	
H-03b2	CUL	03-16-99	12:24	393.20	0.00	W.L.D	ZE0122	12-28-99	
H-03b3	CUL	03-16-99	12:31	391.62	0.00	W.L.D.	ZE0122	12-28-99	
H-03d (PIP)	49ER	03-16-99	12:45	305.86	2.22	W.L.D	ZE0122	12-28-99	
H-03d (PVC)	DL	03-16-99	12:38	319.84	2.22	W.L.D.	ZE0122	12-28-99	
H-04b	CUL	03-10-99	10:21	333.33	0.00	W.L.D	ZE0122	12-28-99	
H-04c	MAG	03-10-99	10:29	190.82	0.00	W.L.D.	ZE0122	12-28-99	
H-05a	CUL	03-10-99	07:50	475.60	0.00	W.L.D.	ZE0122	12-28-99	
H-05b	CUL	03-10-99	07:34	473.11	0.00	W.L.D.	ZE0122	12-28-99	
H-05c	MAG	03-10-99	07:43	349.45	0.00	W.L.D.	ZE0122	12-28-99	
H-06a	CUL	03-10-99	08:33	296.94	0.00	W.L.D.	ZE0122	12-28-99	
H-06b	CUL	03-10-99	08:43	297.24	0.00	W.L.D	ZE0122	12-28-99	
H-06c	MAG	03-10-99	08:38	284.81	0.00	W.L.D	ZE0122	12-28-99	
H-07b1	CUL	03-09-99	06:15	167.32	0.00	W.L.D.	ZE0122	12-28-99	
H-07b2	CUL	03-09-99	06:11	167.76	0.00	W.L.D.	ZE0122	12-28-99	
H-08a	MAG	03-09-99	07:18	W.L.D. 3/9/99 405.90 59	0.00	W.L.D.	ZE0122	12-28-99	
H-08c	Rus/Sal	03-09-99	07:26	453.54	0.00	W.L.D.	ZE0122	12-28-99	

ORIGINAL

Attachment 1 - Water Level Measurement Field Data Sheet

Well Number	Zone	Date	Time	Measurement in Feet	Adjt.	Initials	Instrument I. D. Number	Calibration Due Date	Comments
H-09a	CUL	03-07-99	08:03	415.50	~~8.94~~ 3/11/99 8.92	W.L.D.	ZE0122	12-28-99	
H-09b	CUL	03-07-99	07:49	416.15	0.54	W.L.D	ZE0122	12-28-99	
H-09c	CUL	03-09-99	07:56	416.10	0.00	W.L.D	ZE0122	12-28-99	
H-10a	MAG	03-09-99	08:50	528.81	0.00	W.L.D.	ZE0122	12-28-99	
H-10b	CUL	03-07-99	09:00	695.25	0.00	W.L.D	ZE0122	12-28-99	
H-11b1	CUL	03-09-99	10:45	432.19	0.00	W.L.D.	ZE0122	12-28-99	
H-11b2	CUL	03-09-99	11:04	432.23	0.00	W.L.D.	ZE0122	12-28-99	
H-11b3	CUL	03-07-99	11:14	433.05	0.00	W.L.D	ZE0122	12-28-99	
H-12	CUL	03-09-99	09:49	457.39	0.00	W.L.D.	ZE0122	12-28-99	
H-14	CUL	03-10-99	10:08	338.56	0.00	W.L.D.	ZE0122	12-28-99	
H-15	CUL	03-10-99	11:36	520.75	0.00	W.L.D	ZE0122	12-28-99	
H-16 (PVC)	DL	03-10-99	12:16	108.63	~~3.70~~ 3.72	W.L.D	ZE0122	12-28-99	
H-16 (PIP)	U.L.M	03-10-99	12:20	366.94	3.89	W.L.D.	ZE0122	12-28-99	
H-17	CUL	03-09-99	12:45	425.55	0.00	W.L.D	ZE0122	12-28-99	
H-18	CUL	03-09-99	14:33	354.96	~~0.08~~ 3/11/99 0.00	W.L.D	ZE0122	12-28-99	
H-19b0	CUL	03-09-99	13:34	430.72	0.00	W.L.D.	ZE0122	12-28-99	
H-19b2	CUL	03-09-99	13:48	432.00	0.00	W.L.D	ZE0122	12-28-99	

ORIGINAL

Attachment 1 - Water Level Measurement Field Data Sheet

Well Number	Zone	Date	Time	Measurement in Feet	Adjt.	Initials	Instrument I. D. Number	Calibration Due Date	Comments
H-19b3	CUL	03-09-99	14:16	432.24	0.00	W.L.D	ZE0122	12-28-99	
H-19b4	CUL	03-09-99	14:02	431.49	0.00	W.L.D	ZE0122	12-28-99	
H-19b5	CUL	03-09-99	13:56	431.68	0.00	W.L.D	ZE0122	12-28-99	
H-19b6	CUL	03-09-99	14:10	432.08	0.00	W.L.D	ZE0122	12-28-99	
H-19b7	CUL	03-09-99	13:46	432.28	0.00	W.L.D	ZE0122	12-28-99	
P-14	CUL	3/8/99	14:07	316.31	0.00	MB	ZE0122	12/28/99	
P-15	CUL	03-09-99	15:19	298.49	0.00	W.L.D	ZE0122	12-28-99	
P-17	CUL	03-09-99	13:00	355.35	0.54	W.L.D	ZE0122	12-28-99	
P-18	CUL	03-09-99	10:11	321.49	0.68	W.L.D	ZE0122	12-28-99	
WIPP-12	CUL	3/8/99	13:15	440.32	0.00	MB	ZE0122	12/28/99	CHECKED FOR H2S NEGATIVE
WIPP-13	CUL	3/8/99	12:12	347.73	0.64	MB	ZE0122	12/28/99	
WIPP-18	CUL	3/8/99	13:13	426.01	0.00	MB	ZE0122	12/28/99	
WIPP-19	CUL	3/8/99	13:00	396.62	0.00	MB	ZE0122	12/28/99	
WIPP-21	CUL	3/8/99	12:30	404.78	0.00	MB	ZE0122	12/28/99	
WIPP-22	CUL	3/8/99	12:50	399.86	0.00	MB	ZE0122	12/28/99	
WIPP-25 (PIP)	CUL	3/8/99	09:15	156.34	0.42	MB	ZE0112	12/28/99	
WIPP-25 (ANNULUS)	MAG	3/8/99	09:21	156.68	0.00	MB	ZE0112	12/28/99	

ORIGINAL

Attachment 1 - Water Level Measurement Field Data Sheet

Well Number	Zone	Date	Time	Measurement in Feet	Adjt.	Initials	Instrument I. D. Number	Calibration Due Date	Comments
H-19b3	CUL	03-09-99	14:16	432.24	0.00	W.A.D.	ZE0122	12-28-99	
H-19b4	CUL	03-09-99	14:02	431.49	0.00	W.A.D	ZE0122	12-28-99	
H-19b5	CUL	03-09-99	13:56	431.68	0.00	W.A.D.	ZE0122	12-28-99	
H-19b6	CUL	03-09-99	14:10	432.08	0.00	W.A.D.	ZE0122	12-28-99	
H-19b7	CUL	03-09-99	13:46	432.28	0.00	W.A.D	ZE0122	12-28-99	
P-14	CUL	3/8/99	14:07	316.31	0.00	MB	ZE0122	12/28/99	
P-15	CUL	03-09-99	15:19	298.49	0.00	W.A.D	ZE0122	12-28-99	
P-17	CUL	03-09-99	13:00	355.35	0.54	W.A.D.	ZE0122	12-28-99	
P-18	CUL	03-09-99	10:11	321.49	0.68	W.A.D.	ZE0122	12-28-99	CHECKED FOR H2S NEGATIVE
WIPP-12	CUL	3/8/99	13:15	440.32	0.00	MB	ZE0122	12/28/99	
WIPP-13	CUL	3/8/99	12:12	347.73	0.64	MB	ZE0122	12/28/99	
WIPP-18	CUL	3/8/99	13:13	426.01	0.00	MB	ZE0122	12/28/99	
WIPP-19	CUL	3/8/99	13:00	396.62	0.00	MB	ZE0122	12/28/99	
WIPP-21	CUL	3/8/99	12:30	404.78	0.00	MB	ZE0122	12/28/99	
WIPP-22	CUL	3/8/99	12:50	399.86	0.00	MB	ZE0122	12/28/99	
WIPP-25 (PIP)	CUL	3/8/99	09:15	156.34	0.42	MB	ZE0112	12/28/99	
WIPP-25 (ANNULUS)	MAG	3/8/99	09:21	156.68	0.00	MB	ZE0112	12/28/99	

ORIGINAL

Attachment 1 - Water Level Measurement Field Data Sheet

Well Number	Zone	Date	Time	Measurement in Feet	Adjt.	Initials	Instrument I. D. Number	Calibration Due Date	Comments
H-19b3	CUL	03-09-99	14:16	432.24	0.00	W.A.D	ZE0122	12-28-99	
H-19b4	CUL	03-09-99	14:02	431.49	0.00	W.A.D	ZE0122	12-28-99	
H-19b5	CUL	03-09-99	13:56	431.68	0.00	W.A.D	ZE0122	12-28-99	
H-19b6	CUL	03-09-99	14:10	432.08	0.00	W.A.D	ZE0122	12-28-99	
H-19b7	CUL	03-09-99	13:46	432.28	0.00	W.A.D	ZE0122	12-28-99	
P-14	CUL	3/8/99	14:07	316.31	0.00	MB	ZE0122	12/28/99	
P-15	CUL	03-09-99	15:19	298.49	0.00	W.A.D	ZE0122	12-28-99	
P-17	CUL	03-09-99	13:00	355.35	0.54	W.A.D	ZE0122	12-28-99	
P-18	CUL	03-09-99	10:11	321.49	0.68	W.A.D	ZE0122	12-28-99	
WIPP-12	CUL	3/8/99	13:15	440.32	0.00	MB	ZE0122	12/28/99	CHECKED FOR H2S NEGATIVE
WIPP-13	CUL	3/8/99	12:12	347.73	0.64	MB	ZE0122	12/28/99	
WIPP-18	CUL	3/8/99	13:13	426.01	0.00	MB	ZE0122	12/28/99	
WIPP-19	CUL	3/8/99	13:00	396.62	0.00	MB	ZE0122	12/28/99	
WIPP-21	CUL	3/8/99	12:30	404.78	0.00	MB	ZE0122	12/28/99	
WIPP-22	CUL	3/8/99	12:50	399.86	0.00	MB	ZE0122	12/28/99	
WIPP-25 (PIP)	CUL	3/8/99	09:15	156.34	0.42	MB	ZE0112	12/29/99	
WIPP-25 (ANNULUS)	MAG	3/8/99	09:21	156.68	0.00	MB	ZE0112	12/28/99	

ORIGINAL

Attachment 1 - Water Level Measurement Field Data Sheet

Well Number	Zone	Date	Time	Measurement in Feet	Adjt.	Initials	Instrument I. D. Number	Calibration Due Date	Comments
WIPP-26	CUL	3/8/99	14:30	133.09	0.00	MB	ZE0122	12/28/99	
WIPP-27 (PIP)	CUL	3/8/99	06:06	99.00	042	MB	ZE0112	12/28/99	
WIPP-27 (ANNULUS)	~~MAG~~								~~Abandoned~~
WIPP-28 (PIP)	Rus/Sal	3/8/99	08:15	300.18	0.42	MB	ZE0112	12/28/99	
WIPP-29	CUL	3/8/99	14:58	11:42	0.00	MB	ZE0112	12/28/99	
WIPP-30 (PIP)	CUL	3/8/99	08:51	364.41	2.00	MB	ZE0112	12/28/99	
WQSP-1	CUL	3/8/99	13.49	366.26	0.21	MB	ZE0122	12/28/99	
WQSP-2	CUL	3/8/99	11:11	404.18	0.21	MB	ZE0122	12/28/99	Pump test performed 3/4/99
WQSP-3	CUL	3/8/99	13:26	466.70	0.21	MB	ZE0122	12/28/99	
WQSP-4	CUL	03-10-99	11:11	447.99	0.21	W.A.D.	ZE0122	12-28-99	
WQSP-5	CUL	03-10-99	11:02	383.75	0.21	W.A.D.	ZE0122	12-28-99	
WQSP-6	CUL	03-10-99	10:51	350.50	0.21	W.A.D.	ZE0122	12-28-99	
WQSP-6a	DL	03-10-99	10:55	165.86	0.18	W.A.D.	ZE0122	12-28-99	
H-11b4	CUL	03-09-99	10:28	427.88	0.00	W.A.D.	ZE0122	12-28-99	

ORIGINAL

Attachment 1 - Water Level Measurement Field Data Sheet

WATER LEVEL MEASUREMENT FIELD DATA SHEET

Well Number	Zone	Date	Time	Measurement in Feet	Adjt.	Initials	Instrument I. D. Number	Calibration Due Date	Comments
AEC-7	CUL	03-10-99	07:00	619.44	0.72	M.A.D.	ZE0122	12-28-99	
AEC-08	B/C	3/3/99	11:43	537.58	0.00	MB	ZE0122	12/28/99	
C-2505	SR	03-10-99	11:53	44.87	0.00	M.A.D.	ZE0122	12-28-99	
C-2506	SR	03-10-99	11:56	44.21	0.00	M.A.D.	ZE0122	12-28-99	
C-2507	SR	03-10-99	12:01	45.66	0.00	M.A.D.	ZE0122	12-28-99	
CB-1	CUL	03-09-99	13:14	360.27	0.00	M.A.D.	ZE0122	12-28-99	
D-268	CUL	03-09-99	15:39	275.45	0.75	M.A.D.	ZE0122	12-28-99	PACKER 151-200
DOE-1	CUL	03-10-99	11:23	491.63	0.00	M.A.D.	ZE0122	12-28-99	
DOE-2	CUL	03-10-99	08:10	360.67	0.00	M.A.D.	ZE0122	12-28-99	
EDRA-9	CUL	03-10-99	09:14	404.49	0.65	M.A.D.	ZE0122	12-28-99	
H-01 (PIP)	CUL	03-10-99	09:24	375.86	0.67	M.A.D.	ZE0122	12-28-99	
H-01 (ANNULUS)	MAG	03-10-99	09:32	170.13	0.67	M.A.D.	ZE0122	12-28-99	
H-02a	CUL	03-10-99	09:40	344.00	0.00	M.A.D.	ZE0122	12-28-99	
H-02b1	MAG	03-10-99	09:57	234.33	0.00	M.A.D.	ZE0122	12-28-99	
H-02b2	CUL	03-10-99	09:46	342.70	0.00	M.A.D.	ZE0122	12-28-99	
H-02c	CUL	03-10-99	09:51	342.98	0.00	M.A.D.	ZE0122	12-28-99	

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MEL. Bildeman

Attachment 1 - Water Level Measurement Field Data Sheet

Well Number	Zone	Date	Time	Measurement in Feet	Adjt.	Initials	Instrument I. D. Number	Calibration Due Date	Comments
H-03b1	MAG	03-16-99	12:21	240.12	0.00	W.L.D.	ZE01222	12-28-99	
H-03b2	CUL	03-16-99	12:24	393.20	0.00	W.L.D.	ZE01222	12-28-99	
H-03b3	CUL	03-16-99	12:31	391.62	0.00	W.L.D.	ZE01222	12-28-99	
H-03d (PIP)	49ER	03-16-99	12:45	305.86	2.22	W.L.D.	ZE01222	12-28-99	
H-03d (PVC)	DL	03-16-99	12:38	319.84	2.22	W.L.D.	ZE01222	12-28-99	
H-04b	CUL	03-10-99	10:21	333.33	0.00	W.L.D.	ZE01222	12-28-99	
H-04c	MAG	03-10-99	10:29	190.82	0.00	W.L.D.	ZE01222	12-28-99	
H-05a	CUL	03-10-99	07:50	475.60	0.00	W.L.D.	ZE01222	12-28-99	
H-05b	CUL	03-10-99	07:34	478.11	0.00	W.L.D.	ZE01222	12-28-99	
H-05c	MAG	03-10-99	07:43	349.45	0.00	W.L.D.	ZE01222	12-28-99	
H-06a	CUL	03-10-99	08:33	296.94	0.00	W.L.D.	ZE01222	12-28-99	
H-06b	CUL	03-10-99	08:43	297.24	0.00	W.L.D.	ZE01222	12-28-99	
H-06c	MAG	03-10-99	08:38	284.81	0.00	W.L.D.	ZE01222	12-28-99	
H-07b1	CUL	03-09-99	06:15	167.32	0.00	W.L.D.	ZE01222	12-28-99	
H-07b2	CUL	03-09-99	06:11	167.76	0.00	W.L.D.	ZE01222	12-28-99	
H-08a	MAG	03-09-99	07:18	W.L.D. 3/9/99 405.98 59	0.00	W.L.D.	ZE01222	12-28-99	
H-08c	Rus/Sal	03-09-99	07:26	453.54	0.00	W.L.D.	ZE01222	12-28-99	

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N.E.L. Baldwin

Attachment 1 - Water Level Measurement Field Data Sheet

Well Number	Zone	Date	Time	Measurement in Feet	Adjt.	Initials	Instrument I. D. Number	Calibration Due Date	Comments
H-09a	CUL	03-07-99	08:03	415.50	8:34	W.L.D.	ZE0122	12-28-99	
H-09b	CUL	03-07-99	07:49	416.15	0.54	W.L.D.	ZE0122	12-28-99	
H-09c	CUL	03-07-99	07:56	416.10	0.00	W.L.D.	ZE0122	12-28-99	
H-10a	MAG	03-07-99	08:50	528.81	0.00	W.L.D.	ZE0122	12-28-99	
H-10b	CUL	03-07-99	09:00	675.25	0.00	W.L.D.	ZE0122	12-28-99	
H-11b1	CUL	03-09-99	10:15	432.19	0.00	W.L.D.	ZE0122	12-28-99	
H-11b2	CUL	03-07-99	11:04	432.23	0.00	W.L.D.	ZE0122	12-28-99	
H-11b3	CUL	03-07-99	11:14	433.05	0.00	W.L.D.	ZE0122	12-28-99	
H-12	CUL	03-09-99	09:47	457.39	0.00	W.L.D.	ZE0122	12-28-99	
H-14	CUL	03-10-99	10:08	338.56	0.00	W.L.D.	ZE0122	12-28-99	
H-15	CUL	03-10-99	11:36	520.75	0.00	W.L.D.	ZE0122	12-28-99	
H-16 (PVC)	DL	03-10-99	12:16	108.63	3.70	W.L.D.	ZE0122	12-28-99	
H-16 (PIP)	U.L.M	03-10-99	12:20	366.94	3.87	W.L.D.	ZE0122	12-28-99	
H-17	CUL	03-09-99	13:45	425.55	0.00	W.L.D.	ZE0122	12-28-99	
H-18	CUL	03-09-99	14:33	354.96	3/9/99 0.00 0.08	W.L.D.	ZE0122	12-28-99	
H-19b0	CUL	03-09-99	13:34	430.72	0.00	W.L.D.	ZE0122	12-28-99	
H-19b2	CUL	03-09-99	13:48	432.00	0.00	W.L.D.	ZE0122	12-28-99	

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Mel. Baldemama

Attachment 1 - Water Level Measurement Field Data Sheet

Well Number	Zone	Date	Time	Measurement in Feet	Adjt.	Initials	Instrument I. D. Number	Calibration Due Date	Comments
H-19b3	CUL	03-07-99	14:16	432.24	0.00	W.A.D.	ZE0122	12-28-99	
H-19b4	CUL	03-07-99	14:02	431.49	0.00	W.A.D.	ZE0122	12-28-99	
H-19b5	CUL	03-07-99	13:56	431.68	0.00	W.A.D.	ZE0122	12-28-99	
H-19b6	CUL	03-07-99	14:10	432.08	0.00	W.A.D.	ZE0122	12-28-99	
H-19b7	CUL	03-07-99	13:42	432.28	0.00	W.A.D.	ZE0122	12-28-99	
P-14	CUL	3/8/99	14:07	316.31	0.00	MB	ZE0122	12/28/99	
P-15	CUL	03-09-99	15:19	278.49	0.00	W.A.D.	ZE0122	12-28-99	
P-17	CUL	03-07-99	13:00	355.35	0.54	W.A.D.	ZE0122	12-28-99	
P-18	CUL	03-09-99	10:11	321.49	0.68	W.A.D.	ZE0122	12-28-99	
WIPP-12	CUL	3/8/99	13:15	440.32	0.00	MB	ZE0122	12/28/99	CHECKED FOR H2S NEGATIVE
WIPP-13	CUL	3/8/99	12:12	347.73	0.64	MB	ZE0122	12/28/99	
WIPP-18	CUL	3/8/99	13:13	426.01	0.00	MB	ZE0122	12/28/99	
WIPP-19	CUL	3/8/99	13:00	396.62	0.00	MB	ZE0122	12/28/99	
WIPP-21	CUL	3/8/99	12:30	404.78	0.00	MB	ZE0122	12/28/99	
WIPP-22	CUL	3/8/99	12:50	399.86	0.00	MB	ZE0122	12/28/99	
WIPP-25 (PIP)	CUL	3/8/99	09:15	156.34	0.12	MB	ZE0112	12/28/99	
WIPP-25 (ANNULUS)	MAG	3/8/99	09:21	156.68	0.00	MB	ZE0112	12/28/99	

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Mel. Richardson

Attachment 1 - Water Level Measurement Field Data Sheet

Well Number	Zone	Date	Time	Measurement in Feet	Adjt.	Initials	Instrument I. D. Number	Calibration Due Date	Comments
WIPP-26	CUL	3/8/99	14:30	133.09	0.00	MB	ZE0122	12/28/99	
WIPP-27 (PIP)	CUL	3/8/99	06:00	99.00	042	MB	ZE0112	12/28/99	
WIPP-27 (ANNULUS)	~~MAG~~								~~Obstruction~~
WIPP-28 (PIP)	Rus/Sal	3/8/99	08:15	300.18	0.42	MB	ZE0112	12/28/99	
WIPP-29	CUL	3/8/99	14:58	11:112	0.00	MB	ZE0112	12/28/99	
WIPP-30 (PIP)	CUL	3/8/99	08:51	364.41	2.08	MB	ZE0112	12/28/99	
WQSP-1	CUL	3/8/99	13.49	366.26	0.21	MB	ZE0122	12/28/99	
WQSP-2	CUL	3/8/99	11:11	404.18	0.21	MB	ZE0122	12/28/99	Pump test performed 3/4/99
WQSP-3	CUL	3/8/99	13:26	466.70	0.21	MB	ZE0122	12/28/99	
WQSP-4	CUL	03-10-99	11:11	447.99	0.21	M.B.	ZE0122	12-28-99	
WQSP-5	CUL	03-10-99	11:02	383.75	0.21	M.B.	ZE0122	12-28-99	
WQSP-6	CUL	03-10-99	10:51	350.50	0.21	M.B.	ZE0122	12-28-99	
WQSP-6a	DL	03-10-99	10:55	165.86	0.18	M.B.	ZE0122	12-28-99	
H-11b4	CUL	03-09-99	10:28	427.88	0.00	M.B.	ZE0122	12-28-99	

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Mel. Baldenama
03/22/99

Groundwater level Measurements for March 1999

WELL_NO	ZONE	TOC_AMSL	DATE	TIME	TP_FT_TOC	ADJ_FT	WL_FT	WL_METERS	WL_MSL_FT	WL_MSL_M
AEC-7	CUL	3657.25	03/10/99	07:00	619.44	0.98	618.46	188.51	3038.79	926.22
AEC-8	B/C	3537.10	03/08/99	11:43	537.58	0.00	537.58	163.85	2999.52	914.25
C-2505	SR	3413.05	03/10/99	11:53	44.89	0.00	44.89	13.68	3368.16	1026.62
C-2506	SR	3412.87	03/10/99	11:56	44.21	0.00	44.21	13.48	3368.66	1026.77
C-2507	SR	3410.01	03/10/99	12:01	45.66	0.00	45.66	13.92	3364.35	1025.45
CB-1	CUL	3328.38	03/09/99	13:14	360.27	0.00	360.27	109.81	2968.11	904.68
D-268	CUL	3280.70	03/09/99	15:39	275.45	0.75	274.70	83.73	3006.00	916.23
DOE-1	CUL	3466.04	03/10/99	11:23	491.63	0.00	491.63	149.85	2974.41	906.60
DOE-2	CUL	3419.09	03/10/99	08:10	360.67	0.00	360.67	109.93	3058.42	932.21
ERDA-9	CUL	3410.10	03/10/99	09:14	404.49	0.65	403.84	123.09	3006.26	916.31
H-01 (PIP)	CUL	3399.53	03/10/99	09:24	375.86	0.67	375.19	114.36	3024.34	921.82
H-01 (ANNULUS)	MAG	3399.53	03/10/99	09:29	170.13	0.67	169.46	51.65	3230.07	984.53
H-02a	CUL	3378.09	03/10/99	09:40	344.00	0.00	344.00	104.85	3034.09	924.79
H-02b1	MAG	3378.46	03/10/99	09:57	237.33	0.00	237.33	72.34	3141.13	957.42
H-02b2	CUL	3378.31	03/10/99	09:46	342.70	0.00	342.70	104.45	3035.61	925.25
H-02c	CUL	3378.41	03/10/99	09:51	342.98	0.00	342.98	104.54	3035.43	925.20
H-03b1	MAG	3390.64	03/16/99	12:21	240.12	0.00	240.12	73.19	3150.52	960.28
H-03b2	CUL	3390.03	03/16/99	12:24	393.20	0.00	393.20	119.85	2996.83	913.43
H-03b3	CUL	3388.67	03/16/99	12:31	391.62	0.00	391.62	119.37	2997.05	913.50
H-03d/49 (PIP)	49ER	3390.01	03/16/99	12:45	305.86	2.22	303.64	92.55	3086.37	940.73
H-03d/DL (PVC)	DL	3390.01	03/16/99	12:38	319.84	2.22	317.62	96.81	3072.39	936.46
H-04b	CUL	3333.35	03/10/99	10:21	333.33	0.00	333.33	101.60	3000.02	914.41
H-04c	MAG	3334.04	03/10/99	10:29	190.82	0.00	190.82	58.16	3143.22	958.05
H-05a	CUL	3506.24	03/10/99	07:50	475.60	0.00	475.60	144.96	3030.64	923.74
H-05b	CUL	3506.04	03/10/99	07:34	478.11	0.00	478.11	145.73	3027.93	922.91
H-05c	MAG	3506.04	03/10/99	07:43	349.45	0.00	349.45	106.51	3156.59	962.13
H-06a	CUL	3348.11	03/10/99	08:33	296.94	0.00	296.94	90.51	3051.17	930.00
H-06b	CUL	3348.25	03/10/99	08:43	297.24	0.00	297.24	90.60	3051.01	929.95
H-06c	MAG	3348.52	03/10/99	08:38	284.81	0.00	284.81	86.81	3063.71	933.82
H-07b1	CUL	3164.17	03/09/99	06:15	167.32	0.00	167.32	51.00	2996.85	913.44
H-07b2	CUL	3164.40	03/09/99	06:11	167.76	0.00	167.76	51.13	2996.64	913.38
H-08a	MAG	3432.99	03/09/99	07:18	405.59	0.00	405.59	123.62	3027.40	922.75
H-08c	RUS/SAL	3432.90	03/09/99	07:26	453.54	0.00	453.54	138.24	2979.36	908.11
H-09a	CUL	3406.68	03/09/99	08:03	415.50	0.00	415.50	126.64	2991.18	911.71
H-09b	CUL	3406.86	03/09/99	07:49	416.15	0.54	415.61	126.68	2991.25	911.73
H-09c	CUL	3407.30	03/09/99	07:56	416.10	0.00	416.10	126.83	2991.20	911.72
H-10a	MAG	3688.67	03/09/99	08:50	528.81	0.00	528.81	161.18	3159.86	963.13
H-10b	CUL	3689.47	03/09/99	09:00	695.25	0.00	695.25	211.91	2994.22	912.64
H-11b1	CUL	3411.62	03/09/99	10:45	432.19	0.00	432.19	131.73	2979.43	908.13
H-11b2	CUL	3411.64	03/09/99	11:04	432.23	0.00	432.23	131.74	2979.41	908.12
H-11b3	CUL	3412.42	03/09/99	11:14	433.05	0.00	433.05	131.99	2979.37	908.11
H-11b4	CUL	3410.89	03/09/99	10:28	427.88	0.00	427.88	130.42	2983.01	909.22
H-12	CUL	3427.19	03/09/99	09:49	457.39	0.00	457.39	139.41	2969.80	905.20
H-14	CUL	3347.11	03/10/99	10:08	338.56	0.00	338.56	103.19	3008.55	917.01
H-15	CUL	3481.63	03/10/99	11:36	520.75	0.00	520.75	158.72	2960.88	902.48
H-16 (PVC)	DL	3406.77	03/10/99	12:16	108.63	3.70	104.93	31.98	3301.84	1006.40
H-16 (PIP)	ULM	3406.77	03/10/99	12:20	366.94	3.89	363.05	110.66	3043.72	927.73
H-17	CUL	3385.31	03/09/99	12:45	425.55	0.00	425.55	129.71	2959.76	902.13
H-18	CUL	3414.21	03/09/99	14:33	354.96	0.00	354.96	108.19	3059.25	932.48
H-19b0	CUL	3418.38	03/09/99	13:34	430.72	0.00	430.72	131.28	2987.66	910.64
H-19b2	CUL	3419.01	03/09/99	13:48	432.00	0.00	432.00	131.67	2987.01	910.44
H-19b3	CUL	3419.09	03/09/99	14:16	432.24	0.00	432.24	131.75	2986.85	910.39
H-19b4	CUL	3419.03	03/09/99	14:02	431.49	0.00	431.49	131.52	2987.54	910.60
H-19b5	CUL	3418.63	03/09/99	13:56	431.68	0.00	431.68	131.58	2986.95	910.42
H-19b6	CUL	3419.07	03/09/99	14:10	432.08	0.00	432.08	131.70	2986.99	910.43
H-19b7	CUL	3418.99	03/09/99	13:42	432.28	0.00	432.28	131.76	2986.71	910.35
P-14	CUL	3361.06	03/08/99	14:07	316.31	0.00	316.31	96.41	3044.75	928.04
P-15	CUL	3311.38	03/09/99	15:19	298.49	0.00	298.49	90.98	3012.89	918.33
P-17	CUL	3337.24	03/09/99	13:00	355.35	0.54	354.81	108.15	2982.43	909.04
P-18	CUL	3478.42	03/09/99	10:11	321.49	0.68	320.81	97.78	3157.61	962.44
WIPP-12	CUL	3472.06	03/08/99	13:15	440.32	0.00	440.32	134.21	3031.74	924.07
WIPP-13	CUL	3405.71	03/08/99	12:12	347.73	0.64	347.09	105.79	3058.62	932.27
WIPP-18	CUL	3458.76	03/08/99	13:13	426.01	0.00	426.01	129.85	3032.75	924.38
WIPP-19	CUL	3435.14	03/08/99	13:00	396.62	0.00	396.62	120.89	3038.52	926.14
WIPP-21	CUL	3418.96	03/08/99	12:30	404.78	0.00	404.78	123.38	3014.18	918.72
WIPP-22	CUL	3428.12	03/08/99	12:50	399.86	0.00	399.86	121.88	3028.26	923.01
WIPP-25 (PIP)	CUL	3214.39	03/08/99	09:15	156.24	0.13	155.92	47.52	3058.47	932.22

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WIPP-25 (ANNULUS)	MAG	3214.39	03/08/99	09:21	156.68	0.00	156.68	47.76	3057.71	931.99
WIPP-26	CUL	3153.20	03/08/99	14:30	133.09	0.00	133.09	40.57	3020.11	920.53
WIPP-27 (PIP)	CUL	3178.98	03/08/99	06:00	99.00	0.42	98.58	30.05	3080.40	938.91
WIPP-28 (PIP)	RUS SAL	3349.21	03/08/99	08:15	300.18	0.42	299.76	91.37	3049.45	929.47
WIPP-29	CUL	2978.26	03/08/99	14:58	11.42	0.00	11.42	3.48	2966.84	904.29
WIPP-30 (PIP)	CUL	3429.05	03/08/99	08:51	364.41	2.08	362.33	110.44	3066.72	934.74
WQSP-1	CUL	3419.20	03/08/99	13:49	366.26	0.21	366.05	111.57	3053.15	930.60
WQSP-2	CUL	3463.90	03/08/99	11:11	404.18	0.21	403.97	123.13	3059.93	932.67
WQSP-3	CUL	3480.30	03/08/99	13:26	466.70	0.21	466.49	142.19	3013.81	918.81
WQSP-4	CUL	3433.00	03/10/99	11:11	447.99	0.21	447.78	136.48	2985.22	909.90
WQSP-5	CUL	3384.40	03/10/99	11:02	383.75	0.21	383.54	116.90	3000.86	914.66
WQSP-6	CUL	3363.80	03/10/99	10:51	350.50	0.21	350.29	106.77	3013.51	918.52
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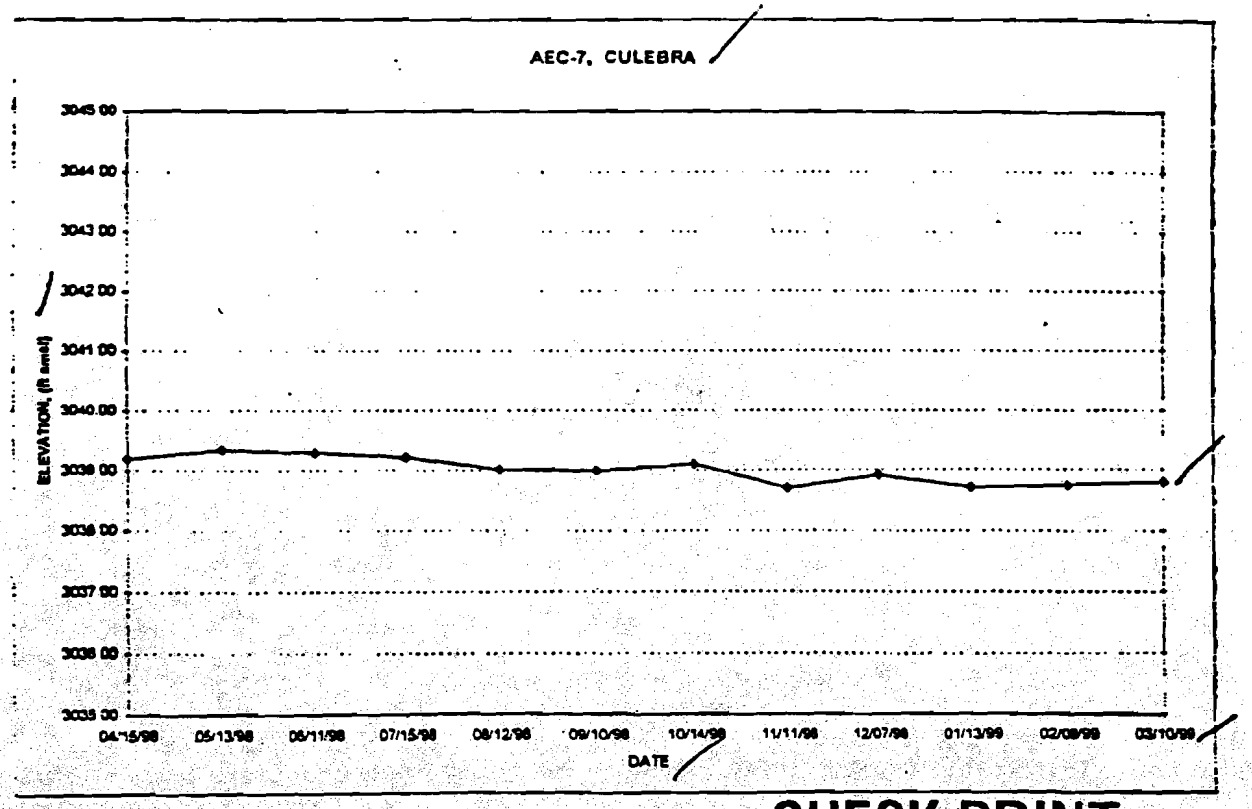
Mel. Baldemann

03/23/99

WATERLEVEL ELEVATION
UPDATE
MARCH 1999

WELL NUMBER	ZONE	CASING ELEVATION ft amsl	DATE	TIME	DEPTH TO WATER	ADJUST TO TOC	ADJUSTED DEPTH TOC	ADJUSTED DEPTH METERS	WATER LEVEL ELEVATION	ELEVATION IN METERS
AEC-7	CUL	3657 25	04/15/98	06:12	619 04	0.98	618.06	188.38	3039.19	926.35
AEC-7	CUL	3657.25	05/13/98	06:00	618.89	0.98	617.91	188 34	3039 34	926.39
AEC-7	CUL	3657.25	06/11/98	06:05	618.94	0 98	617.96	188.35	3039.29	926.38
AEC-7	CUL	3657.25	07/15/98	10:52	619.01	0.98	618 03	188 38	3039.22	926.35
AEC-7	CUL	3657.25	08/12/98	06:23	619.22	0.98	618.24	188.44	3039.01	926.29
AEC-7	CUL	3657 25	09/10/98	11:58	619.24	0.98	618 26	188.45	3038.99	926.28
AEC-7	CUL	3657 25	10/14/98	06:14	619.13	0.98	618.15	188 41	3039.10	926.32
AEC-7	CUL	3657 25	11/11/98	09:30	619 54	0.98	618.56	188.54	3038.69	926.19
AEC-7	CUL	3657 25	12/07/98	11.06	619.32	0 98	618.34	188 47	3038.91	926.26
AEC-7	CUL	3657.25	01/13/99	06:18	619.52	0.98	618.54	188.53	3038.71	926.20
AEC-7	CUL	3657.25	02/08/99	12:28	619.49	0.98	618.51	188.52	3038.74	926.21
AEC-7	CUL	3657 25	03/10/99	07:00	619.44	0.98	618 46	188.51	3038.79	926.22



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Mel. Baldwin
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WATERLEVEL ELEVATION
UPDATE
MARCH 1999

WELL NUMBER	ZONE	CASING ELEVATION ft amsl	DATE	TIME	DEPTH TO WATER	ADJUST TO TOC	ADJUSTED DEPTH TOC	ADJUSTED DEPTH METERS	WATER LEVEL ELEVATION	ELEVATION IN METERS
AEC-8	B/C	3537.10	04/15/98	07:15	549.94	0.00	549.94	167.62	2987.16	910.49
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AEC-8	B/C	3537.10	06/11/98	07:00	547.91	0.00	547.91	167.00	2989.19	911.11
AEC-8	B/C	3537.10	07/15/98	11:18	546.66	0.00	546.66	166.62	2990.44	911.49
AEC-8	B/C	3537.10	08/12/98	07:16	545.62	0.00	545.62	166.30	2991.48	911.80
AEC-8	B/C	3537.10	09/10/98	12:21	544.54	0.00	544.54	165.98	2992.56	912.13
AEC-8	B/C	3537.10	10/14/98	07:02	543.27	0.00	543.27	165.59	2993.83	912.52
AEC-8	B/C	3537.10	11/09/98	11:36	542.28	0.00	542.28	165.29	2994.82	912.82
AEC-8	B/C	3537.10	12/07/98	11:36	540.74	0.00	540.74	164.82	2996.36	913.29
AEC-8	B/C	3537.10	01/13/99	06:52	539.70	0.00	539.70	164.50	2997.40	913.61
AEC-8	B/C	3537.10	02/08/99	12:02	538.61	0.00	538.61	164.17	2998.49	913.94
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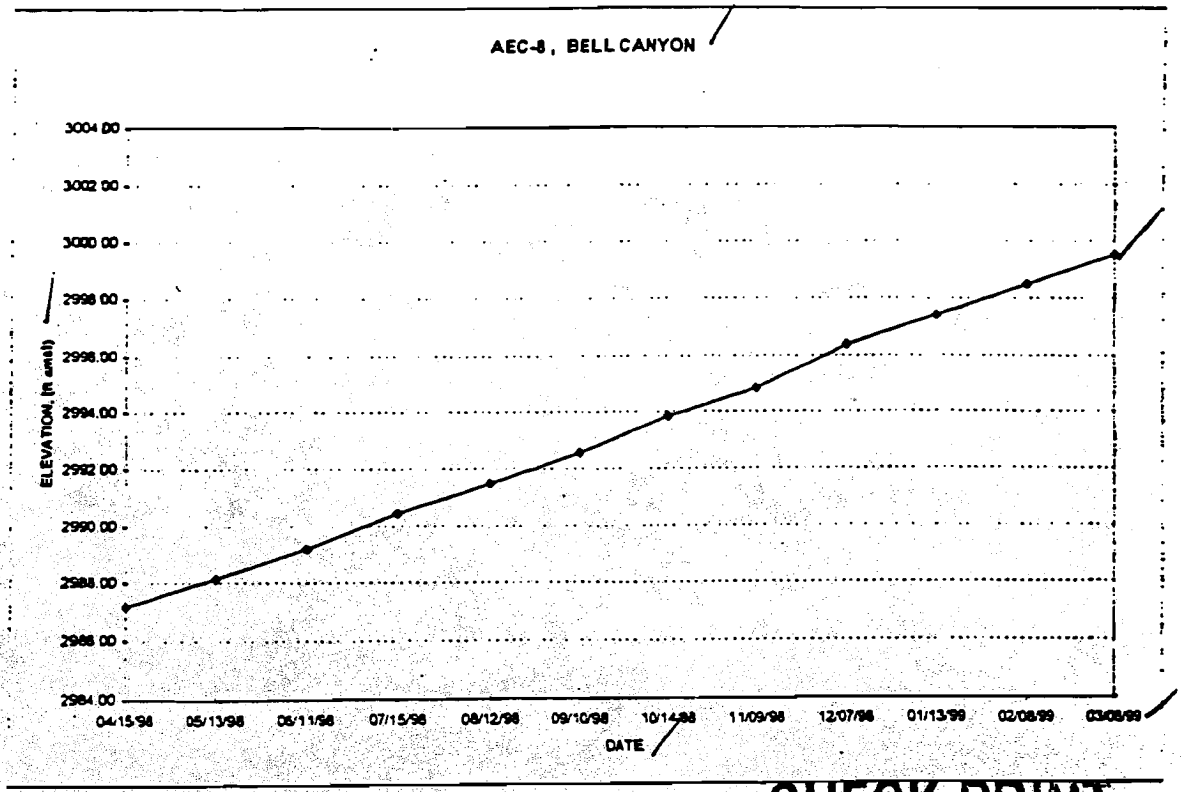

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MEL. Baldwin
03/23/99

Waste Isolation Pilot Plant

Annual

Site Environmental Report

Calendar Year 1997

DOE/WIPP 98-2225

Issue Date: September 29, 1998

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CHAPTER 7 GROUNDWATER PROTECTION

Current groundwater monitoring activities at WIPP are outlined in the Groundwater Monitoring Program Plan and Procedure Manual (WP 02-1, Revision 3). The plan is a QA document that contains program plans for each of the activities performed by groundwater monitoring personnel. In addition, WP 02-1 provides detailed procedures for performing specific activities such as pumping system installations, field parameter analyses and documentation, and QA records management. Groundwater monitoring activities are also defined in the EMP.

The objective of the groundwater monitoring program is to determine the physical and chemical characteristics of groundwater; maintain surveillance of groundwater levels surrounding the WIPP facility, both before and throughout the operational lifetime of the facility; and fulfill the requirements of the RCRA Part B permit application and DOE Order 5400.1.

Background water quality data were collected from 1985 through the 1990 sampling period to fulfill the requirements of DOE Order 5400.1 as reported in DOE/WIPP 92-013, "Background Water Quality Characterization Report for the Waste Isolation Pilot Plant." In the latter part of 1994 seven new wells were drilled (Figures 7.5 through 7.11) in anticipation of the RCRA permitting process. Background data were collected from these wells from 1995 through 1997 and reported in DOE/WIPP 98-2285, "Waste Isolation Pilot Plant RCRA Background Groundwater Quality Baseline Report." This background data will be compared to water quality data collected throughout the operational life of the facility. Preoperational data gathered in the interim period will be used to strengthen the background data, to evaluate the need to make adjustments to comparison criteria, and to determine future regulatory needs and land-use decisions.

The data obtained by the WQSP in 1997 supported two major programs at WIPP: (1) the Groundwater Monitoring Program in compliance with 40 CFR § 264 and (2) performance assessment in compliance with 40 CFR § 191. Each of these programs requires a unique set of analyses and data. Particular sample needs are defined by each program. In addition to the characterization of groundwater, the WQSP supported radionuclide monitoring for the WID Environmental Analysis and Compliance Section. Results of radionuclide sampling are discussed in Chapter 5. Representatives from the EEG were on hand at selected sampling events to collect samples for independent evaluation.

The WIPP site lies within the Pecos Valley section of the Southern Great Plains physiographic province (Powers et al., 1978). Geologic and lithologic descriptions of the area surrounding the site can be found in documents such as the EMP, the Groundwater Protection Management Program Plan (DOE/WIPP 96-2162), and USGS 83-4016 (Mercer, 1983). Industries in the vicinity that could potentially contribute to the pollution of the groundwater are potash mining, oil and gas exploration/production, and agriculture.

The Culebra is the most significant water-bearing unit within the vicinity of WIPP. No known hydrologic connection exists between the repository horizon and the Culebra. Surveillance of hydrological characteristics in the Culebra provides data that can be used to detect changes in water characterization. It also provides additional data for use in hydrologic models designed to predict long-term performance of the repository.

Groundwater surface elevation data is gathered from 77 well bores; five of which are equipped with production-inflated packers to allow groundwater level surveillance of more than one producing zone through the same well bore (Figure 7.2).

Groundwater quality data were gathered from six wells completed in the Culebra member of the Rustler formation and one well completed in the Dewey Lake formation (Figure 7.1). The

water quality sampling process has been developed using logistics from groundwater wells originally constructed for characterization, not intended for groundwater monitoring activities.

Seven wells were drilled in the latter part of 1994 constructed for the explicit purpose of gathering water quality data. These wells are constructed with fiberglass casing and screens that will not bias sample collection. Similar sampling protocols to those used in the past for wells drilled for resource evaluation and site geologic characterization were used through CY 1997. More efficient sampling methods are being evaluated and should be phased in during CY 1998.

Sampling episodes are referred to as a "sampling round." Each sampling round consists of the collection of two types of samples: (1) serial samples and (2) final samples. Serial samples are taken periodically while the well is being purged. Key physical and chemical parameters (known as field parameters) are analyzed and compared with past serial sampling data, when available, until a chemical steady state has been reached. A chemical steady state is defined as ± 5 percent of the average of the three to five preceding parameter measurements made on the final day of serial sampling from preceding sampling rounds. Stabilization of these field parameters is a function of purging and is used as an indicator to determine if the groundwater is representative of the zone being sampled. A final sample is collected when it has been determined that the pumped groundwater has achieved a representative state. The sample is then sent off site to a contract laboratory for analysis.

Groundwater monitoring activities during CY 1997 included Groundwater Quality Sampling and Groundwater Level Surveillance.

Groundwater Quality Sampling

Sampling for groundwater quality was performed semiannually at seven well sites during CY 1997 (Figure 7.1). The wells were serially sampled as soon as possible after the pump was turned on to better observe early chemical reactions to pumping. Field analysis for Eh, pH, specific gravity, specific conductance, alkalinity, chloride, divalent cations, and total iron were performed on a periodic basis during the serial sampling. These field parameters were used as indicators, during the purging process to better determine when the formation water being pumped had reached a representative state. Normally this process required four to seven days to complete. Following the field analysis of the final serial sample, samples were collected and shipped to an independent, contracted, laboratory for analysis. Parameters of analysis by the contracted laboratory include the groundwater monitoring list in Appendix IX of 40 CFR § 264 and those indicator parameters common to the Culebra member of the Rustler as listed in Table 7.1.

WIPP has not received waste; therefore no hazardous constituent has been introduced to the environment as a result of WIPP operations. Data collected provide background information.

The total gallons of water removed from the Culebra as a result of groundwater surveillance activity was approximately 44,318 gallons throughout the year. During the same period 10,962 gallons of water were removed from the Dewey lake formation. Water quality of the Culebra sampled near WIPP is naturally poor and is not suitable for human consumption or for agricultural purposes. The groundwater of the Culebra is considered to be class III waters by EPA guidelines. The water contains naturally high concentrations of total dissolved solids and mineral constituents primarily of chloride, calcium, magnesium, sodium and potassium (Mercer, 1983). The high total of dissolved solids concentration has historically posed problems for laboratories performing analysis because the water interferes with the normal operation of standard laboratory equipment such as Atomic Absorption or Inductively Coupled Plasma, causing estimated quantitation limits to be inconsistent.

Water quality measurements performed in the Dewey Lake formation indicate that the waters are considerably fresher. Samples collected from the Dewey Lake formation are suitable for livestock consumption having TDS values below 10,000 mg/L. These waters are classified as Class II waters according to EPA Guidance. Saturation of the Dewey Lake Formation in the area of WIPP is discontinuous and no hydrologic connection has been established that would indicate that WIPP activities would have an Impact on the Dewey Lake.

Sampling during calendar year 1997 marked the end of data collection for baseline purposes for the RCRA permitting process. A detailed baseline report entitled "Waste Isolation Pilot Plant RCRA Background Groundwater Quality Report" was issued just prior to the Issuance of the 1997 ASER.

To summarize; this report contains calculated background concentrations for groundwater-quality parameters from seven monitoring wells that are located within the boundaries of the WIPP site. From 1995 to 1997, the GMP collected groundwater samples from the Culebra and Dewey Lake water-bearing zones in the area of the WIPP site. The GMP has sampled 7 WIPP monitoring wells five separate times. Groundwater was sampled during the GMP from the Culebra Dolomite Member of the Rustler Formation and the Dewey Lake. The GMP focused primarily on the characterization of Culebra Dolomite groundwater, since the Culebra is the first continuous water-bearing zone above the waste repository horizon and is the most transmissive hydrologic unit in the WIPP area.

Because Culebra groundwater chemistry is extremely variable across the WIPP site, areawide background values for groundwater constituents could not be established. Instead, background groundwater quality was defined for each individual well. A minimum of four separate rounds of data from a well was required to establish the background groundwater quality at that well.

Preliminary analysis categorized GMP data into three groups based on the frequency of detection and the proximity of detections to MDLs. The three groups are as follows:

- Major Cations and Anions. Constituents that collectively make up greater than 99 percent of the dissolved solids. These constituents are generally detected at concentrations that are well above the MDL.

- Minor Cations, Trace Metals, Anions, and Indicator Parameters. Constituents with concentrations that are generally less than 10 mg/L in groundwater. A substantial amount of the data are below the MDL, and those detected concentrations are generally close to the MDL.

- Organic Compounds. Include VOCs, SVOCs, pesticides, and PCBs (all of the parameters included in 40 CFR § 264, Appendix IX). Very few detections of these compounds were observed in GMP data.

Given the three data groups defined above, background concentrations were determined and reported in the following manner:

- A 95th UTL or 95th percentile confidence interval based on the distribution type was computed for every major constituent from each well. Thus, the expected background concentration for a major constituent at a given well is represented by a 95 percent confidence interval.

- The 95th UTL for most minor constituents could not be calculated due to the large number of NDs; thus, the background concentration range for a minor constituent at a given well is represented by the observed 95th percentile concentration range based on MDLs for that parameter at that well.

Prior to the determination of background concentration values, the GMP data were evaluated for trends. Trend analysis was necessary to determine if any concentrations

were changing with time due to natural (or non-WIPP related) causes. The procedure used to determine background water quality is dependent on, or somewhat controlled by, the nature of the concentration/time relationship. In general, temporal trends in concentrations were not found in the GMP data, and the procedure used to establish background water quality reflected this finding. Additional sampling rounds at each GMP well may provide more insight into potential trends in water quality.

The GMP data were also evaluated for potential outliers. Potential outliers were evaluated through visual examination only. If a value appeared to be an outlier by visual examination, an additional observation was performed to estimate if that value was within ±20 percent of its nearest neighbor or if it was due to routine analytical uncertainty. Only four values were actually excluded from the major and minor constituent data set prior to the establishment of background concentration summary statistics and box-and-whisker plots (Figures 7.12 through 7.72).

The following are the specific findings and conclusions of the baseline study:

- Some constituents at several wells, including WQSP-1, WQSP-2, WQSP-3, WQSP-5, WQSP-6, and WQSP-6A show potential concentration trends. However, in almost every case the trend is within the range of expected analytical uncertainty, or the trend is not supported by charge-balance considerations or by similar trends in other constituents, such as TDS.

- Wells WQSP-4, WQSP-5, and WQSP-6 exhibit concentrations of several parameters that decrease significantly from the first to the second or later sampling rounds. This may indicate that the first sample is not representative, possibly due to incomplete well development and that the wells are "cleaning up" from the initial well installation process.

- Background groundwater quality was successfully defined for seven wells. Background concentrations for major and minor cations, anions, and indicator parameters were established for Culebra Dolomite and Dewey Lake groundwater. Although the background concentrations of many minor constituents are uncertain, the baseline report documents the "expected" values for these constituents, if similar analytical techniques are used in future sampling efforts.

- Hazardous organic compounds are not present in groundwater in the vicinity of the WIPP site. Detections of these compounds are very infrequent, and the majority of detected compounds are typical laboratory contaminants as defined by the EPA. Some of the occurrences may also be related to well installation or sampling practices.

Specific details on statistical methods and formulas used to reach these conclusions can be found in DOE/WIPP 98-2285, "Waste Isolation Pilot Plant RCRA Background Groundwater Quality Base line Report."

Groundwater Level Surveillance

In October 1988, WIPP was tasked with conducting a groundwater level surveillance program. Seventy-seven well bores are used to perform surveillance of seven water- bearing zones in the WIPP area. The two zones of primary interest are the Culebra and Magenta members of the Rustler formation. Fifty-nine measurements are taken in the Culebra; and ten, in the Magenta. Three measurements each are taken in the Dewey Lake and Santa Rosa formations. Two measurements are taken in the Rustler/Salado contact. One measurement each is taken in Bell Canyon, Forty-niner, and an unnamed lower member. Locations of groundwater level surveillance sites are pictured in Figure 7.2.

Five well bores are configured to allow monitoring of more than one formation. These are H-01 Culebra/Magenta, H-03d Dewey Lake/Forty-niner, H-16 Dewey Lake/unnamed lower

member, WIPP-25 Culebra/Magenta, and WIPP-27 Culebra/Magenta.

Groundwater surface elevations in the vicinity of WIPP may be influenced by site activities such as pumping tests for site characterization, water quality sampling, or shaft sealing. Other influences on groundwater surface elevations may be caused by natural groundwater level fluctuations and industrial influences from agriculture, mining, and resource exploration.

Groundwater elevation measurements in the Culebra indicate that the generalized directional flow of groundwater is north to south in the vicinity of WIPP (Figure 7.3). Regional groundwater levels taken in 43 Culebra observation wells with more than four data points for the year show increases in water levels occurred in 26 wells and 17 wells showed a decrease in water levels over the period of January 1997 through December 1997. During this period 23 wells had net water level increases or decreases of less than one foot.

Total fluctuation of more than one foot in groundwater levels occurred in 33 of the wells. Nine wells with fluctuations of more than one foot (WQSP-1 through WQSP-6, H-19b0, H-18, and H-14) may have been influenced by groundwater quality sampling activities. Four wells (ERDA [United States Energy Research and Development Administration]-9, WIPP-18, WIPP-19, WIPP-21, and WIPP-22) may have been influenced by site activities.

Water level increases originating to the south of the site in the H-9 area and extending up gradient toward the site are currently unexplained. Studies are currently being conducted to try and explain the anomalies.

Groundwater flow directions in the Magenta appear to be generally from an east to west direction across the WIPP site (Figure 7.4). Regional groundwater level measurements taken in the Magenta dolomite indicate that water levels are increasing in wells located near the center of the site, while water levels near or outside the WIPP boundary appear to be relatively stable. One well H-01 has had anomalus water level increases and appears to be influencing the wells in the immediate vicinity (H-2b1 and H-3b1). The cause is as yet undetermined.

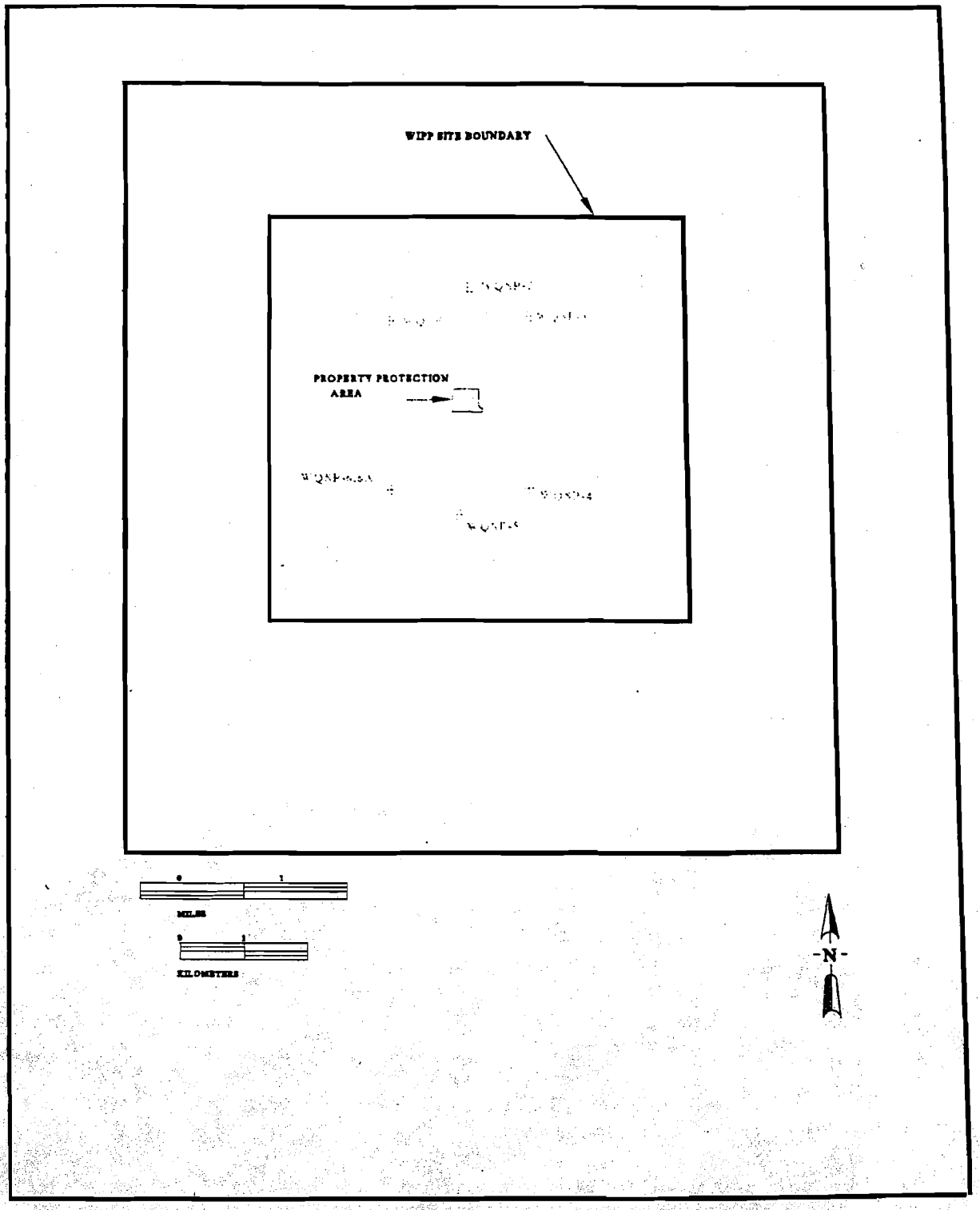

Figure 7.1 - Water Quality Sampling Program Sample Wells - 1997

Attachment D.3

Waste Activity

Documents

Reviewed

WWIS Waste Activity Tracking and Reporting

Ken Mikus
WWIS Data Administrator

March 24th, 1999

COR 194R

The WWIS is a hardware and software system that screens waste container data and provides reports on the TRU waste sent to the WIPP

The WWIS consists of a DEC Alpha server connected to clients (user PCs) using Oracle Database software

- Provides manual and electronic transfer modes for the TRU waste generators to input data on waste containers and proposed shipments to WIPP
- Checks every waste container for agreement with the limits/edits established in the WAC and the QAPP
- Provides on-line query and reporting of waste container and shipment information

TRU Waste Generator Sites insert radionuclide information from assay results

Radionuclide Report sums masses and activities by room, panel, and total repository

Radionuclide Report can display uncertainties if desired

Screen that tracks Material Parameters (Cellulosics, Plastics, and Rubber)

Detailed Reports on Containers, Shipments, and Waste Emplacement

Screens that detail number and types of containers

Developed under WWIS specific software quality assurance program conforming to NQA-1, Sub-section 2.7

Operational since August 1997

Primary (site) and backup (town) servers

Separate instances for production, testing, and development

No emplaced waste. Test data used to demonstrate functions

Document Number	Rev. No.	Document Title	Change No.
WP03-WA.02	0	WIPP Waste Information System Program	2

Reason for Change

ify the WWIS data reasonableness check and the use of the DOE Business Network.

Step/Section	Change	Step/Section	Change
	Replace "The WWIS database is carried on the Internet by way of the DOE Business Network, which can only be accessed by DOE sites. Futher security protection is maintained by encryption of the WWIS data transfers." with "All data transmitted between the WWIS server located at the WIPP and the WWIS client computer(s) located at the WIPP and elsewhere will be via the limited-access Department of Energy Business Network (DOE-BN)." ✓		
and 8.7	Replace "...to review the data for reasonableness." with "...for consistency with the Waste Stream Profile Form ✓		

ation Change Placed	Major/Minor Determination	Validation Required
	☐ Major Change ☒ Minor Change	☐ Yes ☒ No

) Screening formed By	RCRA Permit Screening Performed By
Dan D. Standford	Dan D. Standford
The proposed change does not result in a change in the process or activities as described in the SAR	☐ Screening not required
USQ Safety Evaluation Attached	☒ Permit Screening Attached

Section 2 - REVIEWED BY

ORGANIZATION	PRINTED NAME	SIGNATURE	DATE
ps/WWIS	Dan Standford	Dan D. Standford	3/6/98
te Ops/WWIS	Ken Mikus	Ken Mikus	3/6/98
te Ops	Jeff Cotton		
lator			
nment Services	Craig Gray	Craig Gray	3/6/98

Section 3 - AUTHORIZED BY

ORGANIZATION	PRINTED NAME	SIGNATURE	DATE
WASTE OPS	JJ Grau	JJ Grau	3/6/98

Effective Date: 04/15/97

WP 05-WA.02
Revision 0

WIPP Waste Information System Program

Cognizant Section: Waste Operations

Approved By: Jeff Cotton Signature on file

Cognizant Department: Operations

Approved By: C. E. Conway Signature on file

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ACRONYMS AND ABBREVIATIONS

CAO	Carlsbad Area Office
CFR	Code of Federal Regulations
DOE	Department of Energy
EPA	Environmental Protection Agency
ID	Identification
ISD	Information Systems Development
NMED	New Mexico Environment Department
NRC	Nuclear Regulatory Commission
Q&RA	Quality and Regulatory Assurance
RCRA	Resource Conservation and Recovery Act
SWB	Standard Waste Box
TRAMPAC	TRUPACT-II Authorized Methods for Payload Control
TRU	Transuranic
TRUPACT-II	Transuranic Package Transporter Model II
VOC	Volatile Organic Compound
WAC	Waste Acceptance Criteria
WID	Waste Isolation Division
WIPP	Waste Isolation Pilot Plant
WSPF	Waste Stream Profile Form
WWIS	WIPP Waste Information System

1.0 INTRODUCTION

This Waste Isolation Pilot Plant (WIPP) Waste Information System (WWIS) Program describes and details the methods to be used to implement the WWIS database activities.

The WWIS is specified and required by the Compliance Certification Application for the Waste Isolation Pilot Plant (DOE/CAO 1996-2184, Title 40, Code of Federal Regulations [CFR], Section 191); the Transuranic Waste Characterization Quality Assurance Program Plan (CAO 94-1010); the WIPP Resource Conservation and Recovery Act (RCRA) Part B Permit Application, Chapter C, Waste Analysis Plan (DOE/WIPP 91-005); and the Waste Acceptance Criteria for the WIPP (DOE/WIPP-069).

2.0 SCOPE

This WWIS Program addresses the entire range of activities performed by the WWIS. Data received by the WIPP for waste acceptance purposes is used to determine compliance with the RCRA Part B Permit Application and 40 CFR □194 requirements. Since no physical analysis of waste will take place at WIPP, the data management, review, and approval processes are critical to ensure WIPP's regulatory compliance.

The WWIS is an on-line database system used to:

- Record waste container characterization and certification data supplied by the transuranic (TRU) waste generators, as required by the WIPP Waste Acceptance Criteria (WAC), to gain acceptance for disposal at WIPP
- Print a Summary Report that provides a listing of waste container characterization data for use in review of Waste Stream Profile Forms (WSPF) associated with the container characterization data
- Provide computerized hold and approval points for the WIPP data administrator regarding WIPP acceptance of container characterization and certification data
- Communicate the approval/rejection status of characterization and certification data to the generator/shipper
- Record proposed shipment configuration details from the generator/shipper for containers that have received WIPP approval of characterization data
- Provide a hold and approval point for the WIPP data administrator to approve or reject the proposed shipment

- Communicate the approval/rejection status of proposed shipments to the generator/shipper
- Provide a Shipment Report for WIPP personnel to verify the "as received" shipment against the information listed on the manifest accompanying the shipment, and to verify that containers received are those approved by WIPP for shipment
- Record the disposal location of the containers when they are placed in the underground disposal area
- Record (automatically) any changes made to WWIS data, record changes, and provide a Change Log Report to identify changes that have been made
- Provide required reports, which are entered into the facility operating record and kept as a quality record for the lifetime of the facility

The above functions require the interaction of several groups within Waste Operations, and with generator/shipper sites and others, such as internal and external review/oversight groups. This program defines the responsibilities and activities for each group of WWIS users at WIPP.

3.0 RESPONSIBILITIES

3.1 Waste Operations

The Waste Operations Section is the organization with cognizance over the waste acceptance and emplacement process at WIPP. The review and approval of waste data is coordinated by Waste Operations and all records generated by the review and approval process are controlled by Waste Operations until transferred to Project Records Services.

The WWIS data administrator is responsible for establishing access authorization to the WWIS for generator/shipper sites; approving user characterization data, certification data, proposed shipping data, and maintenance of Administrative Reference Tables used in WWIS operation; deleting generator data records when requested by the generator (the WWIS Change Log Records record deletions archived as a part of the overall database process); and assisting users with problems associated with the application.

The data administrator is also responsible for the following activities regarding WWIS operation:

- Determine the need for access, assign user identifications and enter them into the WWIS
- Determine acceptability of waste container data submitted by the generator in the WWIS Characterization Module for WSPF approval
- Designate approved WSPF numbers in the WWIS Administration Tables
- Determine acceptability of waste container data submitted by the generator in the WWIS Certification Module
- Enter needed data into the Reference Data Tables of the WWIS
- Process WSPF(s) to the requirements of the Waste Stream Profile Form Review and Approval Program (WP 05-WA.03)
- Produce reports from the WWIS
- Enter approved changes to the WWIS data
- Assist generators with data entry problems
- Serve as the contact point at WIPP for the generator sites regarding data transmittal and submittal

Hazardous Waste Operations is responsible for:

- Initially receiving the TRUPACT-II shipment
- Signing the manifest
- Reviewing WWIS data to determine if it agrees with information on the Shipment Manifest
- Notifying the Waste Handling engineer of the manifest review results
- Resolving manifest discrepancies by working with the WWIS data administrator and the generator/shipper

The Waste Handling engineer is responsible for two primary entry inputs to the WWIS:

- Recording acceptance of the shipment in the WWIS after verifying that the correct containers were received, based on shipment information in the WWIS and Shipment Manifest information
- Recording off-loaded container information and container disposal locations

3.2 Resource Conservation and Recovery Act Permitting

The RCRA Permitting Section reviews each WSPF and the associated Characterization Data Summary Report, then completes a checklist to document that review per
WP 05-WA.03. A specific focus of this review is to ensure that the requirements of the WIPP Waste Analysis Plan are properly implemented. RCRA Permitting also performs periodic reviews (on a selected or "as necessary" basis) of generator waste container characterization data entered into the WWIS. Cognizant RCRA Permitting personnel have access to the WWIS database for use in review of administrative information, waste characterization data, certification data, decay analysis, change log, inventory, and regulatory reporting.

3.3 Quality and Regulatory Assurance

Quality and Regulatory Assurance (Q&RA) participates in the review and approval activities for the WSPF to verify that the submittal is complete and properly signed. On a selective basis, Q&RA will review waste container data submitted to WIPP through the WWIS by the generator/shipper sites to determine if the generator data entered into the WWIS is complete.

3.4 Project Record Services

Project Record Services is responsible for the retention of records generated by the WIPP waste acceptance process. Some of the records generated by this process will be retained at the facility as a part of the operational record until closure of the facility. Other records will be sent to records storage. Criteria to define the record retention times are listed in the approved Records Inventory and Disposition Schedule and the implementing procedures for each document.

3.5 Information Systems Development

Information Systems Development (ISD) is the support organization for the WWIS. ISD is responsible for keeping the WWIS functional and facilitating electronic communications between WIPP and the generator sites. ISD also provides a secure area for the WWIS server; performs nightly, quarterly, and annual backups of system records; and maintains network communications.

3.6 Technical Training

The Human Resources Technical Training Section is responsible for controlling and maintaining the WWIS Qualification Card. The qualification cards are used as part of the WIPP qualification program and will be maintained, controlled, and retained per the implementing procedures. The Waste Operations data administrator (the Subject Matter Expert) will aid Technical Training personnel in the development of the WWIS Qualification Card.

3.7 TRU Waste Programs

The Engineering TRU Waste Programs Section provides the cognizant engineer (configuration manager) for the WWIS Program. The cognizant engineer is responsible for providing design and configuration management for the WWIS database and represents the primary source of engineering interface for the WWIS. Configuration management is addressed in approved Waste Isolation Division (WID) management procedures.

3.8 Department of Energy/Carlsbad Area Office

The Carlsbad Area Office manager is responsible for granting, or suspending, a site's authority to certify TRU waste to the WAC (certification authority) and to use the TRUPACT-II and Remote-Handled TRU 72-B Cask (transportation authority) based upon an assessment of their documented TRU waste program and its implementation. After approving the required generator/shipper plans, the CAO, together with the managing and operating contractor, will perform certification audits of the generator/shipper sites to assess the implementation of, and compliance with, the approved plans. Based upon acceptable results of the certification audit, the CAO will grant TRU waste certification authority and transportation authority to the site.

The CAO is also responsible for review and approval/denial of generator/shipper site requests for exceptions (variances) to the WIPP operations and safety requirements. The CAO cannot approve exceptions to requirements that are controlled by others, such as the Nuclear Regulatory Commission (NRC),for transportation or the Environmental Protection Agency (EPA) and the New Mexico Environment Department (NMED) for the RCRA component of TRU-mixed waste, without first obtaining changes to the controlling permits.

4.0 WWIS ACCESS

The hardware for the WWIS system is located in a controlled access area within the WIPP facility. Computer access to the WWIS database is controlled by means of user identifications and passwords assigned to users having a need to use the waste information system. A user must obtain authorization from the WIPP data administrator before being allowed to log onto the electronic system. Prior to granting user access, the data administrator will instruct potential users in the proper use of the WWIS. When the authorization is granted, read/write access restrictions are also imposed on the user to ensure that the integrity of the data within the database is maintained.

4.1 User Access

The WWIS data administrator receives requests for system access from users on the WWIS Access Request Form (Attachment 1).

Generator/shipper sites must be certified by the CAO/WIPP prior to entering waste data into the WWIS for review by the WIPP. The data administrator reviews the WWIS Access Request Form and approves or disapproves the requested authorization reason for access (designated in Attachment 2), signs the WWIS Access Request Form, and forwards the request to the Waste Operations manager for final approval.

After obtaining the approval of the Waste Operations manager, the data administrator provides instruction to the requestor on the proper use of the WWIS, enters the access type onto the WWIS Access Request Form, and makes the necessary entries into the WWIS Administration Reference Tables to allow the user access to the WWIS. Access restrictions are imposed as defined in the Software Requirements Specification and the Software Design Description, and are documented on the approved WWIS Access Request Form.

The data administrator will advise the user when the approved access to the WWIS has been established by providing the user with a copy of the signed WWIS Access Request Form. The signed WWIS Access Request Form will be transmitted to the user as an attachment to the WWIS Access Notification Form (Attachment 3). The data administrator will file a copy of the WWIS Access Notification Form and attached WWIS Access Request Form in the WWIS project files.

The data administrator will revoke any access privileges at the request of the user or Waste Operations manager by accessing the Administrative Reference Tables and inserting an access termination date equal to the date of revocation.

5.0 WWIS COMPONENTS

The WWIS database is a complex, multifaceted database system designed to perform functions ranging from retaining simple data; providing a platform for the review/approval of generator/shipper sites waste information; tracking of waste containers by categories; combining containers into packages and shipments; and to verify emplacement location of the containers in the repository. To fulfill the variety of tasks assigned to the WWIS, the database system is divided into several modules. These modules, other components, and organizational/individual responsibilities are described below.

5.1 Administration

5.1.1 Administrative Tables

The WWIS has an extensive library of Administration Tables. These tables, used by the data administrator, contain complexwide requirements specified in DOE/WIPP-069 and CAO-94-1010. Also included in the tables are site-specific information listed in CAO-approved generator/shipper site Quality Assurance Project Plans, Certification Plans, TRUPACT-II Authorized Methods for Payload Control (TRAMPAC), and data supplied to WIPP regarding individual containers, waste streams, and shipping information.

5.1.2 User Administration

The user administration function is the responsibility of the Waste Operations data administrator. The data administrator is responsible for maintaining WWIS data pertaining to individual users of the system. This includes updating user data files (information about the users), setting up access for new users to the application, instructing personnel in the proper use of the WWIS, assisting users with problems associated with the application, defining the extent of use of the system for each user, and deleting users from the application.

5.1.3 Data Administration

The data administrator is responsible for determining user access to the data, administering Reference Tables used systemwide, producing reports from the Reference Tables, and logging changes. The WWIS is capable of producing several standardized and specialized reports concerning the waste data supplied by the generator/shipper site. Internal and external requests for these reports will be processed by the data administrator on the basis of the nature of the request, the availability of resources to perform the request, and the approval of Waste Operations management. The data administrator updates tables containing limit and reference data and provides change information to the Change Log.

5.1.4 Security

The Waste Operations data administrator controls access to the databases and data through passwords, and controls access to the data at the record level. All data transmitted between the WWIS server located at the WIPP and the WWIS and elsewhere will be via the limited-access Department of Energy Business Network (DOE-BN). Users are assigned access authorization levels as listed in Attachment 2. Users are only allowed to view data pertaining to their access authorization level and/or site.

5.2 Characterization Module

The Characterization Module allows the generator/shipper to enter specific container information to be used to validate the characterization activities of the generator site for the data summary on the WSPF submitted for WIPP approval. Approval of the WSPF will be required before waste containers associated with the waste stream can be approved and accepted.

Required information fields for the characterization data input are indicated by a shaded entry box on the interactive input screen for manual input. For electronic data input, data information is defined in data structure tables included in the WWIS User's Guide.

After the data passes the limit and edit checks and is reviewed by the WWIS data administrator, it is considered "acknowledged" data. An entry is made by the WIPP data administrator, making the data available for viewing to the generator only through the Certification Module pull-down screen. The generator/shipper is denied any further write access to the information fields of the Characterization Module at this point.

This module has provisions to generate a WWIS Waste Characterization Data Report, which contains a listing of the characterization data for the containers covered by a WSPF. A copy of this report will be attached to the WSPF to support the review of the information.

Container data not accepted by WWIS in this module will not be retained by the WWIS. A Bad Data Report will be created and will explain the reason(s) for rejection. Rejected data will require resubmittal to WIPP prior to further consideration.

5.3 Certification Module

The Certification Module allows for generator transmittal and WIPP data administrator verification of submitted WAC data. All modifications to the data will be tracked in a Change Log. In this module, the data administrator will accept or reject certification

data and provide verification reports. After acceptance of the submitted data, the WWIS will automatically generate an Acceptance Report. If the submitted Certification Module data is rejected, the data administrator will generate a Rejection Report and notify the generator/shipper site.

Required information fields for certification data input are indicated by a shaded entry box on the interactive input screen for manual input. For electronic data input, data information is defined in data tables included in the WWIS User's Guide.

After the data passes the limit and edit checks and a review by the WWIS data administrator, it is considered "acknowledged" data and an entry is made by the WIPP data administrator. The generator/shipper is denied any further write access to the information fields of the Certification Module at this point.

5.4 Shipping Module

The Shipping Module allows the generator/shipper to propose a shipment configuration for WIPP approval. The proposed shipment information is entered into the WWIS and subjected to data limit checks to determine if the shipping requirements of the TRAMPAC and WIPP WAC are met by the proposed shipment.

After passing these electronic data checks, the shipping information is reviewed by WIPP operating personnel. If everything is in order, the shipment data is approved and the generator/shipper may proceed with the shipment.

This module generates the Shipment Summary Report used by Waste Operations to verify that the correct containers have been shipped.

5.5 Inventory Module

The Inventory Data Module is designed for WIPP to record what containers have been received, the receipt date, and the disposal locations for those containers.

This module generates the Container Emplacement Report, which will be kept as part of the facility operating record. The Inventory Data Module also generates other reports concerning the disposed waste inventory, including reports on nuclides, container data, headspace gas, and biennial information.

6.0 USING THE WWIS

Each module and component described above requires input from several users, such as the generator/shipper, data administrator, and others. From these modules and Administrative Tables, the WWIS has the capability of generating various reports to track the input from the generator/shipper sites. These reports are listed and described

in WP 05-WA.01, WIPP TRU Waste Data Management Plan. The methods to be employed in the completion of each module of the WWIS database are described and defined below.

6.1 Electronic Data Entry - Characterization Module

Prior to review of generator/shipper characterization data, the data administrator will ensure that the DOE/CAO has granted certification and transportation authority to the generator/shipper site as stated in Section 3.8.

Generators/shippers must notify the WWIS data administrator of new WSPF numbers prior to inputting Characterization Module container data associated with that profile number. After notification of the new numbers, the data administrator will enter the proposed WSPF numbers in the WWIS Administration Reference files, but will leave the approval date blank (indicating that the WSPF is not yet approved).
No generator/shipper site waste data will be accepted by the WWIS database until the data administrator has updated the Administrative Reference Tables to include the WSPF number.

Electronic transfer of characterization data is granted to sites that have an electronic waste information system. The data from the user system must be formatted to be consistent with the WWIS data structures as listed in the WWIS User's Manual (SP-WO-WWIS-002). Before data is transmitted, the user system formatting will be verified to ensure integrity. The WWIS data administrator will transmit the system format and assist the user with the setup of the data structure. The WWIS system performs edit and range checks on the characterization data and identifies all errors by waste container identification number. After electronic transmittal of characterization data to the WWIS, the generators/shippers are only allowed to view their packages and/or print error reports. After the characterization data has passed all range and edit checks and has been approved by the Waste Operations data administrator, the shipper will receive a message to that effect.

6.2 WWIS Database Use in Approving the WSPF

The review and approval of WSPFs are governed by WIPP approved procedures. After receipt of the WSPF from the generator/shipper site, Waste Operations routes a copy of each WSPF and associated WWIS Characterization Data Summary Reports from the WWIS to RCRA Permitting and Q&RA. The Summary Report provides reviewers with a listing of waste container characterization data associated with the WSPF. These organizations review the form against requirements of the WIPP Waste Analysis Plan, the Quality Assurance Program Plan, and the WIPP Quality Assurance Program Description.

After the reviewers have completed their reviews, a meeting may be called by Waste Operations if any profile deficiencies are noted. Waste Operations interfaces with the

generator/shipper to resolve any noted deficiencies. After all WIPP reviewers concur that the WSPF is acceptable, Waste Operations notifies the generator/shipper of the WSPF approval. The WIPP data administrator makes an approved date entry into the WWIS data Reference Tables, causing the program to recognize the approved profile number. This entry is necessary for the data to be accepted into the WWIS Certification Module.

When the WSPF is routed for review, it is tracked by a routing slip and is recorded into a log of the WSPFs received by the WIPP in accordance with WP 05-WA.03.

A critical part of waste stream approval is the WIPP RCRA-Specific Generator Site Waste Screening and Acceptance Audit Program Plan, (WP 02-PC.01). After the initial audit and approval, annual audits are performed for sites shipping waste to WIPP. The data administrator ensures that the waste generator has successfully passed the scheduled CAO certification and WIPP RCRA-specific audits and resolved any significant deficiencies before approving a WSPF from that site.

6.3 Manual Data Entry - Characterization Module

Manual characterization data entry access is granted to generator/shipper sites that have limited or small quantities of TRU waste, or that do not have an electronic information system but do have access to the WWIS database capabilities. Manual data entry allows a generator/shipper site without an electronic waste information system to enter waste data directly into the various blocks of the characterization data entry screens. Although the manually entered data process is much slower than that of electronic data transfer, the entered waste data receives the same edit/limit checks and reviews as electronic data transfers.

Generators/shippers must notify the WWIS data administrator of new WSPF numbers prior to inputting Certification Module container data associated with that profile number. After notification of the new WSPF numbers, the data administrator will enter the proposed numbers in the WWIS Administration Reference files, but will leave the approval date blank (indicating that the profile is not yet approved). No generator/shipper site waste data will be accepted by the WWIS database until the data administrator has updated the Administrative Reference Tables.

6.4 Review and Approval of Characterization Data Entries

The data administrator periodically reviews container Characterization Module data that have passed the WWIS data/limit checks. The review requirements are at the discretion of the data administrator but are primarily performed for consistency with the Waste Stream Profile Form.

After review of the data, the data administrator will indicate acceptance or rejection of each container characterization record on the accept/reject screen feature in the WWIS. If the record is rejected, the data administrator will input the reason for the rejection into the WWIS and notify the generator/shipper of the reason for rejection.

6.5 Electronic Data Entry - Certification Module

The electronic transfer of certification data is granted to sites that have electronic waste information system capabilities. To use the WWIS electronic data option, the data from the user system must be formatted to be consistent with the WWIS data structures. Before data are transmitted, the user system formatting will be verified by acceptance testing of the generator/shipper electronic data system to ensure integrity and compatibility with the WIPP WWIS server.

The WWIS system performs edit and range checks on the data and identifies errors by waste container identification number. After electronic transmittal of certification data to the WWIS, generators/shippers can only view their certification packages and/or print error reports. After the data have passed all range and edit checks and received approval from the Waste Operations data administrator, the generator will receive an electronic message to document the approval.

6.6 Manual Data Entry - Certification Module

Manual certification data entry access is granted to generator/shipper sites which have limited or small quantities of TRU waste or which do not have an electronic information system but do have WWIS database capabilities. Manual data entry allows a generator/shipper site without access to an electronic waste information system to enter waste data directly into the various blocks of the WWIS Certification Module data entry screens. Although the manually entered data process is much slower than that of electronic data transfer, the entered waste data receives the same edit/limit checks and reviews as electronic data transfers.

This module is structured to accept only data that pertains to accepted waste stream profiles. This allows the generator/shipper to enter waste container data for approval of the individual containers. The data will be screened by the WWIS to perform limit checks for each data entry. Data outside the range limits of the WAC will be rejected

by the database.

6.7 Review and Approval of Certification Data Entries

The data administrator will periodically review container Certification Module data that have passed the WWIS data/limit checks. The reviews are at the discretion of the data administrator but are primarily performed for consistency with the Waste Stream Profile Form.

After review of the data, the data administrator will indicate acceptance or rejection of each container characterization record on the accept/reject screen feature in the WWIS. If the record is rejected, the data administrator will input the reason of the rejection into the WWIS. The WWIS automatically notifies the generator/shipper site of the rejection.

6.8 Electronic Data Entry - Shipping Module

The electronic transfer of shipping data will be granted to sites that have an electronic waste information system. The data from the user system must be formatted to be consistent with the WWIS data structures. Before data are transmitted, the user system formatting will be verified by acceptance testing of the generator electronic data system to ensure integrity and compatibility with the WIPP WWIS server. Edit and range checks are performed by the WWIS. The data entered are descriptors by waste container or dunnage container and include shipment, packaging, and assembly information.

6.9 Manual Data Entry - Shipping Module

Manual shipping data entry access is granted to generator/shipper sites which have limited or small quantities of TRU waste or which do not have access to an electronic information system but do have WWIS database capabilities. Manual data entry allows a generator/shipper site without an electronic waste information system to enter waste data directly into the fields of the WWIS Shipping Module data entry screen. Although the manually entered waste data process is much slower than that of electronic data transfer, the entered waste data receives the same edit/limit checks and reviews as electronic data transfers.

6.10 Review and Approval of Shipping Data Entries

After the generator/shipper site has entered the required Shipping Module entries, the WIPP data administrator will review the data to ensure that it is complete and passes the WWIS electronic data checks. The data administrator will additionally verify and document on Attachment 4, Shipping Review of Cellulose, Plastics and Rubber

(CPR), that the amount of the material parameters contained in the shipment will not cause the WIPP repository inventory of cellulose, plastics and rubber to exceed the limit of $2x10^7$ kgs. After these checks have been completed, the data administrator approves the generator/shipper site shipping data entries by selecting the "accept" field on the WWIS "Review/Approve Shipment Information" screen. This approval allows the generator/shipper site to proceed with preparing the proposed shipment for transport to WIPP.

6.11 Shipment Receipt Data

Prior to bringing a TRUPACT-II shipment into the Waste Handling Building, the Waste Handling engineer will print a Shipment Summary Report for use in preparing for the shipment unloading. This report is used by the Waste Handling engineer and Hazardous Waste Operations to provide a summary of parameters important to waste receipt and planning considerations.

6.12 Barcode Data Check of Shipment - Received Containers

The following information will normally be gathered using a programmed WWIS interface for downloading information to the barcode scanner, but the information can be manually recorded and compared to the information in the Shipment Summary Report. Data input to the WWIS can be accomplished by keyboard input of container barcode numbers and disposal/storage locations. The WWIS contains screens which allow manual input of the inventory and location information if the barcoding equipment is not available.

The Waste Handling engineer will place the barcode scanner in the connect cradle and download shipment information to the scanner.

The Waste Handling technician will scan a container barcode from each assembly after it is removed from the TRUPACT-II. (The WWIS program will associate the barcoded container with the seven-pack assembly number and any of the remaining drums of the assembly.) The programmed scanner will indicate if the scanned container is listed in the approved shipment information. (After matching the scanned container number with the number in the WWIS, shipment approval may proceed.)

If the scanner identifies the container number as incorrect, the container will be scanned again. If the number is not recognized in the second scanning, the Waste Handling engineer will be notified.

The Waste Handling engineer will notify the Waste Operations manager and Hazardous Waste Operations that the shipment container number does not agree with the shipment summary information. It is the responsibility of Hazardous Waste Operations to resolve any manifest discrepancies by working with the WWIS data

administrator and the generator/shipper.

6.13 Shipment Approval

The Waste Handling engineer will notify Hazardous Waste Operations if the received container(s) agree with the WWIS Shipment Summary and obtain their recommendation for approval or disapproval of shipment, based on agreement with manifest information.

After verifying agreement between the WWIS Shipment Summary and the Hazardous Waste Manifest from Hazardous Waste Operations, the Waste Handling engineer will indicate acceptance of the shipment by selecting the shipment "accept" screen feature of the WWIS. If the WWIS Shipment Summary and the Hazardous Waste Manifest are not in agreement, the Waste Handling engineer will notify the Waste Operations manager before making a shipment rejection entry into the WWIS (this is expected to be a rare event).

6.14 Recording Overpack Information

If Waste Handling Operations finds it necessary to overpack waste containers (i.e., loading corroded, damaged, or contaminated containers into a larger container), the Waste Handling engineer will access the WWIS Overpacked Container input screen and record the overpacked container (i.e., drum or Standard Waste Box [SWB]) configuration information.

Disposal location information will be recorded, using the same procedures used for non-overpacked containers.

6.15 Barcode Data Entry - Location of Drum/Assemblies

The Waste Handling engineer can establish valid storage locations (room and panel) by updating the pull-down screen in the Inventory Module of the WWIS prior to disposal.

Waste containers may not be taken underground for disposal until the Waste Handling engineer has accepted the shipment, as indicated by the Shipment Approval in the WWIS.

6.16 Container Disposal Data

The Waste Handling engineer will place the underground barcode scanner in the connect cradle and download shipment information to the scanner. The Waste Handling technician can enter the disposal location, including panel and room, into the barcode scanner for each assembly.

After disposal locations for assemblies of the shipment are recorded in the barcode scanner, the Waste Handling engineer will upload the location information from the barcode scanner to the WWIS. Data errors in the module are listed in the "Bad Location" screen of the WWIS.

After uploading the location information, the Waste Handling engineer will review the bad location screen of the WWIS, if necessary, and correct any locations that were found to be incorrect.

The data administrator will print a Waste Container Emplacement Report weekly to document updated emplacements performed during the reporting period. This report is added by the data administrator to the WWIS Operational Log and retained at WIPP for the operational life of the facility.

7.0 SETTING UP OTHER SITES TO USE THE WWIS

The Waste Operations data administrator provides the generator/shipper sites with several levels of assistance in setting up generator/shipper sites with the WWIS database. Services provided to the generator/shipper sites include:

- Providing users' computers with the necessary WWIS client files
- Making appropriate entries in the WIPP WWIS to establish identifications for the designated sites and users
- Providing data structure tables for sites to populate with site waste data (for electronic data entry)
- Providing WWIS database user training (on-the-job training) for generator/shipper site data entry personnel
- Providing the generator/shipper sites with a user's manual
- Providing site support visits by the data administrator and programming support personnel
- Providing telephone support each workday during work hours
- Providing the site with an acceptance test to qualify the site system in the transmittal of data from the site to the WIPP WWIS

8.0 EXCEPTIONS AND UNRESOLVED SAFETY QUESTION DETERMINATIONS

Requests for exceptions (variances) to the WIPP operations and safety requirements must be formally submitted to the CAO for approval. The CAO cannot approve exceptions (variances) to requirements that are controlled by others, such as the NRC for transportation, or the EPA and the NMED for the RCRA component of TRU-mixed waste, without first obtaining changes to the controlling permits. An exception may be allowable since the stated limit is an average based on the average concentration in a room divided by the number of containers emplaced in the room. The typical drum Volatile Organic Compound (VOC) concentration will be well below the established maximum average concentration. An evaluation can be performed at the time of the generator's request for the exception to ensure that the addition of a drum with a VOC concentration greater than the maximum average will not cause the concentration in the room to exceed the maximum average limit.

Unreviewed Safety Question Determinations are performed by WID per WP 12-AR1001. Unreviewed Safety Question Determinations are conducted to determine the impact of proposed waste data that is outside the current limits of the WAC and compares the impact to the margin of safety in the WIPP Safety Analysis Report.

The data administrator, upon written notification of a CAO-approved Exception Request and receipt of an acceptance of the proposed change by Environment, Safety, and Health, will update the WWIS WAC Exception Table with the WAC exception number, package identification, and the new limits for the field allowed in the exception.

9.0 DATA CHANGE CONTROL

The data administrator is responsible for WWIS data management and change control. The WWIS has several methods of identifying, documenting, and controlling the changing of generator/shipper site waste data. These methods include:

- Rejecting container data not accepted by WWIS in the Characterization Module or Certification Module (a Bad Data Report will be created, explaining the reason for rejection)
- Resubmitting rejected data will require correction and resubmittal to the WIPP prior to further consideration
- Changing the approval status after completion of each review and approval stage, defining which module can be used to gain access to the data
- Deleting a record, if a record change is required by the generator/shipper after the approval process has begun (the WIPP data administrator deletes the record after recording the reason for the deletion in the Change Log and places a copy of the deleted record in the database Change Log for future reference)

- Recording (automatically) any changes made to WWIS data records and providing a Change Log Report to identify changes that have been made (Change Log records will be maintained by the database and archived when the database archive copies are made)

10.0 WWIS PROGRAM REPORTS

The WWIS is designed to produce standardized reports for various uses. The WWIS reports are listed in WP 05-WA.01. These reports will satisfy routine needs, but specialized reports may occasionally be required of the WWIS data. Provisions are available for performing queries to provide information for nonstandard data requests. These requests will be processed by the data administrator on the basis of the nature of the request, the availability of resources to perform the request, and the approval of Waste Operations management.

10.1 Printing Standardized Reports

Access to WWIS database standardized reports is controlled by the access authorizations assigned to users. The WWIS data administrator will print and provide copies of reports for WIPP personnel who do not have access authorization to the WWIS information.

The WWIS data administrator will print and issue reports to organizations outside of WIPP only with the express written direction of the CAO or the reports may be sent to the CAO representative for distribution. Such written requests for distribution will be filed by the data administrator for future reference.

10.2 Shipment Summary Report

The Shipment Summary Report will be generated at the request of the Waste Handling engineer after all of the shipment information has been received by the WWIS and will include the information necessary for acceptance at the WIPP. This information will include shipment number, TRUPACT-II number, assembly number, inner containment vessel closure date, shipment certification date, shipment date, weight, surface dose rate, identification numbers of each container in the shipment, total activity level, nuclides (by TRUPACT-II), and the Hazardous Waste Manifest Number (if assigned) to the shipments.

10.3 Nuclide Report

The Nuclide Report lists the radionuclides contained in the waste disposed at WIPP at the time that the report is generated and includes the total activity of individual radionuclides as well as the total repository activity. The report is organized by waste type (contact-handled/remote-handled), using selection criteria established by the user, such as nuclides by generator during a specified period, or all actinides. This report can be used to aid in EPA reporting and assist WIPP personnel in organizing data requests for input to the Decay Module. This report is to be generated by WIPP personnel as required.

10.4 Waste Emplacement Report

The Waste Emplacement Report is generated on an emplacement period basis when containers have been emplaced or otherwise dispositioned and the data has been input to the WWIS from the barcode reader interface. The data is to be collected by container (for SWBs or Ten-Drum Overpacks) or assembly number (for seven-packs). This report will be generated weekly and will be added to the Operational Log and retained at WIPP for the operational life of the facility.

10.5 Headspace Gas Concentration Report

The Headspace Gas Concentration Report contains the average concentration of all headspace analytes in a particular storage room. The selection criteria is for all containers in a room as defined by actual emplacement information. This report is generated on demand.

10.6 Regulatory Reporting: Biennial Reporting Input Report

The Biennial Reporting Input Report will be generated annually and is arranged by waste type for each generator contributing waste to WIPP in the previous year. This report summarizes the amount (weight and volume) of the waste received from each generator and collects all of the EPA hazardous codes to provide cross-correlation in the various reporting schemes. The EPA identification of each waste generator is included along with the Item Description Code (or other local code), the waste matrix code, TRUPACT-II Content Code, and the WIPP waste stream identification. This report is intended to provide input to WID personnel responsible for generating the Biennial Report.

11.0 WWIS PROGRAM RECORDS

Project Record Services is responsible for the retention of records generated by the WIPP WWIS database program. Some of the records generated by this program will be retained at the facility as a part of the operational record until closure of the facility.

Other records will be sent to records storage. Criteria to define record retention times are listed in the approved Records Inventory and Disposition Schedule and the implementing procedures for each document.

11.1 Backup and Archiving Requirements

The WWIS data administrator will ensure that required nightly backups of system information are performed. The WWIS data administrator will use this backup information to reconfigure the system in the abnormal event of a system failure and loss of system data. Nightly backups will be sent out of the building to a backup server to provide for the event of catastrophic hardware failure.

In the event of a system failure, the WWIS data administrator is responsible for evaluating the failure event and determining the write-access users that should be notified of the failure since data entered on the day of the failure may have been lost.

The WWIS data administrator will create quarterly and annual archive copies of the database information and will provide the archive copies of the WWIS database to Waste Operations for inclusion in the operating record, which will be retained for the life of the facility.

12.0 SITE-DERIVED WASTE

Waste data for site-derived waste will be input into the WWIS by the Waste Handling engineer. This activity will be performed per the requirements of the procedure entitled Site-Derived Mixed Waste Handling, WP 05-WH1036.

13.0 TRAINING FOR THE WWIS PROGRAM

This section outlines the type of training that each type of WWIS user must have, including a qualification card for the data administrator(s). The WWIS data administrator qualification card specifies the required reading, prerequisite training, knowledge requirements, and practical application requirements needed to ensure proper use of the WWIS by the data administrator. The WIPP Technical Training Section administers the qualification card program and controls the WWIS Qualification Cards.

The basis of the remaining WWIS training will be on-the-job training. Waste Operations on-the-job WWIS training will include for the Waste Handling technicians' and Waste Handling engineers' hands-on use of the system to gain the practical application knowledge needed to operate the system.

The Configuration Manager will receive instruction on the proper use of the WWIS from the data administrator (the Subject Matter Expert). Software configuration management training required for the Configuration Manager is described in the WIPP Training Program (WP 14-TR.01) and Engineering procedures.

The data administrator will be qualified per the criteria listed in WIPP RCRA Part B Permit Application, DOE/WIPP 91-005, Revision 6, Appendix H-2; and training will be documented on a WWIS Operator Qualification Card. Waste Handling personnel will be required by their training program to be qualified to operate the WWIS. This training will be documented on the Waste Handling Qualification Cards. Other personnel will be instructed through on-the-job training in the use of the WWIS by the data administrator prior to granting of an access code to the WWIS database.

14.0 REFERENCES

CAO-94-1010, Transuranic Waste Characterization Quality Assurance Program Plan

CAO-95-1108, WIPP Waste Information System Software Quality Assurance Plan

DOE/CAO 1996-2184, 40 CFR 191, Compliance Certification Application for the Waste Isolation Pilot Plant

DOE/WIPP-069, Waste Acceptance Criteria for the Waste Isolation Pilot Plant

DOE/WIPP 91-005, WIPP RCRA Part B Permit Application, Chapter C, Waste Analysis Plan

SP-WO-WWIS-002, WWIS User's Manual

WP 05-WA.01, WIPP TRU Waste Data Management Plan

WP 05-WA.03, Waste Stream Profile Form Review and Approval Program

Attachment 1 - WWIS Access Request Form

Date: _____ Requestor: _____ Phone: _____

Company: _____ E-Mail Address: _____ Fax: _____

Organization or Site Requesting Access To WWIS: _____

Address: _____ City/State: _____ Zip: _____

Period of Access Authorization Requested: End Date: _____ or _____ Indefinite

TYPE OF USER:

_ Generator/Shipper

_ Characterization Data Official
_ Certification Official
_ Shipping Official
_ Regulatory Compliance Official
_ WIPP Operations
_ Remote Site Query Only (your site data only)
_ WIPP Query Only
_ RCRA Permitting Section Staff
_ Quality Engineers
_ Data Administrator
_ Database Administrator
_ Computer Protection Program Manager
_ System Administrator

REASON FOR ACCESS:

_ Generator/shipper data input for review and approval
_ WIPP employee - assigned WIPP duties
_ Regulatory Compliance oversight
_ Quality Assurance oversight
_ External analysis
_ Other: _____

Signature of Requestor: _____

Site TRU Steering Committee Member: _____

FOR WIPP APPROVAL USE ONLY

_____ _____
Data Administrator Date

_____ _____
Waste Operations Manager Date

Assigned User ID: _____ Assigned Password ID: _____

Assigned Site ID: _____ Assigned Database ID: _____

Attachment 2 - WWIS User Access Authorization Levels

Group	Function/Access							
	Admin-istration	Charact-erization	Certifi-cation	Shipping	Decay Analysis	Change Log	Inventory	Regula-tory Reporting
Generator/Shipper		R/W	R/W	R/W				
Characterization Approver		R/W*						
Certification Approver			R/W*					
Shipping Approver				R/W*				
Regulatory Compliance Officials		R	R		R			R
WIPP Operations				R/W			R/W	
Remote Site Query Only (their specific site only)		R	R	R				
WIPP Query Only		R	R	R	R		R	
Quality Engineers	R	R	R	R	R	R	R	R
External Analyst		R	R	R	R		R	
Data Administrator	R/W	R/W	R/W	R/W	R/W	R/W	R/W	R/W
Database Administrator	R/W	R/W	R/W	R/W	R/W	R/W	R/W	R/W
Computer Protection Program Manager	R					R		
System Administrator	R/W							

R - Read Access
W - Write Access
* - May be the same approver (i.e., data administrator)

Attachment 3 - WWIS Access Notification Form

Date:_____

Requestor:_____ Phone:_____ Site:_____

Requestor Organization: _____

Address: _____
_____
_____
_____

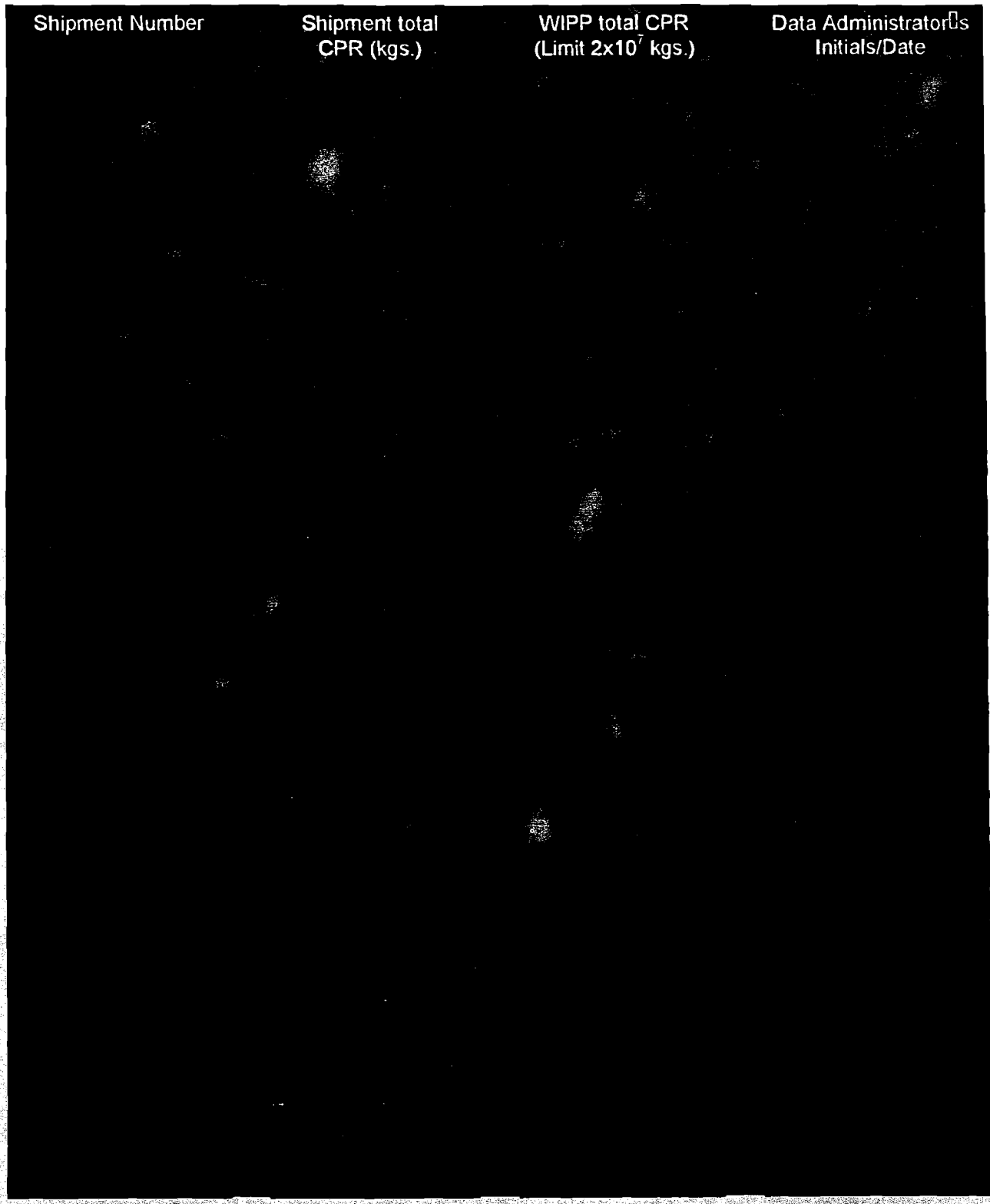
WWIS ACCESS: Approved_____ Rejected_____

WIPP/WID Waste Operations Data Administrator:

_____ Date:_____
Signature

Attachment: WWIS Access Request Form

Attachment 4 - Shipping Review of Cellulose, Plastics and Rubber



Shipment Number	Shipment total CPR (kgs.)	WIPP total CPR (Limit 2×10^7 kgs.)	Data Administrator's Initials/Date

Waste Isolation Pilot Plant
Waste Information System

Report	RP0360 - Waste Container Data Report
Filename	
Run by	MIKJSK
Report Date	03/24/1999 12:39
Total Pages	6

Selection Criteria

Container Number	*57023*
Site Id	*%*
Waste Stream	*%*
Data Status Code	*%*

LANL Data

Chuck Dym
3249
1440
CBR194G

Waste Container Data Report

Waste Container Information

Cntr Num : 57023
Site Id : LA - LOS ALAMOS NATIONAL LABORATORY
Data Status Code : Shipment Data Approved by WIPP
Waste Stream Profile : LA-TA-55-43.01
Type Code : 2 - SWB

WAC Ex. # :
WAC Rev # : 5
Cert Date : 03/08/1999
Cert Site : LA - LOS ALAMOS NATIONAL LA
Generator Site : LA - LOS ALAMOS NATIONA
IDC Code :
Matrix Code : S5400
Trucon Code : LA125A
Shipping Category : III.1C1
Pcb Conc(Ppm) : 0
Decay Heat (Watts) : .206
Decay Heat Uncert (Watts) : .0336
Closure Date : 05/27/1998
Vent Date : 02/24/1994
Filter Install Date : 05/27/1998
Filter Model Number : NF013
Aspiration Id : 3
Gas Gen Rate :
Gas Hyd Meth Gen Rate :
Gas Gen Comp Date :
Shipment Num : LA00001
Packaging Num : 128
Assembly Id : 128B

Handling Code : CH
Waste Type Code : TRU
Wst Strm Bir Id : T-004
Wst Strm Mwir Id : 0.00
Tru Alpha Act (Ci) : 6.160E+00
Tru Alpha Act Uncert (Ci) : 2.010E+00
Tru Alpha Act Conc (Ci/g) : 4.468E-05
Tru Alpha Act Conc Uncert (Ci/g) : 1.458E-05
Pu239 Eq Act (PE Ci) : 5.61
Pu239 Fiss Gm Eq (Fge) : .11
Pu239 Fiss Gm Eq Uncert (Fge) : .04
Layers Of Packaging : 1
Fill Factor (%) : 44
Liner Type :
Liner Punctured :
Gross Weight (Kg) : 424.9
Gross Weight Uncert (Kg) : 1.4
Alpha Surf Cont (dpm/100cm2) : 7
BG Surf Cont (dpm/100cm2) : 12
Bg Dose Rate (mrem/hr) : 0
Neut Dose Rate (mrem/hr) : 0
Total Dose Rate (mrem/hr) : 0
Cntr Disposal Date :
Cntr Status Code : PRE

Overpack Cntr Num :
Overpack Cntr Type :

Nuclide Information

Radionuclide	Description	Activity(Ci)	Activity Uncert(Ci)	Mass(G)	Mass Uncert(G)
PU-238	PLUTONIUM 238	6.15	1.005	.356	.058
PU-240	PLUTONIUM 240	.00183	.0076	.00794	.0331
PU-241	PLUTONIUM 241	.000003	.000001	.00112	.000212
PU-242	PLUTONIUM 242	.000007	.000002	.00168	.000475
PU-239	PLUTONIUM 239	.00434	.00113	.069	.01795
AM-241	AMERICIUM 241	.00421	.00284	.00121	.00082
NP-237	NEPTUNIUM 237	.000000	.000000	.000602	.000158

Waste Container Data Report

Waste Container Information

Cntr Num : **57023**
Site Id : **LA - LOS ALAMOS NATIONAL LABORATORY**
Data Status Code : **Shipment Data Approved by WIPP**
Waste Stream Profile : **LA-TA-55-43.01**
Type Code : **2 - SWB**

Nuclide Information

Radionuclide	Description	Activity(Ci)	Activity Uncert(Ci)	Mass(G)	Mass Uncert(G)
U-234	URANIUM 234	.00047	.000133	.0744	.02095

Material Parameters Information

Waste Matl Parm	Description	Weight(Kg)
7	RUBBER	4.39
1	IRON BASE METAL ALLOYS	114.15
3	OTHER METAL/ALLOYS	.06
6	CELLULOSICS	1.55
8	PLASTICS	18.1

Assay Methods Information

Radio Assay Method	Description	Assay Date
FRAM	PC/GAMMA ISOTOPIC RATIO SYSTEM	04/30/1998
PAN	PASSIVE/ACTIVE NEUTRON COUNTER	04/30/1998

Characterization Methods Information

Method Id	Description	Charz Method Date
RTRM	MOBILE RTR @ LANL	01/13/1998
VISUAL	VISUAL CHARACTERIZATION METHOD	03/27/1998

Sample Information

Sample Id : H-8FEB0413.D
Sample Type : HGHM
Layer No Sampled : 0
Date Sampled : 02/04/1998

Sample Amounts

Analyte	Method	Concentration	Date Analyzed	Detection Method
1333-74-0 - HYDROGEN	520.1	.02 Volume %	02/04/1998	U
74-82-8 - METHANE	520.1	.02 Volume %	02/04/1998	U

Sample Id : V-8FEB0413.D
Sample Type : HGVO
Layer No Sampled : 0
Date Sampled : 02/04/1998

Waste Container Data Report

Waste Container Information

Cntr Num : **57023**
Site Id : **LA - LOS ALAMOS NATIONAL LABORATORY**
Data Status Code : **Shipment Data Approved by WIPP**
Waste Stream Profile : **LA-TA-55-43.01**
Type Code : **2 - SWB**

Sample Information

Sample Id : V-8FEB0413.D
Sample Type : HGVO
Layer No Sampled : 0
Date Sampled : 02/04/1998

Sample Amounts

Analyte	Method	Concentration	Date Analyzed	Detection Method
100-41-4 - ETHYL BENZENE	430.1	2.43 Ppm	02/04/1998	U
107-06-2 - 1,2-DICHLOROETHANE	430.1	2.42 Ppm	02/04/1998	U
108-10-1 - METHYL ISOBUTYL KETONE	430.1	25.5 Ppm	02/04/1998	U
108-67-8 - 1,3,5-TRIMETHYLBENZENE	430.1	3.71 Ppm	02/04/1998	U
108-88-3 - TOLUENE	430.1	2.07 Ppm	02/04/1998	U
108-90-7 - CHLOROBENZENE	430.1	2.3 Ppm	02/04/1998	U
108383/106423 - M,P-XYLENE	430.1	4.9 Ppm	02/04/1998	U
110-82-7 - CYCLOHEXANE	430.1	2.39 Ppm	02/04/1998	U
127-18-4 - TETRACHLOROETHYLENE	430.1	1.83 Ppm	02/04/1998	U
156-59-2 - CIS-1,2-DICHLOROETHYLENE	430.1	2.31 Ppm	02/04/1998	U
56-23-5 - CARBON TETRACHLORIDE	430.1	1.88 Ppm	02/04/1998	U
60-29-7 - ETHYL ETHER	430.1	2.66 Ppm	02/04/1998	U
67-56-1 - METHANOL	430.1	15.1 Ppm	02/04/1998	U
67-64-1 - ACETONE	430.1	20.5 Ppm	02/04/1998	U
67-66-3 - CHLOROFORM	430.1	1.76 Ppm	02/04/1998	U
71-36-3 - BUTANOL	430.1	21.8 Ppm	02/04/1998	U
71-43-2 - BENZENE	430.1	1.52 Ppm	02/04/1998	U
71-55-6 - 1,1,1-TRICHLOROETHANE	430.1	2.01 Ppm	02/04/1998	U
75-09-2 - METHYLENE CHLORIDE	430.1	1.71 Ppm	02/04/1998	U
75-25-2 - BROMOFORM	430.1	2.65 Ppm	02/04/1998	U
75-34-3 - 1,1-DICHLOROETHANE	430.1	2.23 Ppm	02/04/1998	U
75-35-4 - 1,1-DICHLOROETHYLENE	430.1	.92 Ppm	02/04/1998	U
76-13-1 - 1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	430.1	1.91 Ppm	02/04/1998	U
78-93-3 - METHYL ETHYL KETONE	430.1	18.9 Ppm	02/04/1998	U
79-01-6 - TRICHLOROETHYLENE	430.1	1.72 Ppm	02/04/1998	U
79-34-5 - 1,1,2,2-TETRACHLOROETHANE	430.1	2.49 Ppm	02/04/1998	U
95-47-6 - O-XYLENE	430.1	2.54 Ppm	02/04/1998	U
95-63-6 - 1,2,4-TRIMETHYLBENZENE	430.1	3.47 Ppm	02/04/1998	U

Comment Information

Comment Type	Comments

Waste Container Data Report

Waste Container Information

Cntr Num : **57023**
Site Id : **LA - LOS ALAMOS NATIONAL LABORATORY**
Data Status Code : **Shipment Data Approved by WIPP**
Waste Stream Profile : **LA-TA-55-43.01**
Type Code : **2 - SWB**

Comment Information

Comment Type	Comments
WASTE CONTAINER	ORIGINAL DRUM REPACKAGED INTO MULTIPLE DRUMS, THEN INDIVIDUAL DAUGHTER DRUMS REPACKAGED INTO SWB WITH DRUM LID REMOVED & 3 EMPTY DRUMS
RADIONUCLIDES	49CFR173.433F ISOTOPE LIST FOR SHIPPING PAPERS & LABELING: PU-238
GENERAL COMMENTS	FILTER DATE AND CLOSURE DATE ARE FOR SWB CONTAINER, VENT DATE IS FOR WASTE VENTING WHICH IS THE DATE ORIGINAL DRUM WAS VENTED, RTRM ON ORIGINAL DRUM BEFORE REPACKAGING
ASSAY METHODS	DAUGHTER DRUM WAS USED FOR RADIOASSAY
CHARZ METHODS	ORIGINAL VENTED & FILTERED DRUM WAS REPACKAGED AFTER HGAS

Waste Isolation Pilot Plant
Waste Information System

Report:	RPI380 Nuclide Report
Filename:	
Run by:	MLKUSK
Report Date:	03/24/1999 14:52
Total Pages:	2

Selection Criteria

Site id :	%
Nuclide :	%
Panel Number :	%
Room Number :	%
Handling Code :	%
Show Uncertainty :	YES
TRU Nuclides Only :	%
EPA Tracked Nuclides Only:	Y

Test DATA

Chuck Byrne 3/24/99 1457

Nuclide Report

Panel Number : 1 Room Number : 1

Radionuclide	Activity (Ci)	Activity Uncert (Ci)	Mass(G)	Mass Uncert(G)
PU-239 - PLUTONIUM 239	613	63.05	68	63.5
Totals:	613	63.05	68	63.5

Panel Number : 1 Room Number : 2

Radionuclide	Activity (Ci)	Activity Uncert (Ci)	Mass(G)	Mass Uncert(G)
AM-241 - AMERICIUM 241	.017937191	7	.0012559	.005171
PU-238 - PLUTONIUM 238	.047886207	7	.003351	.002767
PU-239 - PLUTONIUM 239	4.020013791	10	3.07141	19.22
PU-240 - PLUTONIUM 240	.233645937	7	.01636	1.0151
PU-242 - PLUTONIUM 242	.00002954	7	.000002068	.007454
Totals:	4.319512666	38	3.092378968	20.250492

Panel Number : 1 Room Number : 6

Radionuclide	Activity (Ci)	Activity Uncert (Ci)	Mass(G)	Mass Uncert(G)
PU-239 - PLUTONIUM 239	14	6.1	134	6.1
Totals:	14	6.1	134	6.1

Panel Number : 1 Room Number : 7

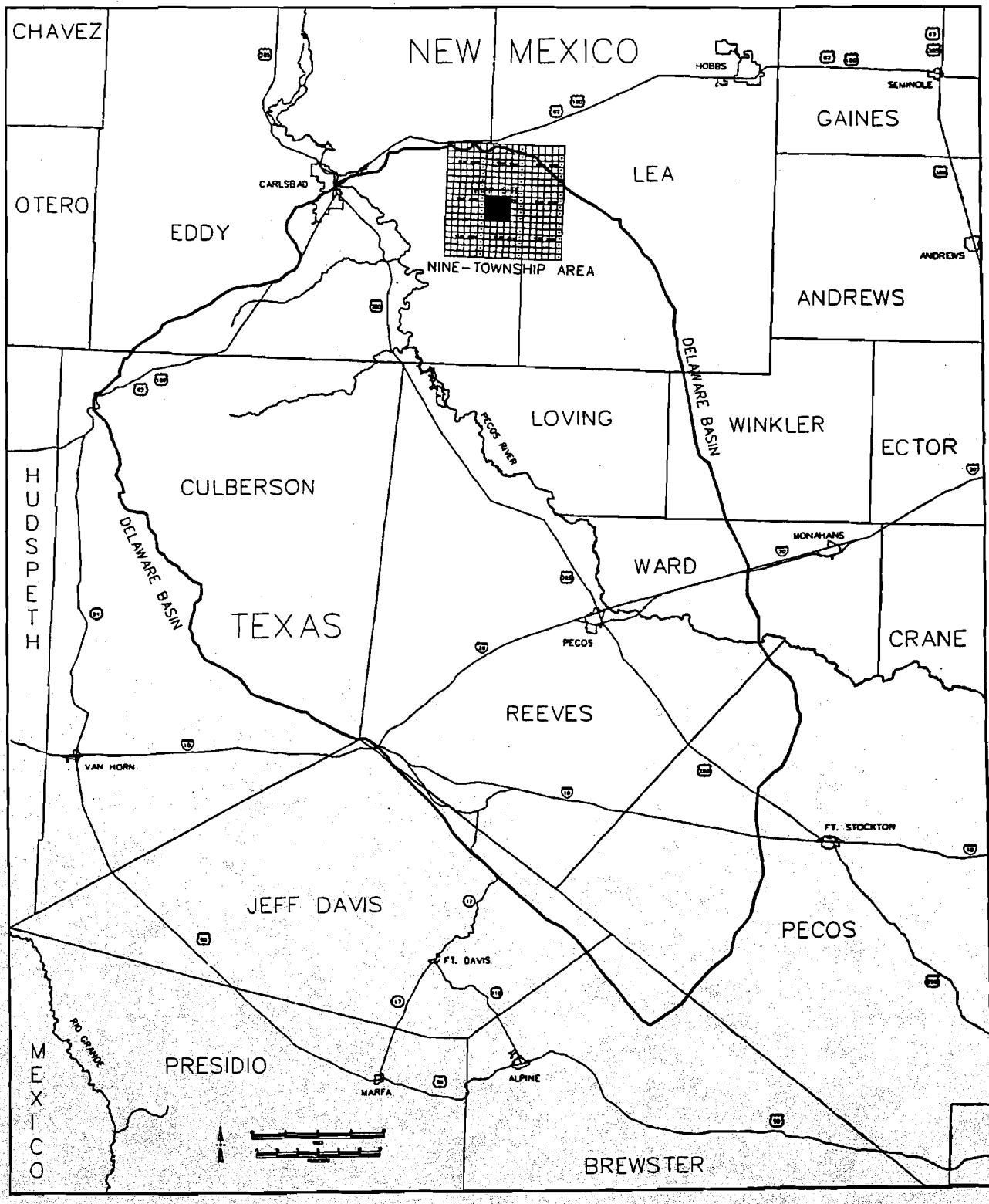
Radionuclide	Activity (Ci)	Activity Uncert (Ci)	Mass(G)	Mass Uncert(G)
U-238 - URANIUM 238	.00000068	2	0	2
Totals:	.00000068	2	0	2

Panel Number : 1 Room Number : 7

Radionuclide	Activity (Ci)	Activity Uncert (Ci)	Mass(G)	Mass Uncert(G)
AM-241 - AMERICIUM 241	1.487297834	35.33348	.402953	.124164
PU-238 - PLUTONIUM 238	80.452481581	35.181366	46.487302	.032572
PU-239 - PLUTONIUM 239	128.099689442	38.7763	1805.07754	191.121
PU-240 - PLUTONIUM 240	5.380749684	35.86457	15.3752	11.2917
PU-242 - PLUTONIUM 242	.000489627	35.000065651	.064286713	.075494
Totals:	215.420708168	180.155781651	1867.40728171	202.64493
Grand Totals:	846.740221514	289.305781651	2072.49966068	294.495422

CCA. 40 CFR Part 191, Compliance Certification Application for the Waste Isolation Pilot Plant. DOE/CAO-1996-2184. October 1996, United States Department of Energy, Waste Isolation Pilot Plant, Carlsbad Area Office, Carlsbad, New Mexico.

FIGURE 1 SURVEILLANCE AREAS WITHIN THE DELAWARE BASIN



NEW MEXICO DRILLED HOLE DATABASE Wednesday, March 24, 1999

AMERICAN PETROLEUM INSTITUTE NUMBER 30015220860000

LOCATION INFORMATION

TOWNSHIP	21S
RANGE	27E
SECTION	35
LOCATION	1980 FS-1980 FW
COUNTY	EDDY
NINE TOWNSHIP	☐
UNIT LOCATION	K

MAP INFORMATION

MAP SYMBOL	OG
STATE X-PLANE	552650
STATE Y-PLANE	521671

LOCATION POINTS ARE FOR REFERENCE ONLY - NO ACTUAL SURVEY MADE.

CURRENT WELL INFORMATION

WELLNAME	HUNKER COM
WELL#	1
OPERATOR	WESTERN OIL
WELL STATUS	OIL & GAS WELL
9 TWN LEASE	
FIELD NAME	CARLSBAD E
WELL DEPTH	11895
PB DEPTH	
PAY ZONE	
PRODUCING FORMATION	
ELEVATION	3127KB

HISTORICAL WELL INFORMATION

DRILLER	
WELL TYPE	6-DEVELOPMENT
PLUGGED DATE	
SPUD DATE	03/31/1977
COMP-DATE	06/02/1977
TD FORMATION	359-MSSP
1ST CASING STRING	13 3/8 @ 428
2ND CASING STRING	8 5/8 @ 2650
3RD CASING STRING	5 1/2 @ 11895
4TH CASING STRING	
5TH CASING STRING	

MISCELLANEOUS WELL INFORMATION

INCIDENCE REPORT-9 TWN ☐ KNOWN POTASH LEASE AREA ☐ AIR DRILLED ☐ WAS BRINE ENCOUNTERED ☐ ☐ FIELD VISIT

WELL HISTORY

1st WORKOVER

2nd WORKOVER

3rd WORKOVER

4th WORKOVER

5th WORKOVER

NOTES

Chuck By fax 03/24/99 J 1504

COB 194 J