OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT
SPECIAL INSTRUCTION SHEET

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Complete Only Applicable Items

This is a placeholder page for records that cannot be scanned.

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4. Author Name(s) ROBERT A. STELLER	5. Author Organization SNL

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SN-M&O-SCI-025-V1

DOWNHOLE SEISMIC COMPONENT OF GEOTECHNICAL INVESTIGATION FOR A POTENTIAL WASTE HANDLING BUILDING

opened: ~~Dec 07~~, 2000
June ~~17~~, 15
RAS 6/12/01 RAS 7/30/01

COLLEGE RULED

Robert A. Steller

Date Completed:
February ~~27~~, 2002 AG 2/27/02

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DOWNHOLE SEISMIC COMPONENT OF GEOTECHNICAL INVESTIGATION FOR A POTENTIAL WASTE HANDLING BUILDING

OPENED: JUNE 15, 2000

THIS INVESTIGATOR: ROBERT A. STELLER

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lmj 2/6/02

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QA:QA

Scientific Notebook SN-M&O-SCI-025-V1

Downhole Seismic Component of

Geotechnical Investigation for a Potential Waste Handling Building

Date Opened: June 15, 2000

Principal Investigator: Michael J. Luebbers

Lead/Supervisor: Cliff Howard

Responsible Professional: Mark T. Peters

12/2/00

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Initial Entry

The paragraphs below are numbered to correspond with the subparagraph numbers used in Paragraph 5.3.1.a of AP-SIII.1Q, Rev. 1 in listing the required content of all Initial Entries.

1. Principal Investigator: Michael J. Luebbers

   Investigators: Rob Steller and John Diehl

   Lead/Supervisor: Cliff Howard

   Responsible Professional: Mark T. Peters

   Work title and Work Breakdown Structure No.: This scope of work supports the activity "Soils Report and TDMS Seismic Properties Submittal", the planning for which is documented in Technical Development Plan TDP-WPS-GE-000001. This work supports the task of performing a geotechnical investigation to acquire geotechnical, geologic and geophysical data for use in developing geotechnical recommendations and ground motions for the preliminary design of a potential Waste Handling Building (WHB). This work is in response to Input Request Nos. 00070.R and 00071.Ra, originated by the Repository Surface Depository Department. The Work Breakdown Structure number for FY00 and FY01 covering this work is WBS 1.2.22.6T. The work is being performed under Work Package 4201226TM3 (FY00) and 4201226TZC (FY01). Other scientific notebooks that are planned to be used for the overall task are listed following this initial entry.

   Research Objective: The work reported in this scientific notebook supports the task of acquiring seismic velocity data for use in developing the values of geotechnical parameters to be used in developing geotechnical recommendations and ground motions for design of a potential WHB. The recommendations were requested by Input Request Nos. 00070.R and 00071.Rb.

   12/7/00

   Proposed Approach: Perform downhole seismic logging to acquire data useful to developing some of the needed input. Perform logging using a set of boreholes selected by the Principal Investigator (PI) from among planned boreholes UE-25 RF#14 through RF#29; logging may also be performed using existing borehole UE-25 RF#13. Measurements should be made at the same depths as in the downhole seismic logging of the same borehole performed by Bruce Redpath under scientific notebook SN-M&O-SCI-030-V1.

   To investigate potential effects of anisotropy, measurements will be made in boreholes selected by the PI with the seismic source offset in two orthogonal directions from the borehole used to introduce the receiver into the subsurface. Select the two orthogonal directions so that the directions are the same as used in the downhole seismic logging performed by Bruce Redpath under scientific notebook SN-M&O-SCI-030-V1.

   It is anticipated that Bruce Redpath will select the two orthogonal directions so that one direction is parallel to bedding strike and the other direction is perpendicular to bedding strike. At this time, it is estimated that the bedding strike is N20W (i.e., 20 degrees west of north) based on bedding strikes measured at the North Portal cut. Unless that is contradicted by subsequent data obtained during site exploration, one offset would be either to the northnorthwest or the southsoutheast of the borehole, and the other would be either to the eastnortheast or the westsouthwest of the borehole. While the

offset to either the northnorthwest or southsoutheast (i.e., along strike) should produce similar results, the offset to the eastnortheast (i.e., perpendicular to strike) may not produce the same result as obtained with offset to the westsouthwest due to the differing orientation of the beds relative to the incidence of the seismic waves.

When performing double surveys to investigate anisotropy, the survey to the northnorthwest or southsoutheast (i.e., along strike) should include all the measurement depths, while the orthogonal survey may be include all of the measurement depths or some subset. If a subset of measurement depths is used, a sufficient number and distribution of depths should be used to verify whether or not an anisotropy effect exists and to quantify the degree of anisotropy.

From the raw measurements, interpret the recordings to identify ("pick") the arrival times, t, of the compressional and shear waves at the downhole receiver. Compute the adjusted arrival time, t_a, which is the arrival time, t, adjusted for the horizontal offset distance, d, between source and receiver:

$$t_a = t \cdot d/(d^2+z^2)^{0.5}$$

where z is the difference in elevation between the source and the receiver, or, for the relatively flat ground at the planned survey locations, z is the depth of the receiver below ground surface. Plot adjusted arrival times for the compressional waves and shear waves as a function of receiver depth below ground surface. Identify intervals where the data points on the plots define either a straight line (in rock and some soils) or a power function (in some soils). For each interval thus identified, compute the corresponding compressional wave velocity or shear wave velocity. For each depth interval, use the values of compressional wave velocity and shear wave velocity to calculate Poisson's ratio using the theory of elasticity. For each borehole and offset, tabulate receiver depth, raw compressional and shear wave arrival times, and adjusted compressional and shear wave arrival times. For each borehole and offset, tabulate the depth interval of each seismic layer, shear wave velocity or velocity function, compressional wave velocity or velocity function, and Poisson's ratio. The two types of tabulation can be combined into a single table if desired. Each table should identify the borehole used and the offset distance and azimuth. Evaluate sources of error and uncertainty in each of these data sets.

12/96 RAS

The downhole logging procedure will be documented in this scientific notebook.

2. *Samples*: No samples will be taken in connection with the downhole seismic effort.

3. *Test Equipment*: The following measuring and test equipment will be used in the field for downhole seismic logging:

   - Digital recorder, such as the OYO Model 3331 digital recorder, manufactured by OYO Corporation of Tokyo, Japan.
   - For shear wave measurements, a variable azimuth geophone that can be oriented with a fluxgate magnetometer compass sensor built into the geophone assembly.
   - For compressional wave measurements, a vertical geophone; a digital seismograph or digital logging recorder.
   - Shear beam, strike plate and vehicle.
   - Sledgehammers with impulse switches.

- Various cables.
- Ruler.
- Batteries.
- Miscellaneous equipment and supplies.

The timing circuit of the OYO Model 3331 digital recorder requires calibration to verify that time is measured to an accuracy of ±0.1% of full scale. The recorder has sampling rates of 2, 5, 10, 20, 50, 100 and 200 microseconds. Sensitivity is in millivolt range, 12 bits deep. DOE contractor, Bechtel Nevada, calibrated two of these recorders, Serial Nos. 15014 and 12004, on June 6, 2000 at their Las Vegas facility. A copy of the calibration records will be inserted in this scientific notebook following this initial entry. Calibration will be repeated upon completion of this work or at intervals not exceeding one year, whichever comes first.

The depth of the receiver below ground surface is used to calculate velocity and is needed in order to know to what material the measurement applies. Consequently, depth of the receiver below ground surface should be measured to an accuracy of ±0.2 foot or ±0.5 percent, whichever is larger.

The tops of the casings will be used as references for measuring depth. The difference in elevation between the top of casing and the ground surface at the same borehole will be measured with an ordinary ruler to the nearest 0.1 foot so that the depth of the geophone below ground surface can be calculated to the tolerances stated in the preceding paragraph.

12/1/00

4. *Relevant procurement activities, such as calibration or analytical services*: Calibrations/verifications will be required, as discussed in Section 3. The services of GEOVision, a division of Blackhawk Geometrics, have been procured to perform the downhole surveys documented in this scientific notebook. The services of Bruce Redpath, geophysicist, have been procured to review the downhole surveys documented in this scientific notebook.

5. *Software Programs to be Used*: We will use the following software in this scientific notebook:

   - Microsoft Word for Windows, Version 97 SR-2 or more recent.
   - Microsoft Excel for Windows, Version 97 SR-2 or more recent.

   Section 2.1.1 of AP-SI.1Q exempts Microsoft Word and Microsoft Excel from the qualification requirement. However, any software routines, macros, or software applications used within these programs for quality-affecting work will need to be documented in the AMR in accordance with Section 5.1 of AP-SI.1Q.

6. *Applicable Standards and Criteria*: Beyond those identified in the Development Plan referenced in Item 1 above, no standards or criteria apply to the work documented in this scientific notebook.

7a. *Any special training/qualifications including procedures, processes or skills*: The operators of the downhole seismic logging equipment, Robert Steller and/or John Diehl, have been selected based on their experience in operating this type of equipment and in interpreting the data acquired with this type of equipment. The reviewer of the data, Bruce Redpath, has been selected based on his experience in performing this type of geophysical measurement and interpreting this type of data. Other than these requirements, no special training/qualifications, procedures, processes or skills are required beyond those documented in the technical qualifications of the personnel identified in Item

8a of this Initial Entry as having authority to contribute original material to this scientific notebook. Personnel performing evaluations reported herein shall have academic education involving specialized course work in relevant subject matter or equivalent on-the-job learning/training. It is the responsibility of the PI and Investigators to consider the background of staff before assigning the staff member to a task.

7b. *Environmental conditions*: Not applicable.

7c. *Accuracy, precision, or representativeness of results; and pertinent potential sources of error*: There are no predefined standards for the accuracy and precision of the results. The accuracy and precision of the data being acquired/developed and described herein will be assessed and the implications for the seismic velocities will be described at appropriate locations in the scientific notebook. The scientific notebook will address the representivity of the seismic velocities after they are developed. No potential sources of error have been identified, other than those inherent in the limited accuracy of the measuring equipment.

12/7/00

8. *Additional relevant information*: None

9. *Full citations of all works referenced in this scientific notebook that are related to methodologies in the scientific investigation, and quality status, as appropriate*: References related to methodologies used in this scientific notebook will be cited in the entry where they are first used.

10. *Provisions for controls of electronically managed data*: The completed Supplement V form will be inserted after this initial entry. All data acquired or developed under this scientific notebook will be prepared for submittal to the Technical Data Management System (TDMS) and then submitted to the TDMS. Data submitted to the TDMS will meet TDMS requirements for submitted data. All data acquired in the field will be transferred whenever possible and as soon as practical to electronic format stored on a storage unit in the office. While at the site and in transit between the site and the office, all data will be stored/handled in such manner as to minimize the chance of theft or destruction. In the office, all project data will be backed-up on a separate storage medium to guard against loss until the data can be transferred to the TDMS. Offsite dual-storage will be used whenever practical. Access to stored data will be limited to employees of the companies involved in data acquisition, development and submittal. The scientific notebook will describe how the storage and transfer media are identified as to source, physical and logical format, and date acquired/developed, as appropriate. The acquisition and development of the data will be described herein. If data is transcribed (copied) by manual means (for example, from hand-written notes in a scientific notebook to an electronic data format), the correctness of the transcription shall be verified and documented by a person independent of the original transcription process.

Several staff may access data from the same scientific notebook or the same electronic file stored on a shared file server (local area network); such use by multiple staff requires no special means to verify that each staff member sees the same data because the source is identical. Electronic files transmitted to project associates who are not accessing data from the same source will be manually verified to ensure that the data received is the same as the source data. This may be done by one of several techniques:

- The originating person sends both an electronic and a printed version of the file and the receiving person verifies that the electronic data received matches the printed data. The

receiving person provides a statement that the check and been performed and that the data has been found to be unaltered. The statement will be inserted in this scientific notebook.

- In the case of TDMS, the originating person can view the data actually posted on the Automated Technical Data Tracking system (ATDT), thus verifying that the data has not only been received correctly, but also has been processed correctly. This is the preferred method because it has been observed that data can be received intact but improperly processed. Manual verification will be recorded in the scientific notebook.

RAS 12/7/00

11. *Organizations that will provide input to, or use, the results of the investigation documented by this scientific notebook and that are not identified in the development plan*: Repository Surface Depository Department.

Personnel who may contribute original material to this scientific notebook and examples of their signatures/initials (space is left to add additional signatures if needed):

Name	Signature	Initials	Date
Robert Steller	Rob Steller 6/12/01 RAS	RS	10-10-00
John Diehl	[illegible]	JGD	10-11-00
Bruce Redpath	Bruce B. Redpath	BBR	30 OCT 00
Michael Luebbers	Michael Luebbers	ML	10-02-00
Cliff Howard	Cliff Howard	CH	11-13-01

Investigators who are responsible for this scientific notebook: Rob Steller and John Diehl

Initial Entry Prepared by:

Michael Luebbers
Michael J. Luebbers

Oct. 2, 2000
Date

Compliance Review by:

Jon A. Zeisloft

10-18-00
Date

Approved by Lead/Supervisor:

Cliff Howard

Cliff Howard

Date 10-18-00

BKS
12/7/00

Blank
Cliff Howard 11-15-01

Cross References to Other Scientific Notebooks

This scientific notebook is related to concurrent scientific notebooks for the geotechnical studies or ground motion studies for a potential Waste Handling Building. These scientific notebooks are:

- SN-USGS-SCI-122-V1, "Collection and Processing of Geotechnical Data from Test Pits and Drill Holes for the Waste Handling Building Foundation", which will be used to document collection and processing of geotechnical data from planned boreholes UE-25 RF#14 through RF#29 and planned test pits TP-WHB-1 through TP-WHB-4.

- SN-M&O-SCI-020-V1, "Crosshole Seismic Velocity Measurements in North Ramp of Exploratory Studies Facility", which will be used to document crosshole measurements performed using planned boreholes in the walls of the Experimental Studies Facility (ESF) North Ramp tunnel.

- SN-M&O-SCI-021-V1, "SASW Measurements In North Ramp of the Exploratory Studies Facility", which will be used to document spectral analysis of surface waves (SASW) logging performed in the North Ramp of the Exploratory Studies Facility.

- SN-M&O-SCI-022-V1, "SASW Measurements at Waste Handling Building Site", which will be used to document spectral analysis of surface waves (SASW) logging performed at a potential site for a waste handling building in the vicinity of the ESF North Portal.

- SN-M&O-SCI-023-V1, "SASW Measurements at the Top of Yucca Mountain", which will be used to document spectral analysis of surface waves (SASW) logging performed at the top of Yucca Mountain.

- SN-M&O-SCI-024-V1, "Borehole Suspension Seismic Component of Geotechnical Investigation for a Potential Waste Handling Building", which will be used to document suspension seismic logging performed using planned boreholes UE-25 RF#14 through RF#29.

- SN-M&O-SCI-026-V1, "Development of Geotechnical Parameters for Geotechnical Investigation of a Potential Waste Handling Building", which will be used to document process leading to selection of values for geotechnical parameters needed to perform geotechnical evaluations for foundations for a potential waste handling building.

- SN-M&O-SCI-027-V1, "Foundation Evaluations for Geotechnical Investigation of a Potential Waste Handling Building", which will be used to document evaluations performed to develop geotechnical recommendations for preliminary design of foundations for a potential waste handling building, as requested in Input Request No. 00071.Ra.

- SN-M&O-SCI-030-V1, "Downhole Seismic Measurements at the Potential Waste Handling Building Site", which will be used to document downhole seismic logging performed using planned boreholes UE-25 RF#14 through RF#29 and existing borehole UE-25 RF#13.

Michael Luebbers

Michael Luebbers

Oct. 2, 2000

Date

10

OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT
PROCESS CONTROL EVALUATION FOR SUPPLEMENT V

QA: QA

A. Process/Work Activity Identification: (check one)

☐ Process Procedure (identify process procedure number including revision and ICN level being evaluated)

☒ Work Activity (identify by work package number, work planning document, technical product, etc.)

WBS 1.2.22.6T. Work Package 4201226TM3 (FY00) and 4201226TZC (FY01).

B1. Work Activities/Processes/Process Functions Evaluation

	Yes	No
1. Will, or does, the work activity/process/process function depend on a form of electronic media to store, maintain, retrieve, modify, update, or transmit quality-affecting information?	x	
2. Will, or does, the work activity/process function manage, control, or use an electronic database, spreadsheet, set of files, or other holding system for information that is intended to be used to support the licensing position?	x	
3. Will, or does, the work activity/process function transfer data electronically from one location to another? (The method may be File Transfer Protocol, electronic download, tape to tape, disk to disk, etc.)	x	

If the answers in Section B1 are all "No," process in accordance with Section 5.1.b)6), otherwise proceed to B2.

B2. Work Activities/Processes/Process Functions Compliance Evaluation

	Yes	No	N/A
1. Does the process procedure or work activity document provide adequate controls to protect data from damage and destruction for its prescribed lifetime?	x		
2. Does the process procedure or work activity document provide adequate controls to ensure the data are readily retrievable?	x		
3. Does the process procedure or work activity document describe how data will be stored with respect to media, conditions, location, retention time, security, and access?	x		
4. Does the process procedure or work activity document describe how the storage and transfer media are identified as to source, physical and logical format, and date prepared?	x		
5. Does the process procedure or work activity document provide adequate controls to ensure completeness and accuracy of the data input and any subsequent changes?	x		
6. Does the process procedure or work activity document provide adequate access controls to maintain data security and integrity?	x		
7. Does the process procedure or work activity document provide adequate controls to ensure that data transfers are error free or within a defined permissible error rate? (e.g., copying raw data from notebook to electronic data form, electronic media to another electronic media, File Transfer Protocols, etc.)	x		

If a "No" answer is given for any question in section B2, proceed to Section C, otherwise process in accordance with Section 5.1.b)6). Mark "N/A" for those items that are not applicable to the specific process or work activity.

C. Results of Evaluation

Provide a summary of the "as-is condition," proposed remedial actions, and expected completion date of document revision, for each item in B2 that was indicated as "No."

Responsible Manager:	Date:
Cliff Howard	10-18-00

OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT
SCIENTIFIC NOTEBOOK
COMPLIANCE REVIEW WORKSHEET

QA: QA 9-19-00
Page: 1 Of: 2

Scientific Notebook Identifier: (from Scientific Notebook Register)	Investigator:
SN-M&O-SCI-025-V1	MICHAEL J. LUEBBERS 02-06-00

Scientific Notebook Title: DOWNHOLE SEISMIC COMPONENT OF GEOTECHNICAL INVESTIGATION FOR A POTENTIAL WASTE HANDLING BUILDING

	Print Name:	Signature:	Organization:	Date:
Reviewed by:	JON ZEISLOFT	Jon Zeisloft	M&O/ART/DSDQ	9-19-00
Review Comment Resolution Satisfactory:	JON ZEISLOFT	Jon Zeisloft	M&O/ART/DSDQ	10-18-00
Review Acceptance *(to be signed by Responsible Manager or PI after the Compliance Review is complete)*:	Cliff Howard	Cliff Howard	M&O/ART/SNL	10-18-00

Type of Compliance Review: Scientific Notebook page range reviewed 1 to 10 2-11-01

1. Initial Entry Review — [X] *Complete Parts 1 and 2*
2. Interim Review — [ ] *Complete Parts 1 and 3*
3. Closure Review — [ ] *Complete Parts 1, 3, and 4*

Additional Implementing Documents Identification *(e.g., technical procedures, APs, etc., if applicable)*:
— NA —

Instructions for Completing This Form:

1. If any part of a compound question in the Requirements/Criteria column cannot be answered **YES**, then mark the entire requirement, **NO**, and provide an explanation in the **COMMENTS** column.
2. Marking the **N/A** box means the criteria is not applicable to this notebook. If the N/A box is checked, provide a brief justification in the **COMMENTS** column.
3. All criteria marked **NO** require an explanation in the **COMMENTS** column and will be considered a non-compliance issue which the investigator must address in comment response.
4. The Review Acceptance box above will be completed by the Responsible Manager or PI only after the Reviewer has signed above for satisfactory Comment Resolution.

Requirements/Criteria and Relevant Paragraph [AP-SIII.1Q, Para. No.]	CRITERIA MET Yes	No	N/A	Comments
PART 1: GENERAL/IDENTIFICATION AND CONTROL OF SCIENTIFIC NOTEBOOKS				
1. Use of bound notebook? [5.1.2]	✓			
2. Continuous pagination? [5.1.2]	✓			
3. Loose material securely attached? [5.1.3]			✓	new book
4. Any excessive blank spaces? [5.1.4]			✓	"
5. Are supplemental records properly cross-referenced? [5.1.5]			✓	"
6. Have all entries been dated, and initialed or signed? [5.1.6]	✓			only the initial entry / new book.
7. Are corrections lined through, initialed and dated, and explained if appropriate? [5.1.7]			✓	new book
8. Is the notebook sufficiently legible for imaging? [5.1.7]	✓			
9. Is Table of Contents adequate? [5.1.9]	✓			
10. Is there a unique Scientific Notebook Register ID number located on the first page or cover? [5.2a)]	✓			
11. Reference to a preceding and/or following notebook (as appropriate)? [5.2c)]			✓	initial SN of investigation

OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT
SCIENTIFIC NOTEBOOK
COMPLIANCE REVIEW WORKSHEET

QA: QA 10-18-00
Page: 2 Of: 2

Scientific Notebook: (from Scientific Notebook Register)
SN-M&O-SCI-025-V1

Requirements/Criteria and Relevant Paragraph [AP-SIII.1Q, Para. No.]	CRITERIA MET Yes	No	N/A	Comments
PART 2: SCIENTIFIC NOTEBOOK INITIAL ENTRY				
12. Is there an approved planning document included or referenced? [5.3.1a)]	✓			
13. Are all criteria of 5.3.1a) adequately discussed? [5.3.1a)]	✓			
14. List of samples to be used? [5.3.1a) 2)]			✓	none to be used
15. List of equipment to be used? [5.3.1a) 3)]	✓			
16. List of measuring and test equipment needing calibration and the calibration details/methods? [5.3.1a) 3)]	✓			
17. List of needed procurements? [5.3.1a) 4)]	✓			
18. Has all required information of [5.3.1a) 5)] been provided?	✓			
19. List of standards and criteria to be used? [5.3.1a) 6)]	✓			
20. List of special training and/or qualification requirements? [5.3.1a) 7)]	✓			
21. ID of prerequisites or special or unique environmental conditions required? [5.3.1a) 7)]			✓	none required
22. Accuracy, precision or representativeness of results requirements identified? [5.3.1a) 7)]	✓			
23. Potential sources of error? [5.3.1a) 7)]	✓			
24. Has any miscellaneous relevant information necessary to understand the research been included? [5.3.1a) 8)]			✓	none
25. List citations of all work referenced in the notebook? [5.3.1a) 9)]	✓			to be cited at first use of each.
26. Are there provisions for controls of any electronically managed data? [5.3.1a) 10)]	✓			
27. Has planning been coordinated with those providing input to or using the results from scientific notebook? [5.3.1a) 11)]	✓			under "Research Objective"
28. List of personnel contributing to the notebook with their signatures and initials? [5.3.1b)]	✓			
29. Are there cross-linking statements between preceding, succeeding and concurrent scientific notebooks? [5.3.1c)]	✓			only concurrent is applicable
30. Initial entry signed and dated? [5.3.1a)]	✓			
31. Acceptance of the initial-entry compliance review including resolution of comments? [5.3.2a)]	✓			
32. Is completion of initial-entry compliance review documented in the notebook? [5.3.2c)]	✓			

(End of Initial Entry Compliance Review – J. Rudolph 10-18-00)
– Only pages 1 & 2 used –

12/20/00

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FOR FUTURE ENTRIES. RAS 7/30/01

OTHER REFERENCED DOCUMENTS

Following are attachments to this SN:

Attachment 1: CD-ROM with Electronic Data for This SN titled "SCI-025-V1 CD-ROM"

Attachment 2: CD-ROM with "Summary Data Report of Downhole Seismic Component of Geotechnical Studies for a Potential Waste Handling Building." dated September 21, 2001

added by JOD 9-24-01

11-15-01 Both of these CD roms are located in the front pouches of the front cover of this book. Cliff Howard

rest of page is blank
9-26-01
JOD

PROCEDURE FOR

DOWNHOLE SEISMIC VELOCITY LOGGING

Background

This procedure describes a method for measuring shear and compressional wave velocities in soil and rock. The Downhole Method is applied by generating shear and compressional waves at the surface and measuring the travel time between the surface and the borehole.

Objective

The outcome of this procedure is a plot and table of P and S_H wave velocity versus depth for each borehole. Alternatively or additionally, travel time plots may also be produced. Standard analysis is performed on source to receiver data. Data is presented in report format, with ASCII data files and digital records transmitted on diskette.

12/7/00

Instrumentation

1. OYO Model 170 Digital Logging Recorder or equivalent
2. Downhole probe, including horizontal and vertical geophones, fluxgate compass for orientation downhole, and system for locking probe against the side of the borehole
3. 16 and 20-pound sledge hammers with impulse switches to trigger recording
4. Geophone for surface recording to check trigger time
5. Winch and logging cable
6. Batteries to operate OYO 170 and controls for downhole probe
7. Various cables

Downhole soil velocities are measured using a proprietary variable azimuth downhole geophone and the OYO Model 170 Digital Logging recorder. This system orients the downhole geophones parallel to the axis of excitation at the surface, insuring that signals received at the downhole geophones are of maximum amplitude, and are not subject to errors in travel time caused by incorrect phase of first arrival picks, as found with non-orientable downhole probes.

The downhole probe consists of a horizontal and vertical geophone mounted on a rotatable structure with a fluxgate magnetometer compass sensor. The compass/geophone assembly is mounted with preamplifiers and compass drive circuitry inside a 2.5 inch diameter case approximately 30 inches in length. The compass/geophone assembly can be rotated from the surface control module to match the azimuth of the horizontal geophone axis with the azimuth of the surface shear wave source. The probe receives control signals from, and sends the amplified geophone signals to, instrumentation on the surface via an armored 7 conductor cable. The cable is wound onto the drum of a winch and is used to support the probe. Cable travel is measured to provide probe depth data. The probe is locked into the borehole by inflation of an external rubber bladder that runs the length of the probe.

20 pound sledge hammer blows against the ends of a steel capped traction plank are used as an S_H-wave energy source. The traction plank is weighted by placing under the wheels of a 10,000 pound truck. 16 * pound sledge hammer blows against a steel plate on the soil surface are used as a P-wave energy source. System triggering is performed by a piezo hammer switch mounted on each hammer handle. A vertical and horizontal geophone are mounted near the borehole collar to record reference wave forms to verify consistent triggering from each hammer blow. *

12/7/00 DAS

In operation, the S_H-wave produced by swinging the hammer in one direction produces an output at both the surface and downhole horizontal geophones which is digitized and recorded. The hammer is then swung in the opposite direction, and the horizontal output signals are again recorded, producing a shear-wave record of polarity opposite to the previous record. A vertical hammer blow is executed, and the responses of the vertical geophones to the resultant P-wave are recorded.

The signal from each geophone generated by each hammer blow is recorded as a different channel on the recording system. The Model 170 recorder has six channels (two simultaneous recording channels), each with a 12 bit 1024 sample record. The recorded data is displayed on a CRT display and on paper tape output as six channels with a common time scale. Data and all system parameters are stored on 3.5 inch floppy diskettes for further processing. Up to 8 hammer blows can be summed to improve the signal-to-noise ratio of the signals.

Review of the displayed data on the CRT or paper tape allows the operator to set the gains, filters, sample rate, and summing number in order to optimize the quality of the data before recording to floppy diskette.

* NOTE: For this project the same 20-lb sledge hammer was used for both S_H- and P-wave source. JGD 9-27-01

Environmental Conditions

For best results, the borehole must be between 7.5 and 17 cm in diamater, or 3 to 6 inches.

The locking method requires that the borehole be cased with PVC for best results. The casing must be properly installed and grouted. The best method is using a tremie tube to pump grout from the bottom. Any voids in the grout will cause problems with the data. Likewise, large grout bulbs used to fill cavities will also cause problems. The grout must be set before testing. This means the grouting must take place at least 48 hours before testing.

For borehole casing, applicable preparation procedures are presented in ASTM Standard D4428/D4428M-91 Section 4.1 (see ASTM website for copy).

The recording system must be protected from rain. The downhole probe may or may not be submersible (depending on type). The procedure below provides for emptying the borehole of water.

Calibration

Calibration of the Model 170 digital recorder is required.

PAS 12/7/00

Downhole Measurement Procedure

Prior to performing downhole measurements each borehole casing is emptied using a submersible pump or bailer. The downhole probe compass azimuth is checked at the surface, and compared to the azimuth of the traction plank S_H-wave source. The mechanical and electronic depth encoders are set to zero with the geophones located at ground level. The probe is then lowered to the bottom of the borehole at the desired intervals. At each desired depth, the probe is locked in place by inflating the rubber bladder to 20 PSI over the ambient pressure at the probe depth. The compass/geophone assembly is then rotated to match the azimuth of the surface S_H-source. At each sampling depth the measurement sequence of two opposite horizontal records and one vertical record is performed, and the gains adjusted as required. The waveform data from each depth is printed on paper tape, checked, and recorded on diskette before moving to the next depth. Upon removal of the probe from the borehole, depth indications are re-checked with the geophones located at ground level.

Typical depth spacing for measurements is 1.5 meters, or 5 feet. Alternative spacing is 1 meter, or 3 feet.

Deviations From Above Written Methods And Procedures

It is permissible for on-site personnel to deviate from this procedure with respect to the size of sledge hammers, the weight of the truck, removing water from the borehole (not needed for submersible geophone packages), or the use of a winch (manual lowering is acceptable for shallow depths), provided adequate waveforms are obtained.

Required Field Records

1) Field log for each borehole (see example attached) showing

   a) Borehole identification

   b) Date of test

   c) Tester or data recorder

   d) Description of measurement

   e) Any deviations from test plan and action taken as a result

   f) QA Review

2) Paper output records for each measurement as backup showing and ID number

3) List of record ID numbers (for data on diskette) and corresponding depth

4) Diskettes with backup copies of data on hard disk, labeled with borehole designation, record ID numbers, date, and tester name.

RAS 12/7/00

Downhole Analysis

The digital records are analyzed to locate the first arrival of energy on each downhole geophone record. The horizontal records are studied to verify the presence of clear S_H-wave pulses, as indicated by the presence of opposite polarity pulses on each pair of horizontal records. Ideally, the shear-wave signals from the 'normal' and 'reverse' hammer blows are very nearly inverted images of each other. Digital FFT - IFFT lowpass filtering is used to remove the higher frequency converted P-wave signal and cultural noise from the S_H-wave signal.

Trigger timing is checked by comparing the records obtained from the surface geophones; if any shifting of trigger time is seen, these values are used to correct the total downhole travel time. Total travel time is corrected for changes in path length due to offset of the source from the borehole collar, and then plotted versus depth.

Results are further presented in the form of velocity profiles with depth for both P- and S_H-wave velocities.

QA Review

This procedure has been reviewed and approved by the undersigned.

Registered Geophysicist _____ Date 12/7/98

QA Review _____ Date 12/7/98

References:

1. "Standard test Methods for Crosshole Seismic Testing", ASTM Standard D4428/D4428M-91, July 1991, Philadelphia, PA

BAS 12/2/00

Blank CH 2-5-02

12/7/00 RAJ

Laptop computer

Steel tape

5X6 or 6X6 pressure treated plank with Steel end caps

☐ Hammer switch

16# or 20# sledge

Vertical geophone

Mighty Werlitzer

Data collection switching device and controller.

CH 2-25-02

CH 2-25-02

Regulators

Nitrogen bottle

Battery

Downhole geophone by orientable & compass

OYO PS-170 Logger/Recorder

Diskettes with Data

12/7/8 RAS 12/7/8 RAS

Bechtel Nevada

Standards and Calibration Laboratory
P.O.Box 98521, M/S NLY064 Las Vegas, NV 89193-8521

Report No. 1000018202

CALIBRATION REPORT

Company	YUCCA MOUNTAIN PROJECT	Instrument	SEISMIC RECORDER	Inst Id	006851
Department	YMP M&O	Manufacturer	OYO	Interval	12 Months
Chg #	E0260240 WI10255	Model Number	3331	Cal Date	06/06/2000
Requestor:	J. DIEHL	Serial	15014	Next Cal	06/06/2001

STATEMENT of TRACEABILITY and COMPLIANCE

This certifies the above instrument has been calibrated using standards and instruments which are traceable to the National Institute of Standards and Technology (NIST), Sandia PSL, other National Laboratories, an accepted value of a natural physical constant, a ratio calibration technique, or participation in National Measurement Assurance Systems. This calibration complies with the Bechtel Nevada Quality Management Process Description, PD-0001.002, ANSI / NCSL Z540-1-1994 and TRW MPO A08252CC0X.

User Location	ESCL	Humidity:	40.0	Temperature:	75.0
Cal Procedure	MAN OY001 REV 1.2	Accuracy:			

ACCURACY CERTIFIED TO: SEE DATA SHEETS
SOURCE OF SPECIFICATION: MANUFACTURER

Measurement Standards:

Instrument Type	Mfr. Model	Inst Id	Cal Date	Cal Due
COUNTER	HP 5335A	002032	11/30/1999	11/30/2000
FUNCTION GENERATOR	HP 3325B	001757	03/06/2000	03/06/2001

A test uncertainty ratio of at least 4:1 is maintained unless otherwise stated.

Test Results Summary:

Condition

VISUAL INSPECTION: OK; AS FOUND : PASS; AS LEFT : PASS

Calibration Notes

Calibrated By: O.BRABHAM/MET.TECH.

Reviewed By: C.E.TUNLEY/MANAGER

Reviewed Date: 06/06/2000

This report shall not be reproduced except in full, without written approval of the Bechtel Nevada Standards & Calibration Laboratory.

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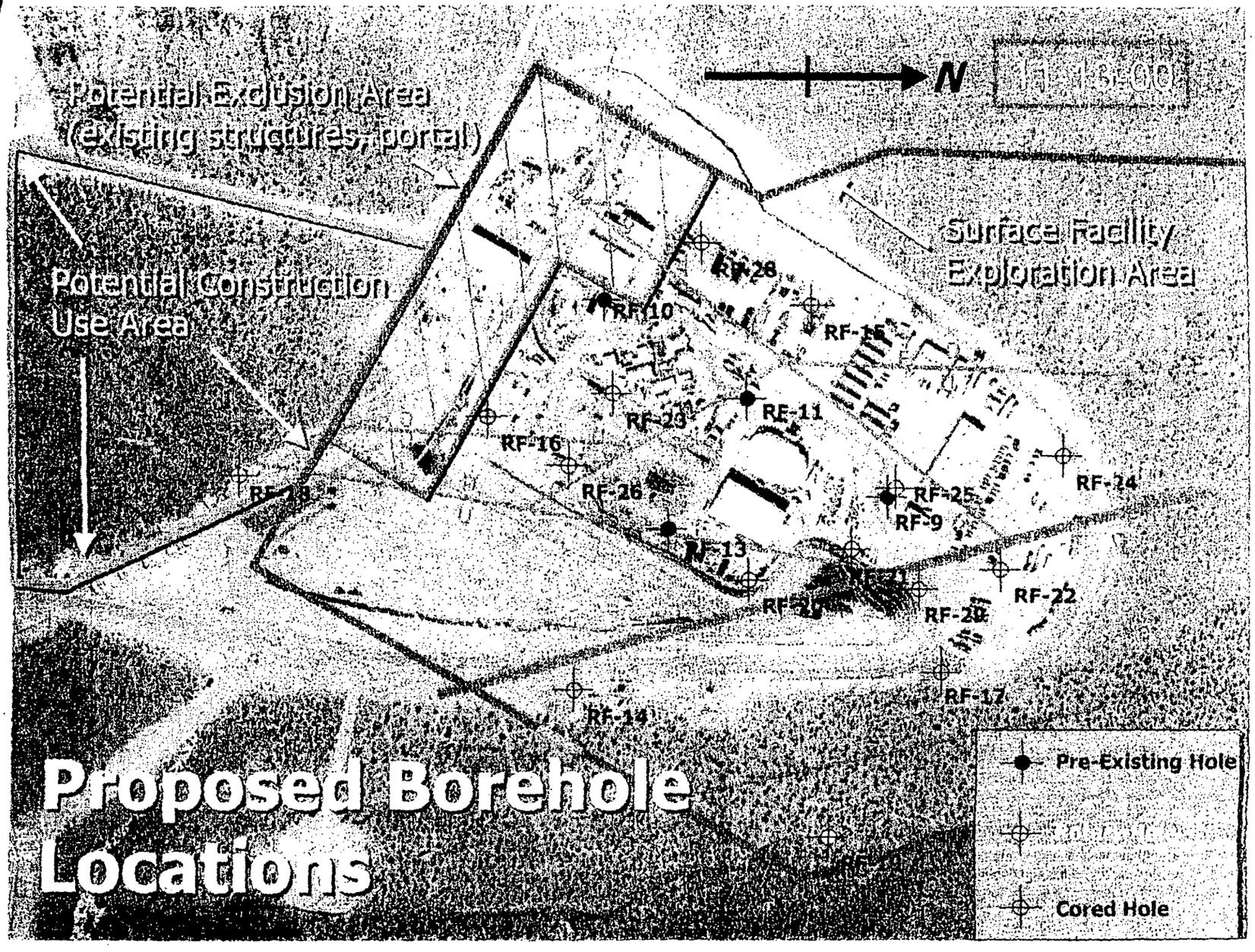
RAS 12/1/08

RAS 12/1/08



A better image of this figure is attached on page 72. Bighorn Hound 11-15-01

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BLANKS LINES ON PAGES 22 & 23 ARE INTENTIONAL
RAS 6/12/01

DOWNHOLE VELOCITY FIELD LOG

SITE: Yucca Mtn ESF NPP RF-13 DATE: 12/8/00, 12/9/00
CLIENT: TRW JOB: 0290
AUTHOR: ROBERT A. STELLER (RAS) PAGE 1 OF 5

CONTACT: _____ _OFFICE_ PHONE: _____
_____ PHONE: _____
CONTACT: _____ _OFFICE_ PHONE: _____
_____ PHONE: _____
CONTACT: _____ _____ PHONE: _____
_____ PHONE: _____
CONTACT: _____ _____ PHONE: _____
_____ PHONE: _____
DRILLER: _____ _____ PHONE: _____
COMPANY: _____ _____ PHONE: _____

RAS 12/9/00
DIRECTIONS TO SITE: _____

GENERAL SITE CONDITIONS/LOCATION: _____

EA#: _____
BOREHOLE DESIGNATION: RF-13 LOCATION: _____
COUNTY: _____ RANGE: _____ TOWNSHIP: _____ SECTION: _____
BOREHOLE CONSTRUCTION: CASED ✓ UNCASED _____
DIAMETERS AND DEPTH RANGES: 3" 0 TO _____; _____, _____ TO _____
BOREHOLE TOTAL DEPTH AS DRILLED: _____
CONDUCTOR CASING?: YES ✓ DEPTH TO BOTTOM OF CASING _____; NO _____
DEPTH TO BEDROCK: _____ DEPTH TO WATER TABLE: _____
BOREHOLE FLUID: WATER ✓; FRESH WATER MUD _____; SALT WATER MUD _____;
OTHER: _____
DEPTH TO BOREHOLE FLUID: _____ TIME SINCE LAST CIRCULATION: NA

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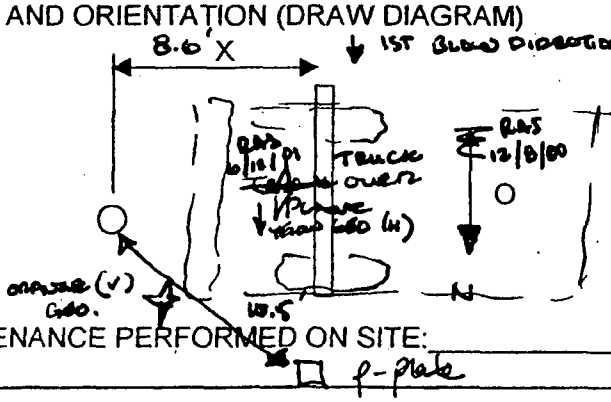
SITE: YMP ESF NPP RF-13 DATE: 12/8/00, 12/9/00
CLIENT: TRW JOB: 0290
AUTHOR: RAS PAGE 2 OF 5

LOGGING CREW:
VEHICLE(S) USED AND MILEAGE: RED ✓; BLUE ; WHITE
MOBILIZED FROM: DEPARTURE TIME:
ARRIVED ON SITE:
STANDBY TIME: CAUSE:
LOGGING STARTED: 13:00, 12/8/00 LOGGING COMPLETED: 10:45 12/9/00
DEMOBILIZED TO: ARRIVAL TIME:
ADDITIONAL DEMOB TIME: REASON:

BATTERIES CHANGED BEFORE LOGGING: YES ; NO ✓; STORED WITH NEW
WINCH COMPROBE ✓ HAND WHITE TR.
INSTRUMENT 12004 15014 ✓
GEOPHONE GEO-1

RAS 12/9/00

SETUP AND ORIENTATION (DRAW DIAGRAM)



OFFSET "X" 10.5 FT. - P-WAVE
8.6 FT. - SHEAR
ORIENTATION "O" MAG NORTH 0°
GEOPHONE POSITION ✧

MAINTENANCE PERFORMED ON SITE:
P-plate

EQUIPMENT PROBLEMS OR FAILURES:

SUGGESTIONS, ADDITIONS, CHANGES:

COMMENTS: COMPASS AT CW JOB 60' FROM TRUCK READS 36°. BOREHOLE STICKUP = 1.4 FT.

GEOVISION DOWNHOLE LOGGING FIELD NOTES RF-13

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SITE: YMP ESF NRP RF-13 DATE: 12/8/00

CLIENT: TRW JOB: 0290

AUTHOR: RAS PAGE 3 OF 5

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
0.9	3.00	RAS 6/12/01		
1.8	6.00	001		START @ 15:00
2.7	9.00	2		
3.7	12.00	3		
4.6	15.00	4		
5.5	18.00	5		
6.4	21.00	6		
7.3	24.00	7		
8.2	27.00	8		
9.1	30.00	9		
10.1	33.00	10		
11.0	36.00	11		
11.9	39.00	12		
12.8	42.00	13		WAVEFORMS CHANGED - HI FREQ PRESENT
13.7	45.00	14		
14.6	48.00	15		
15.5	51.00	16		
16.5	54.00	17		
17.4	57.00	18		
18.3	60.00	19		
19.2	63.00	20		
20.1	66.00	21		
21.0	69.00	22		
21.9	72.00	23		
22.9	75.00	24		
23.8	78.00	25		
24.7	81.00	26		
25.6	84.00	27		
26.5	87.00	28		
27.4	90.00	29		
28.3	93.00	30		
29.3	96.00	31		
30.2	99.00	32		
31.1	102.00	33		
32.0	105.00	34		
33.5	110.00	35		
35.1	115.00	36		
36.6	120.00	37		
38.1	125.00	38		

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GEOVISION DOWNHOLE LOGGING FIELD NOTES RF-13

SITE: YMP ESF NRP RF-13 DATE: 12/8/00, 12/9/00

CLIENT: TRW JOB: 0290

AUTHOR: RAS PAGE 4 OF 5

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
39.6	130.00	39		
41.1	135.00	40		
42.7	140.00	41		
44.2	145.00	42		
45.7	150.00	43		
47.2	155.00	44		
48.8	160.00	45		
50.3	165.00	46		
51.8	170.00	47		
53.3	175.00	48		
54.9	180.00	49		
56.4	185.00	50		
57.9	190.00	51		CONTINUED WATER?
59.4	195.00	52		
61.0	200.00	53		
62.5	205.00	54		
64.0	210.00	55		
65.5	215.00	56		
67.1	220.00	57		
68.6	225.00	58		
70.1	230.00	59		
71.6	235.00	60		
73.2	240.00	61		
74.7	245.00	62		
76.2	250.00	63		
77.7	255.00	64		
79.2	260.00	65		
80.8	265.00	66		
82.3	270.00	67		
83.8	275.00	68		
85.3	280.00	69 70		#69 LAST MEASUREMENT ON 12/8/00
86.9	285.00	71		AT 16:15. #70 FIRST MEASUREMENT
88.4	290.00	88 — ACCIDENTALLY INCREMENTED RECORD *		ON 12/9/00 @ 08:30
89.9	295.00	89		
91.4	300.00	90		
93.0	305.00	91		
94.5	310.00	92		
96.0	315.00	93		
97.5	320.00	94		

RAS 12/9/00

JGD 10-4-01

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GEOVISION DOWNHOLE LOGGING FIELD NOTES RF-13

SITE: Yucca Mtn ESF NPP RF-13 DATE: 12/9/00

CLIENT: TRW JOB: 0290

AUTHOR: RAS PAGE 5 OF 5

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
99.1	325.00	95		
100.6	330.00	96		
102.1	335.00	97		
103.6	340.00	98		
105.2	345.00	99		HIT BOTTOM @ WITCH INTERVAL
106.7	350.00			OF 106.2 m - 09:15
108.2	355.00			MOVE-OFF RF-13 @ 10:45 -
109.7	360.00			MOVE TO RF-15 & BAIL
111.3	365.00			FINISH WITH BAILING @ 11:30
112.8	370.00			
114.3	375.00			
115.8	380.00			
117.3	385.00			
118.9	390.00			
120.4	395.00			
121.9	400.00			
123.4	405.00			
125.0	410.00			
126.5	415.00			
128.0	420.00			
129.5	425.00			
131.1	430.00			
132.6	435.00			
134.1	440.00			
135.6	445.00			
137.2	450.00			
138.7	455.00			
140.2	460.00			
141.7	465.00			
143.3	470.00			
144.8	475.00			
146.3	480.00			
147.8	485.00			
149.4	490.00			
150.9	495.00			
152.4	500.00			
153.9	505.00			
155.4	510.00			
157.0	515.00			

RAS 12/9/00

RAS 6/12/01

JGD 10-4-01

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BLANK LINES ON PAGES 27 & 28 ARE INTENTIONAL
RAS 6/12/01

DOWNHOLE VELOCITY FIELD LOG

SITE: Yucca Flat NTS RF-17 DATE: 12/9/00
CLIENT: TRW JOB: 0290
AUTHOR: ROBERT A. STELLER (RAS) PAGE 1 OF 6

CONTACT: _____ _OFFICE_ PHONE: _____
_____ PHONE: _____
CONTACT: _____ _OFFICE_ PHONE: _____
_____ PHONE: _____
CONTACT: _____ _____ PHONE: _____
_____ PHONE: _____
CONTACT: _____ _____ PHONE: _____
_____ PHONE: _____
DRILLER: _____ _____ PHONE: _____
COMPANY: _____ _____ PHONE: _____

DIRECTIONS TO SITE: _____

RAS 12/11/00

GENERAL SITE CONDITIONS/LOCATION: _____

EA#: _____
BOREHOLE DESIGNATION: RF-17 LOCATION: _____
COUNTY: _____ RANGE: _____ TOWNSHIP: _____ SECTION: _____
BOREHOLE CONSTRUCTION: CASED ✓ UNCASED _____
DIAMETERS AND DEPTH RANGES: 4" 0 TO 647' ; _____, _____ TO _____
BOREHOLE TOTAL DEPTH AS DRILLED: 662.1
CONDUCTOR CASING?: YES ✓ DEPTH TO BOTTOM OF CASING 4.87 ; NO ____
DEPTH TO BEDROCK: _____ DEPTH TO WATER TABLE: _____
BOREHOLE FLUID: WATER ✓ ; FRESH WATER MUD _____ ; SALT WATER MUD _____ ;
OTHER: _____
DEPTH TO BOREHOLE FLUID: _____ TIME SINCE LAST CIRCULATION: NA

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SITE: YMP ESF NPP RF-17 DATE: 12/9/00
CLIENT: TRW JOB: 0290
AUTHOR: RAS PAGE 2 OF 6

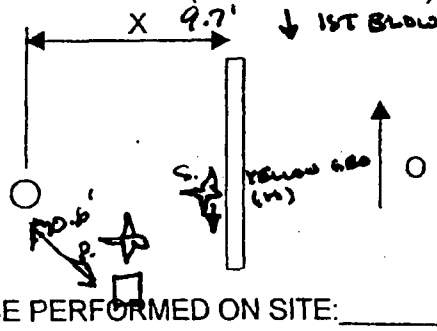
LOGGING CREW:
VEHICLE(S) USED AND MILEAGE: RED ✓; BLUE ; WHITE
MOBILIZED FROM: DEPARTURE TIME:
ARRIVED ON SITE:
STANDBY TIME: CAUSE:
LOGGING STARTED: 13:00, 12/9/00 LOGGING COMPLETED: 13:20, 12/11/00
DEMOBILIZED TO: ARRIVAL TIME:
ADDITIONAL DEMOB TIME: REASON:

BATTERIES CHANGED BEFORE LOGGING: YES ; NO ✓; STORED WITH NEW
WINCH COMPROBE ✓ HAND WHITE TR
INSTRUMENT 12004 15014 ✓
GEOPHONE GEO-1

RAS 12/11/00

SETUP AND ORIENTATION (DRAW DIAGRAM)

P = 10-6'
OFFSET "X" S_H = 9.7'



ORIENTATION "O" 340°
By Brunton compass
GEOPHONE POSITION
Magnetic North CH
2-22-02

MAINTENANCE PERFORMED ON SITE:

EQUIPMENT PROBLEMS OR FAILURES:

SUGGESTIONS, ADDITIONS, CHANGES:

COMMENTS: # compass in GEO phone READS 180° @ CW STOP
Sticking = 1.1'

GEOVISION DOWNHOLE LOGGING FIELD NOTES RF-17

29

SITE: Imp EGF NPP RF-17 DATE: 12/9/00

CLIENT: TRW JOB: 0290

AUTHOR: R. Stellar PAGE 3 OF 6

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
0.9	3.00	RMS 6/12/01		
1.8	6.00	001, 002		@ 13:10 #001 IS TEST
2.7	9.00	002		#002 IS DATA
3.7	12.00	4		
4.6	15.00	5		
5.5	18.00	6		
6.4	21.00	7		
7.3	24.00	8		
8.2	27.00	9		
9.1	30.00	10		
10.1	33.00	11		
11.0	36.00	12		
11.9	39.00	13		
12.8	42.00	14		
13.7	45.00	15		
14.6	48.00	16		
15.5	51.00	17		
16.5	54.00	18		
17.4	57.00	19		
18.3	60.00	20		
19.2	63.00	21		
20.1	66.00	22		
21.0	69.00	23		
21.9	72.00	24		
22.9	75.00	25		
23.8	78.00	26		
24.7	81.00	27		
25.6	84.00	28		
26.5	87.00	29		
27.4	90.00	30		
28.3	93.00	31		
29.3	96.00	32		
30.5	100.00	33		
32.0	105.00	34		
33.5	110.00	35		
35.1	115.00	36		
36.6	120.00	37		
38.1	125.00	38		
39.6	130.00	39		

GEOVISION DOWNHOLE LOGGING FIELD NOTES RF-17 30

SITE: YMP ESF NPP RF-17 DATE: 12/9/00, 12/11/00
CLIENT: TRW JOB: 0290
AUTHOR: RAS PAGE 4 OF 6

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
41.1	135.00	40		
42.7	140.00	41		
44.2	145.00	42		
45.7	150.00	43		
47.2	155.00	44		
48.8	160.00	45		
50.3	165.00	46		TIMEBASE TO 200ms H, 100ms V
51.8	170.00	47		
53.3	175.00	48		
54.9	180.00	49		
56.4	185.00	50		
57.9	190.00	51		
59.4	195.00	52		
61.0	200.00	53		
62.5	205.00	54		
64.0	210.00	55		
65.5	215.00	56		
67.1	220.00	57		
68.6	225.00	58, 59		END DAY @ 15:15 12/9/00
70.1	230.00	60		UNSITE @ 08:30 12/11/00
71.6	235.00	61		FIRST RECORD ASR @ 08:55
73.2	240.00	62		
74.7	245.00	63		
76.2	250.00	64		
77.7	255.00	65		
79.2	260.00	66		
80.8	265.00	67		
82.3	270.00	68		
83.8	275.00	69		
85.3	280.00	70		
86.9	285.00	71		
88.4	290.00	72		
89.9	295.00	73		
91.4	300.00	74		
93.0	305.00	75		
94.5	310.00	76		
96.0	315.00	77		
97.5	320.00	78		
99.1	325.00	79		

GEOVISION DOWNHOLE LOGGING FIELD NOTES RF-17

31

SITE: YMP ESF NPP RF-17 DATE: 12/11/00
CLIENT: TRW JOB: 0290
AUTHOR: RAS PAGE 5 OF 6

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
100.6	330.00	80		
102.1	335.00	81		
103.6	340.00	82		
105.2	345.00	83		
106.7	350.00	84		
108.2	355.00	85		
109.7	360.00	86		
111.3	365.00	87		
112.8	370.00	88		
114.3	375.00	89		
115.8	380.00	90		
117.3	385.00	91		
118.9	390.00	92		
120.4	395.00	93		
121.9	400.00	94		
123.4	405.00	95		
125.0	410.00	96		
126.5	415.00	97		STACK x2 ↓ ON VERTICAL
128.0	420.00	98		
129.5	425.00	99		
131.1	430.00	100		DISK #2 ↓
132.6	435.00	101		
134.1	440.00	102		
135.6	445.00	103		
137.2	450.00	104		
138.7	455.00	105 RAS 6/12/01		P-PLATE MOVE TO NEW LOCATION
140.2	460.00	106, ~~107~~		~~106 DEPTH WRONG, USE 107~~ RAS 12/6/00
141.7	465.00	107, 108		107 DEPTH WRONG, USE 108
143.3	470.00	109		
144.8	475.00	110		
146.3	480.00	111		
147.8	485.00	112		RETAPE H & V HAMMER SWITCH
149.4	490.00	113		
150.9	495.00	114		
152.4	500.00	115		
153.9	505.00	116		
155.4	510.00	117		
157.0	515.00	118		
158.5	520.00	119		STACK 2X ON HORIZONTAL ↓

12/6/00 RAS

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GEOVISION DOWNHOLE LOGGING FIELD NOTES RF-17

SITE: YMP ESF NPP RF-17 DATE: 12/11/00
CLIENT: TRW JOB: 0290
AUTHOR: RAS PAGE 6 OF 6

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
160.0	525.00	120		WATER TRUCK DISTRC. RAS 12/11/00
161.5	530.00	121 122, 123		ADD PAPER, 121 w/ ~~100~~ 92 MISC, H DELAY
163.1	535.00	~~123~~ 124 RAS	12/11/00	122, w/o ~~100~~ 92 MISC DELAY RAS 12/11/00
164.6	540.00	~~124~~ 125		123 w/ ~~100~~ 92 MISC H DELAY RAS 12/11/00
166.1	545.00	~~125~~ 126		USE 122.
167.6	550.00	~~126~~ 127		
169.2	555.00	128		
170.7	560.00	129		
172.2	565.00	130		
173.7	570.00	131		
175.3	575.00	132		
176.8	580.00	133		
178.3	585.00	134		
179.8	590.00	135		
181.4	595.00	136		
182.9	600.00	137		
184.4	605.00	138		
185.9	610.00	139		
187.5	615.00	140		RAS 6/12/01
189.0	620.00	141		LAST ~~FIELD~~ MEAS @ 13:20
190.5	625.00			WATER TRUCK ARRIVES, MUST
192.0	630.00			FILL HOLE FOR SUSPENSION.
193.6	635.00			ZERO CHECK OK.
195.1	640.00			
196.6	645.00			BOTTOM OF CASE @ 647?
198.1	650.00			
199.6	655.00			
201.2	660.00			
202.7	665.00			T.D. @ 668'
204.2	670.00	RAS 6/12/01		
205.7	675.00			
207.3	680.00			
208.8	685.00			
210.3	690.00			
211.8	695.00			
213.4	700.00			

12/11/00 RAS

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GEOVISION DOWNHOLE PROCESSING NOTES

BOREHOLE: UE-25 RF-17 DATE: 1/16/01

CLIENT: TRW JOB: 0290

AUTHOR: R STELLER PAGE 1 OF 4

DEPTH METERS	DEPTH FEET	LP FILTER SHEAR	LP FILTER P-WAVE			COMMENTS HP FILTER, TRACE NOT PICKED - WHY?
1.8	6.00	300	500			
2.7	9.00	300	500			
3.7	12.00	300	500			
4.6	15.00	300	500			
5.5	18.00	300	500			
6.4	21.00	300	500			
7.3	24.00	300	500			
8.2	27.00	300	500			
9.1	30.00	300	500			
10.1	33.00	300	500			
11.0	36.00	300	500			
11.9	39.00	250	500			
12.8	42.00	250	500			
13.7	45.00	250	500			
14.6	48.00	250	500			
15.5	51.00	250	500			
16.5	54.00	150	400			
17.4	57.00	150	400			
18.3	60.00	150	400			
19.2	63.00	150	400			
20.1	66.00	150	400			
21.0	69.00	150	400			
21.9	72.00	150	400			
22.9	75.00	150	400			
23.8	78.00	150	400			
24.7	81.00	150	400			
25.6	84.00	150	400			
26.5	87.00	150	400			
27.4	90.00	150	400			
28.3	93.00	150	400			
29.3	96.00	150	400			
30.5	100.00	150	400			
32.0	105.00	150	400			
33.5	110.00	150	400			
35.1	115.00	150	400			
36.6	120.00	150	400			
38.1	125.00	150	400			

RAS 1/16/01

GEOVISION DOWNHOLE PROCESSING NOTES

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BOREHOLE: UE-25 RF-17 DATE: 1/16/01
CLIENT: TRW JOB: 0290
AUTHOR: R STELLER PAGE 2 OF 4

DEPTH METERS	DEPTH FEET	LP FILTER SHEAR	LP FILTER P-WAVE			COMMENTS HP FILTER, TRACE NOT PICKED - WHY?
39.6	130.00	150	400			
41.1	135.00	150	400			
42.7	140.00	150	400			
44.2	145.00	150	400			
45.7	150.00	150	400			
47.2	155.00	150	400			
48.8	160.00	150	400			
50.3	165.00	150	400			
51.8	170.00	150	400			
53.3	175.00	150	400			
54.9	180.00	150	400			
56.4	185.00	150	400			
57.9	190.00	150	400			
59.4	195.00	150	400			
61.0	200.00	150	400			
62.5	205.00	150	400			
64.0	210.00	150	300			
65.5	215.00	150	300			
67.1	220.00	150	300			
68.6	225.00	150	300			
70.1	230.00	150	300			
71.6	235.00	150	300			
73.2	240.00	150	300			
74.7	245.00	150	300			
76.2	250.00	150	300			
77.7	255.00	150	300			
79.2	260.00	150	300			
80.8	265.00	150	300			
82.3	270.00	150	300			
83.8	275.00	150	300			
85.3	280.00	150	300			
86.9	285.00	150	300			
88.4	290.00	150	300			
89.9	295.00	150	300			
91.4	300.00	150	300			
93.0	305.00	150	300			
94.5	310.00	150	300			

RAS 1/16/01

GEOVISION DOWNHOLE PROCESSING NOTES

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BOREHOLE: UE-25 RF-17 DATE: 1/16/01

CLIENT: TRW JOB: 0290

AUTHOR: R STELLER PAGE 3 OF 4

DEPTH METERS	DEPTH FEET	LP FILTER SHEAR	LP FILTER P-WAVE			COMMENTS HP FILTER, TRACE NOT PICKED - WHY?
96.0	315.00	150	300			
97.5	320.00	150	300			
99.1	325.00	150	300			
100.6	330.00	150	300			
102.1	335.00	150	300			
103.6	340.00	150	300			
105.2	345.00	150	300			
106.7	350.00	150	300			
108.2	355.00	150	300			
109.7	360.00	150	300			
111.3	365.00	150	300			
112.8	370.00	150	300			
114.3	375.00	150	300			
115.8	380.00	100	200			
117.3	385.00	100	200			
118.9	390.00	100	200			
120.4	395.00	100	200			
121.9	400.00	100	200			
123.4	405.00	100	200			
125.0	410.00	100	200			
126.5	415.00	100	200			
128.0	420.00	100	200			
129.5	425.00	100	200			
131.1	430.00	100	200			
132.6	435.00	100	200			
134.1	440.00	100	200			
135.6	445.00	100	200			
137.2	450.00	100	200			
138.7	455.00	100	200			
140.2	460.00	100	200			
141.7	465.00	100	200			
143.3	470.00	100	200			
144.8	475.00	100	200			
146.3	480.00	100	200			
147.8	485.00	100	200			
149.4	490.00	100	200			
150.9	495.00	100	200			

RAS 1/16/01

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GEOVISION DOWNHOLE PROCESSING NOTES

BOREHOLE: UE-25 RF-17 DATE: 1/16/01
CLIENT: TRW JOB: 0290
AUTHOR: R STELLER PAGE 4 OF 4

DEPTH METERS	DEPTH FEET	LP FILTER SHEAR	LP FILTER P-WAVE			COMMENTS HP FILTER, TRACE NOT PICKED - WHY?
152.4	500.00	100	200			
153.9	505.00	100	200			
155.4	510.00	100	200			
157.0	515.00	100	200			
158.5	520.00	100	200			
160.0	525.00	100	200			
161.5	530.00	100	200			
163.1	535.00	100	200			
164.6	540.00	100	200			
166.1	545.00	100	200			
167.6	550.00	100	200			
169.2	555.00	100	200			
170.7	560.00	100	200			
172.2	565.00	100	200			
173.7	570.00	100	200			
175.3	575.00	100	200			
176.8	580.00	100	200			
178.3	585.00	100	200			
179.8	590.00	100	200			
181.4	595.00	100	200			
182.9	600.00	100	200			
184.4	605.00	100	200			
185.9	610.00	100	200			
187.5	615.00	100	200			
189.0	620.00	100	200			

RAS 1/16/01

All depths, as noted in the field logs, are referenced to ground level, in order to provide accurate depth data values on both processed and unprocessed digital data files. This was achieved by measuring the 1.1 foot casing stick-up with a standard steel tape measure, and using the same tape to shift the depth zero mark on the geophone probe up by the same distance. Then, by lowering the new geophone probe depth reference point to the top of the casing and setting the mechanical and digital depth counters to zero, all depth data for the borehole would be directly referenced to ground surface.

Once the probe was lowered below ground level to a depth of approximately 5 feet, the upper 1 foot of the casing was stuffed with open cell foam and cotton towels to damp any acoustic energy generated by the surface hammer blows that might be transmitted down the borehole.

At each measurement depth the probe was locked in place by inflating the probe bladder to 20 psi above the calculated ambient pressure for that depth. These calculations were only performed once the probe was submerged in water. The lock was confirmed by pulling on the support cable by hand, before feeding enough additional support cable into the casing to "spiral" the cable in the casing, preventing the transmission of any motion through the cable from the surface to the probe. The geophone orientation motor was then driven until the flux gate compass output an orientation of 180 +/- 0.5 degrees, the orientation obtained on the surface oriented parallel with the traction plank, in the direction of the first hammer blow, as recorded in the field notes.

PKS 1/16/01

The geophone probe was lowered at 3 foot intervals from 6 feet to 96 feet, then at 5 foot intervals from 100 feet to 620 feet, to match the depths used by Bruce Redpath. Single hammer blows were used for the horizontal records to a depth of 515 feet, with double hammer blows stacked from 520 to 620 feet. Single hammer blows were used for the vertical records to a depth of 410 feet, with double hammer blows stacked from 415 to 620 feet.

Data was not collected from 625 to 645 feet due to scheduling conflicts with the water truck, which necessitated filling the borehole with water before completion of the data collection.

At 535 feet, the travel time for the downhole shear wave signal approached the 200 millisecond maximum record length for the OYO 170 seismograph, so a 92 millisecond digital delay was inserted in the trigger line to prevent loss of the signal. This delay is confirmed by comparison of travel times at 530 feet with and without the delay, as well as the lack of any discontinuity in the travel time plots at this depth.

All data files, as noted on the field data sheets, were linked to analysis files titled RF17DWN1.SPS and RF17DWN2.SPS, for filtering and time picking using the OYO PSLog analysis program, version 1.00. These files correspond to arrivals picked at first break and first peak/trough, respectively. Geovision standard procedure uses first break arrrivals; the peak/trough picks were performed as a comparison to Bruce Redpath's preliminary downhole data analysis.

All the data files were recorded in the field without any filtering, at a sample rate of 200 microseconds. Digital low-pass filtering was performed using the PSLog program to remove higher frequency contamination of the downhole signals caused by compressional-wave contamination of the shear-waves, ambient vibration and acoustic contamination. The filters were selected to be at least twice the frequency of the fundamental signal being picked, with the filter break points recorded in the "Geovision Downhole Processing Notes" in this notebook, pages 33 – 36.

The signals from the surface reference geophones were picked without filtering, at the same waveform feature on each record, to determine if there was any change in trigger time due to changes in the seating of the traction plank or compressional-wave plate through the data collection, or mis-triggers of the hammer switches due to glancing hammer blows. As is typically seen, the trigger signals varied by up to +/- 2 milliseconds. These reference pick values were averaged for each hammer direction, and this average was subtracted from each record's individual reference pick value, to provide a "variance from the average" for use as a trigger correction for each hammer direction.

RKS 1/16/01

The trigger correction was then subtracted from each picked travel time to produce a trigger reference corrected travel time. Next, the travel path correction was calculated, as outlined in the procedure on page 4 of this notebook, and the reference corrected travel time was adjusted to produce a reference and path corrected travel time. The normal and reverse direction shear-wave reference and path adjusted travel times were averaged for each depth, and then plotted with the compressional-wave travel times versus depth, to produce a adjusted travel time plot.

As outlined in the procedure on page 4 of this notebook, intervals where the data points on this plot defined a straight line were identified, and Excel's linear curve fit function was used to determine the slope (velocity) of each plot interval. At this time, an additional constant time offset was added to the travel times, to force the travel time plots to pass through zero time at zero depth, so that the linear fit of the shallowest depth interval would be not be skewed by a non-zero origin. For the first breaks analysis, these offsets were 2 milliseconds and -3 milliseconds for shear and compressional waves, respectively.. For the first peaks analysis, these offsets were 0 milliseconds and -6 milliseconds for shear and compressional waves, respectively.

RLS 1/16/01

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@SUP PS
YUCCA MTN PROJ ESF NPP
TRW
GEOVISION
RF-17 DOWNHOLE
12/09/00 AND 12/11/00
4 IN PVC, DOWNHOLE 9.7 FT S OFFSET, 10.8 P OFFS

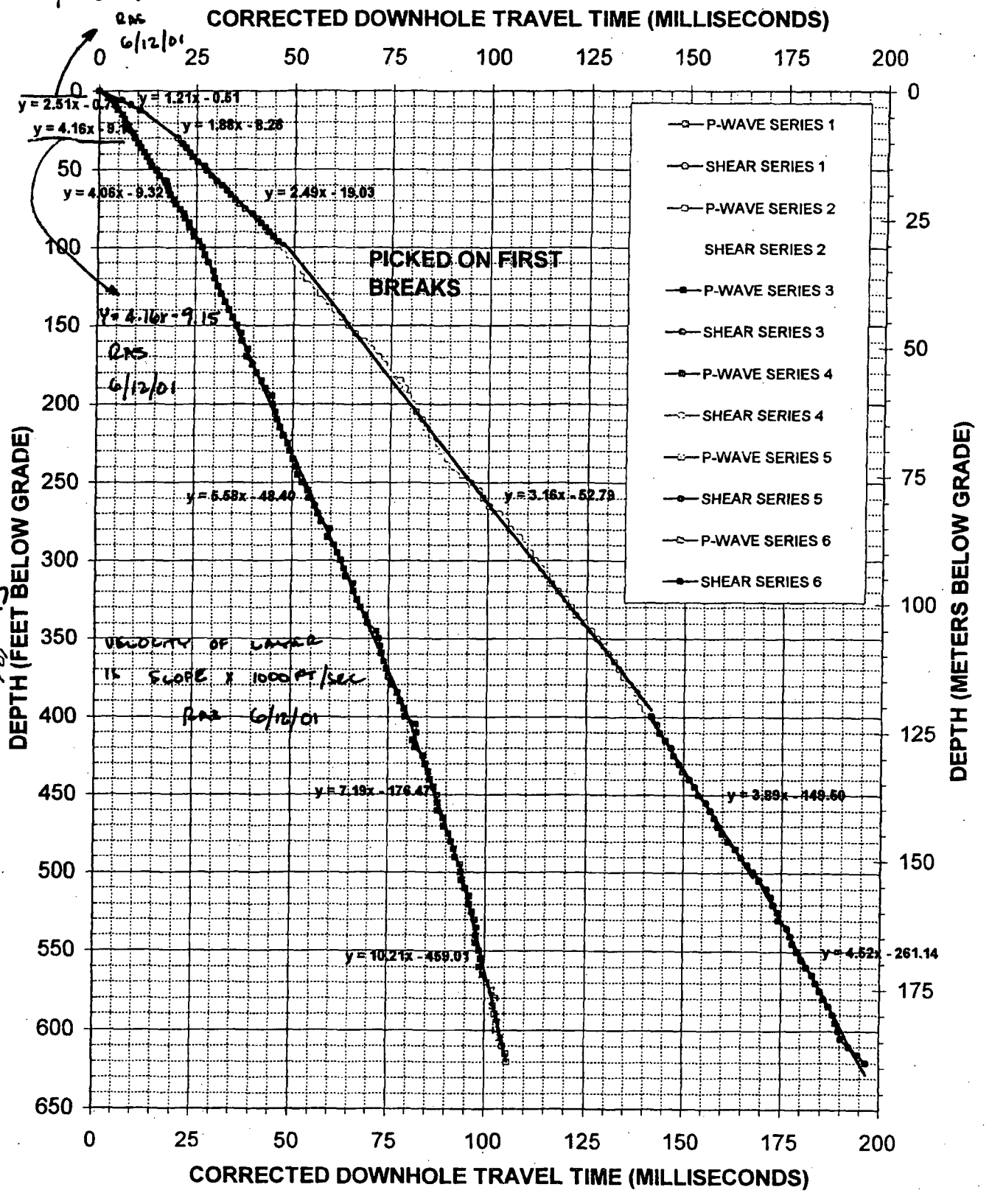
AZIMUTH = 340 DEGREES MAGNETIC

Nominal Receiver Depth(ft)	Raw Shear Normal travel time (ms)	Raw Shear Reverse travel time (ms)	Raw Compressional travel time (ms)	Adjusted Shear Normal travel time (ms)	Adjusted Shear Reverse travel time (ms)	Adjusted Average Shear travel time (ms)	Adjusted Compressional travel time (ms)
6	8.6	8.0	7.6	8.0	5.6	5.8	3.2
9	9.2	8.8	7.7	8.4	7.7	8.0	4.0
12	11.6	10.5	8.1	10.7	10.3	10.5	4.8
15	13.0	11.9	8.3	12.4	12.1	12.3	6.1
18	14.8	12.8	8.8	14.4	13.8	14.0	6.8
21	15.4	14.6	9.5	16.0	15.3	15.7	7.2
24	17.0	15.6	9.9	17.5	16.8	17.1	7.5
27	17.9	17.9	10.9	18.8	18.6	18.8	8.0
30	19.6	18.7	11.2	20.4	19.9	20.1	9.4
33	20.9	19.9	12.4	21.7	21.1	21.4	10.3
36	21.9	20.5	12.9	22.7	22.1	22.4	10.9
39	23.4	21.3	14.1	23.8	22.7	23.3	11.8
42	21.9	21.9	15.3	24.6	23.6	24.1	12.6
45	24.7	23.7	16.5	25.4	25.5	25.5	13.4
48	24.9	25.5	15.5	27.5	26.6	27.2	13.9
51	26.5	25.8	17.5	27.8	27.5	27.8	14.9
54	27.3	26.7	17.9	29.1	28.6	28.9	15.8
57	29.1	28.3	20.3	30.4	30.0	30.2	17.3
60	30.0	29.5	20.2	31.9	31.4	31.8	17.7
63	30.9	31.2	20.9	33.0	32.7	32.8	17.9
66	32.6	32.1	18.0	33.8	33.9	33.7	18.3
69	34.0	32.6	22.0	35.2	34.7	34.9	19.4
72	34.4	34.2	22.8	36.0	36.1	36.1	19.8
75	36.3	35.8	24.0	37.4	37.7	37.6	20.9
78	38.3	37.8	23.7	38.4	39.4	38.4	21.9
81	39.5	38.9	24.8	40.6	40.8	40.7	22.1
84	40.4	39.6	26.0	41.8	41.5	41.8	23.1
87	41.2	40.9	25.9	42.7	42.6	42.7	23.3
90	42.3	42.2	26.5	43.4	44.0	43.7	24.4
93	43.3	43.3	27.0	45.2	44.9	45.0	24.6
96	45.1	44.4	28.5	46.1	46.3	46.2	25.8
100	46.5	45.4	29.3	47.2	47.7	47.4	26.7
105	47.7	47.0	31.3	48.6	49.0	48.9	27.5
110	48.9	48.6	31.1	50.2	50.7	50.5	28.3
115	51.0	49.8	32.5	52.8	51.7	52.3	29.5
120	51.7	51.3	32.7	53.5	52.8	53.2	30.1
125	55.1	53.9	33.4	55.8	55.8	55.7	30.9
130	55.0	54.7	34.6	56.6	56.5	56.7	31.7
135	56.7	56.6	35.8	58.3	58.5	58.9	32.7
140	58.1	58.6	37.1	60.3	60.5	60.4	33.7
145	61.1	60.0	37.8	63.0	61.8	62.4	34.6
150	62.6	61.8	38.0	64.7	63.7	64.2	35.6
155	64.4	64.7	40.0	65.7	66.2	65.9	37.0
160	66.3	65.8	40.6	68.4	68.1	68.2	37.2
165	68.4	67.8	41.1	70.4	69.9	70.1	38.6
170	70.0	70.0	41.6	72.2	71.9	72.0	39.3
175	71.6	71.2	43.1	73.8	73.1	73.4	39.9
180	73.2	72.6	44.0	74.2	74.7	74.4	41.0
185	75.6	75.6	44.8	76.0	77.3	77.6	42.2
190	76.8	76.6	46.6	76.2	78.3	78.7	43.2
195	77.6	77.4	47.1	80.0	79.3	79.6	44.6
200	79.0	78.0	47.6	81.2	79.9	80.5	45.0
205	80.0	78.4	48.6	82.0	81.3	81.8	46.6
210	81.4	80.6	49.7	83.6	82.9	83.2	48.3
215	82.6	82.0	50.0	84.6	83.7	84.2	47.0
220	83.6	83.6	50.5	85.8	85.7	85.8	47.9
225	85.6	85.4	52.1	87.9	87.1	87.4	49.1
230	86.3	86.0	52.6	88.5	87.7	88.1	49.5
235	87.6	87.8	53.7	89.6	89.7	88.7	50.3
240	89.6	89.4	54.0	91.6	91.3	91.5	51.1
245	91.5	91.0	54.7	93.9	93.1	93.5	51.6
250	93.8	93.4	55.9	95.9	95.5	95.7	52.7
255	95.4	95.8	57.3	97.8	97.9	97.8	54.0
260	98.6	98.8	58.7	98.8	98.7	98.8	54.5
265	98.4	98.4	58.8	100.8	100.3	100.5	55.9
270	100.6	101.0	60.4	103.2	102.7	103.0	56.7
275	102.4	102.2	61.0	104.6	104.3	104.5	57.6
280	103.6	103.6	62.6	105.8	105.5	105.7	58.8
285	105.8	106.0	62.6	108.0	107.9	108.0	59.2
290	107.0	107.0	63.3	109.0	108.9	109.0	60.8
295	108.6	109.8	65.1	110.8	110.5	110.7	61.7
300	110.0	110.0	65.8	112.2	111.7	112.0	62.6
305	111.0	111.8	66.5	113.2	113.7	113.5	63.5
310	112.6	113.2	67.7	115.0	114.9	115.0	63.9
315	114.0	114.2	68.8	116.2	116.1	116.2	65.8
320	116.6	115.6	69.3	118.0	117.7	117.9	65.9
325	117.8	117.8	70.9	120.2	119.5	119.9	67.1
330	119.0	119.2	70.2	121.4	121.1	121.3	67.9
335	120.2	120.4	72.2	122.4	122.3	122.4	69.2
340	122.2	122.4	72.6	124.6	124.3	124.5	69.7
345	124.0	124.8	74.7	126.2	126.5	126.4	72.0
350	125.3	126.0	74.8	127.5	127.9	127.7	72.6
355	127.0	127.4	75.7	129.4	129.3	129.4	72.9
360	128.4	128.6	76.2	130.6	130.5	130.6	73.4
365	129.8	130.4	76.8	132.2	132.1	132.2	74.0
370	131.4	131.6	77.9	133.8	133.1	133.4	74.6
375	133.0	132.4	78.4	135.0	134.3	134.7	75.1
380	134.6	134.4	79.3	136.6	136.3	136.5	76.1
385	136.2	136.2	80.2	138.0	138.1	138.1	77.5
390	138.6	137.2	81.2	138.8	139.1	139.0	78.3
395	139.2	139.0	82.4	140.2	140.1	140.2	78.3
400	140.0	140.0	82.4	141.8	141.9	141.9	79.5
405	141.0	141.2	84.4	143.0	143.3	143.2	82.1
410	141.8	142.4	83.6	143.6	144.1	143.9	82.3
415	143.2	143.6	84.2	145.4	145.5	145.5	81.5
420	144.8	145.0	84.6	146.8	146.9	146.9	82.1
425	145.4	145.8	86.8	147.2	147.7	147.5	84.1
430	146.6	147.0	87.6	148.8	149.1	149.0	84.7
435	147.8	148.2	88.2	149.8	149.9	149.9	85.5
440	149.6	149.8	89.0	151.8	151.5	151.7	85.9
445	151.2	150.4	89.8	153.4	152.5	153.0	86.9
450	152.4	151.8	90.6	154.4	153.3	153.9	87.7
455	153.6	153.4	91.2	156.0	155.5	155.8	87.8
460	155.2	154.4	92.2	157.0	156.7	156.9	87.9
465	156.4	155.8	93.0	158.2	157.5	157.9	88.3
470	157.6	156.4	93.6	159.6	159.1	159.9	89.5
475	158.8	157.0	94.6	160.8	159.1	160.0	90.7
480	160.0	158.8	95.4	162.0	160.7	161.4	91.3
485	161.2	161.2	96.2	163.4	162.3	163.4	92.1
490	162.8	162.4	96.6	165.0	164.5	164.8	92.5
495	164.4	164.4	97.4	166.4	166.5	166.5	93.7
500	166.4	165.6	98.2	168.2	167.5	167.9	93.9
505	167.2	167.8	98.2	169.4	169.5	169.5	94.1
510	168.8	169.6	99.0	170.8	171.7	171.3	95.1
515	170.4	170.2	100.2	172.4	172.3	172.4	96.1
520	171.4	170.8	100.8	173.4	172.5	173.0	98.1
525	172.6	171.6	100.8	174.0	173.7	174.3	96.7
530	173.8	170.8	101.0	175.6	172.9	174.4	97.5
535	82.8	82.2	101.8	176.8	176.2	176.9	97.9
540	83.8	83.0	102.4	177.8	177.0	177.4	97.9
545	84.6	83.4	102.8	178.6	177.4	178.0	97.7
550	85.6	84.6	102.4	179.8	178.6	179.1	98.7
555	86.6	85.8	103.2	180.8	179.8	180.2	99.1
560	87.6	87.8	103.8	181.6	181.6	181.6	99.9
565	88.0	88.0	104.4	183.0	183.0	183.0	99.5
570	89.8	89.8	105.2	183.8	183.8	183.8	100.7
575	90.8	90.8	105.0	184.8	184.8	184.8	101.8
580	91.8	91.8	105.6	185.6	185.8	185.7	102.7
585	93.0	93.2	106.6	187.0	187.2	187.1	102.5
590	94.0	94.2	107.2	188.0	188.2	188.1	102.7
595	94.6	95.0	108.2	188.6	189.0	188.8	103.3
600	95.4	96.0	107.6	189.4	190.0	189.7	103.1
605	98.2	98.8	108.4	190.2	190.8	190.4	104.1
610	98.0	98.0	108.8	192.0	193.0	192.5	104.7
615	100.2	101.2	110.2	194.2	195.2	194.7	105.5
620	102.6	102.4	110.6	196.6	196.4	196.6	105.7

Depth Interval Start (ft)	Depth Interval End (ft)	Interval Shear Velocity (ft/sec)	Interval Compressional Velocity (ft/sec)	Interval Poisson Ratio
0	15	1210	2510	0.35
15	30	1660	4160	0.37
30	100	2460	4060	0.20
100	400	3160	6590	0.28
400	500	3860	7190	0.29
500	620	4520	10210	0.38

RAS
1/16/01

YMP EFS NPP BOREHOLE RF-17



RAS 6/12/01

CH 11-15-01

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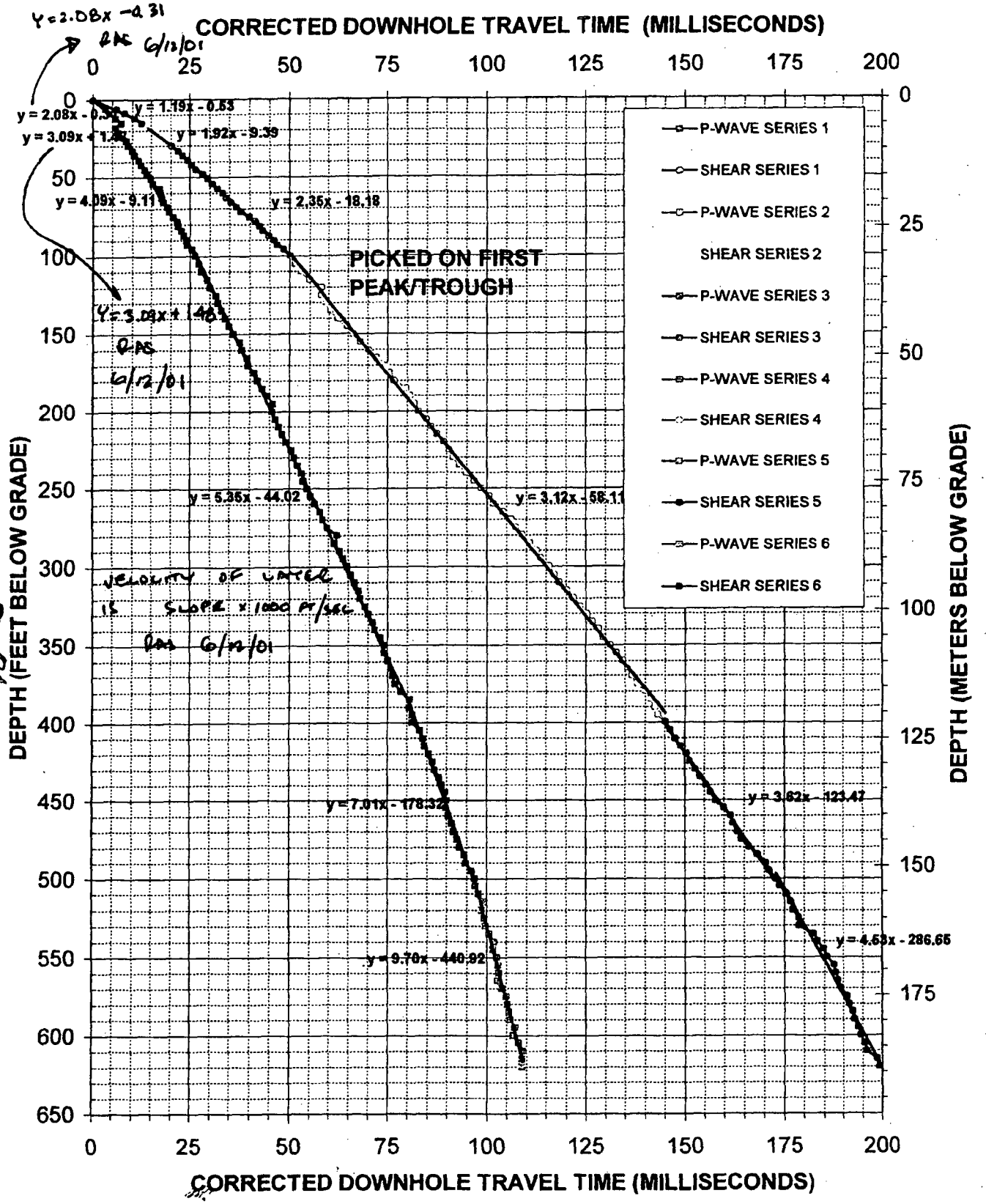
YMP EFS NPP BOREHOLE RF-17



Y = 2.08x - 0.31 RAS 6/12/01

Y = 3.09x + 1.48 RAS 6/12/01

VELOCITY OF LAYER IS SLOPE x 1000 FT/SEC RAS 6/12/01

RAS 1/15/02

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GEOVISION DOWNHOLE PROCESSING NOTES

BOREHOLE: UE-25 RF-13 DATE: 1/18/01

CLIENT: TRW JOB: 0290

AUTHOR: R STELLER PAGE 1 OF 3

DEPTH METERS	DEPTH FEET	LP FILTER SHEAR	LP FILTER P-WAVE			COMMENTS HP FILTER, TRACE NOT PICKED - WHY?
1.8	6.00	300	500			
2.7	9.00	300	500			
3.7	12.00	250	500			
4.6	15.00	250	500			
5.5	18.00	250	500			
6.4	21.00	250	500			
7.3	24.00	250	500			
8.2	27.00	250	500			
9.1	30.00	250	500			
10.1	33.00	250	500			
11.0	36.00	250	500			
11.9	39.00	250	500			
12.8	42.00	250	500			
13.7	45.00	250	500			
14.6	48.00	200	500			
15.5	51.00	150	500			
16.5	54.00	150	500			
17.4	57.00	150	500			
18.3	60.00	150	500			
19.2	63.00	150	500			
20.1	66.00	150	500			
21.0	69.00	150	500			
21.9	72.00	150	500			
22.9	75.00	150	500			
23.8	78.00	150	500			
24.7	81.00	150	500			
25.6	84.00	150	500			
26.5	87.00	150	500			
27.4	90.00	150	500			
28.3	93.00	150	500			
29.3	96.00	150	500			
30.2	99.00	150	500			
31.1	102.00	150	500			
32.0	105.00	150	500			
33.5	110.00	150	500			
35.1	115.00	150	500			
36.6	120.00	150	500			

1/18/01 RAS

JCM 10-4-01

43

GEOVISION DOWNHOLE PROCESSING NOTES

BOREHOLE: UE-25 RF-13 DATE: 1/18/01
CLIENT: TRW JOB: 0290
AUTHOR: R STELLER PAGE 2 OF 3

DEPTH METERS	DEPTH FEET	LP FILTER SHEAR	LP FILTER P-WAVE			COMMENTS HP FILTER, TRACE NOT PICKED - WHY?
38.1	125.00	150	500			
39.6	130.00	150	500			
41.1	135.00	150	500			
42.7	140.00	150	500			
44.2	145.00	150	500			
45.7	150.00	150	500			
47.2	155.00	150	500			
48.8	160.00	150	500			
50.3	165.00	150	500			
51.8	170.00	150	500			
53.3	175.00	150	500			
54.9	180.00	150	500			
56.4	185.00	150	500			
57.9	190.00	150	500			
59.4	195.00	150	500			
61.0	200.00	150	500			
62.5	205.00	150	500			
64.0	210.00	150	500			
65.5	215.00	150	500			
67.1	220.00	150	500			
68.6	225.00	150	500			
70.1	230.00	150	500			
71.6	235.00	150	300			
73.2	240.00	100	300			
74.7	245.00	100	300			
76.2	250.00	100	300			
77.7	255.00	100	300			
79.2	260.00	100	300			
80.8	265.00	100	300			
82.3	270.00	100	300			
83.8	275.00	100	300			
85.3	280.00	100	300			
86.9	285.00	100	300			
88.4	290.00	100	300			
89.9	295.00	100	300			
91.4	300.00	100	300			
93.0	305.00	100	300			

RAS 1/18/01

GEOVISION DOWNHOLE PROCESSING NOTES

BOREHOLE: UE-25 RF-13 DATE: 1/18/01
CLIENT: TRW JOB: 0290
AUTHOR: R STELLER PAGE 3 OF 3

DEPTH METERS	DEPTH FEET	LP FILTER SHEAR	LP FILTER P-WAVE			COMMENTS HP FILTER, TRACE NOT PICKED - WHY?
94.5	310.00	100	300			
96.0	315.00	100	300			
97.5	320.00	100	300			
99.1	325.00	100	300			
100.6	330.00	100	300			
102.1	335.00	100	300			
103.6	340.00	100	300			
105.2	345.00	100	300			

RAS 1/18/01

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JOD
9-26-01

All depths, as noted in the field logs, are referenced to ground level, in order to provide accurate depth data values on both processed and unprocessed digital data files. This was achieved by measuring the 1.4 foot casing stick-up with a standard steel tape measure, and using the same tape to shift the depth zero mark on the geophone probe up by the same distance. Then, by lowering the new geophone probe depth reference point to the top of the casing and setting the mechanical and digital depth counters to zero, all depth data for the borehole would be directly referenced to ground surface.

Once the probe was lowered below ground level to a depth of approximately 5 feet, the upper 1 foot of the casing was stuffed with open cell foam and cotton towels to damp any acoustic energy generated by the surface hammer blows that might be transmitted down the borehole.

At each measurement depth the probe was locked in place by inflating the probe bladder to 20 psi above the calculated ambient pressure for that depth. These calculations were only performed once the probe was submerged in water. The lock was confirmed by pulling on the support cable by hand, before feeding enough additional support cable into the casing to "spiral" the cable in the casing, preventing the transmission of any motion through the cable from the surface to the probe. The geophone orientation motor was then driven until the flux gate compass output an orientation of 36 +/- 0.5 degrees, the orientation obtained on the surface oriented parallel with the traction plank, in the direction of the first hammer blow, as recorded in the field notes.

1/18/01

The geophone probe was lowered at 3 foot intervals from 6 feet to 105 feet, then at 5 foot intervals from 105 feet to 345 feet, to match the depths used by Bruce Redpath. Single hammer blows were used for the horizontal and vertical records for the total depth of the borehole.

All data files, as noted on the field data sheets, were linked to analysis files titled RF13DWN1.SPS and RF13DWN2.SPS, for filtering and time picking using the OYO PSLog analysis program, version 1.00. These files correspond to arrivals picked at first break and first peak/trough, respectively. Geovision standard procedure uses first break arrrivals; the peak/trough picks were performed as a comparison to Bruce Redpath's preliminary downhole data analysis.

All the data files were recorded in the field without any filtering, at a sample rate of 200 microseconds. Digital low-pass filtering was performed using the PSLog program to remove higher frequency contamination of the downhole signals caused by compressional-wave contamination of the shear-waves, ambient vibration and acoustic contamination. The filters were selected to be at least twice the frequency of the fundamental signal being picked, with the filter break points recorded in the "Geovision Downhole Processing Notes" in this notebook, pages 41 – 43.

The signals from the surface reference geophones were picked without filtering, at the same waveform feature on each record, to determine if there was any change in trigger time due to changes in the seating of the traction plank or compressional-wave plate through the data collection, or mis-triggers of the hammer switches due to glancing hammer blows. As is typically seen, the trigger signals varied by up to +/- 2 milliseconds. These reference pick values were averaged for each hammer direction, and this average was subtracted from each record's individual reference pick value, to provide a "variance from the average" for use as a trigger correction for each hammer direction.

The trigger correction was then subtracted from each picked travel time to produce a trigger reference corrected travel time. Next, the travel path correction was calculated, as outlined in the procedure on page 4 of this notebook, and the reference corrected travel time was adjusted to produce a reference and path corrected travel time. The normal and reverse direction shear-wave reference and path adjusted travel times were averaged for each depth, and then plotted with the compressional-wave travel times versus depth, to produce a adjusted travel time plot.

RAS 1/10/01

As outlined in the procedure on page 4 of this notebook, intervals where the data points on this plot defined a straight line were identified, and Excel's linear curve fit function was used to determine the slope (velocity) of each plot interval. At this time, an additional constant time offset was added to the travel times, to force the travel time plots to pass through zero time at zero depth, so that the linear fit of the shallowest depth interval would be not be skewed by a non-zero origin. For the first breaks analysis, these offsets were -2 milliseconds for both shear and compressional waves. For the first peaks analysis, , these offsets were -5 milliseconds and -4 milliseconds for shear and compressional waves, respectively.

Rob Shaw 1/10/01

Blank CH 11-15-01

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@SUSP_PS
YUCCA MTN PROJ ESF NPP
TRW
GEOVISION
RF-13 DOWNHOLE
12/08/00 AND 12/09/00
3 IN PVC, DOWNHOLE 8.6 FT S OFFSET, 10.5 P OFFS

AZIMUTH = 0 DEGREES MAGNETIC

Nominal Receiver Depth(ft)	Raw Shear Normal travel time (ms)	Raw Shear Reverse travel time (ms)	Raw Compressional travel time (ms)	Adjusted Shear Normal travel time (ms)	Adjusted Shear Reverse travel time (ms)	Adjusted Average Shear travel time (ms)	Adjusted Compressional travel time (ms)
6	16.2	13.4	8.8	7.9	6.1	7.0	3.2
9	16.8	14.2	9.0	10.6	8.3	9.4	4.6
12	17.6	15.4	9.2	12.8	10.4	11.6	6.3
15	19.0	16.8	9.9	15.0	12.4	13.7	6.8
18	20.4	18.0	10.8	17.2	14.1	15.7	7.4
21	21.1	19.2	11.6	18.2	15.6	16.9	8.3
24	22.2	21.6	11.9	19.4	18.3	18.8	9.1
27	23.9	23.0	12.5	21.3	19.8	20.6	9.6
30	24.5	23.8	12.8	22.3	20.6	21.4	11.0
33	25.9	25.1	14.0	23.6	22.1	22.8	11.8
36	27.7	26.5	15.0	25.7	23.6	24.7	12.1
39	29.4	28.1	14.6	27.2	25.6	26.4	13.0
42	30.4	28.9	16.4	28.0	26.1	27.0	13.6
45	30.9	29.9	17.3	28.6	27.1	27.9	14.7
48	32.4	30.3	18.6	30.4	27.6	29.0	16.9
51	33.8	31.4	19.5	31.6	28.7	30.2	17.1
54	34.6	32.6	20.3	32.8	30.2	31.5	18.1
57	35.8	33.4	20.9	33.5	30.6	32.2	18.6
60	36.4	34.8	22.1	34.3	32.4	33.4	19.1
63	37.5	36.2	23.1	35.4	33.6	34.6	19.9
66	38.3	37.4	23.3	36.3	34.8	35.5	20.9
69	39.1	38.6	22.1	37.4	36.2	36.8	21.5
72	40.5	39.6	23.9	38.5	37.7	38.1	21.8
75	42.7	40.9	24.6	40.5	38.5	39.5	22.9
78	43.9	41.5	25.7	41.9	38.9	40.4	23.5
81	44.9	42.5	26.3	43.0	39.9	41.5	24.0
84	46.6	44.1	26.4	44.8	41.6	43.2	24.7
87	47.9	45.9	27.8	46.2	43.4	44.8	25.2
90	49.4	47.5	28.7	47.4	45.3	46.4	25.9
93	50.2	48.3	28.9	48.4	46.1	47.2	27.4
96	51.6	50.5	29.8	50.0	48.2	49.1	27.7
99	52.8	50.9	30.9	51.3	49.0	50.1	28.3
102	54.0	51.8	31.7	52.0	49.8	50.9	29.4
105	54.7	53.4	32.4	52.8	51.2	52.0	29.8
110	56.1	55.0	31.7	54.5	52.7	53.6	30.5
115	58.1	56.6	33.6	56.1	54.3	55.2	31.1
120	59.9	57.7	34.2	57.8	55.1	56.5	32.6
125	60.9	58.7	36.2	59.0	56.2	57.6	33.6
130	62.7	61.3	35.1	60.5	58.9	59.7	34.4
135	64.6	64.0	37.6	62.4	61.5	62.0	35.4
140	66.2	65.8	38.4	64.6	63.4	64.0	36.2
145	67.8	68.2	39.8	66.1	66.0	66.1	37.4
150	70.2	70.2	39.2	68.3	68.4	68.3	38.5
155	71.6	72.2	42.0	70.5	70.6	70.5	39.8
160	73.6	73.6	42.6	71.7	71.8	71.7	40.4
165	75.6	75.6	42.6	73.9	73.6	73.7	41.2
170	76.1	77.2	44.0	76.4	74.9	75.7	41.6
175	80.6	78.8	45.6	78.7	76.2	77.5	43.4
180	81.4	79.8	48.8	79.5	77.2	78.4	45.1
185	83.6	82.6	48.2	81.5	80.0	80.8	45.8
190	85.6	83.4	49.0	83.1	81.3	82.2	47.0
195	86.2	84.8	48.8	85.9	82.6	84.3	47.8
200	88.6	86.8	49.8	86.4	84.7	85.5	49.2
205	90.4	88.0	52.2	88.3	85.7	87.0	49.8
210	91.6	88.8	53.4	89.9	86.7	88.3	50.8
215	92.8	90.0	54.6	90.9	87.7	89.3	52.1
220	93.2	90.0	54.2	90.7	87.9	89.3	53.4
225	93.0	90.6	56.4	90.7	88.6	89.6	54.1
230	92.4	90.6	57.0	90.5	88.5	89.5	54.6
235	93.2	91.4	58.2	90.9	89.9	90.4	55.6
240	94.1	92.8	58.2	91.8	91.1	91.4	55.9
245	95.2	93.6	58.2	93.1	92.0	92.5	56.0
250	95.6	94.6	58.4	93.9	92.9	93.4	56.3
255	95.8	95.6	58.8	94.1	94.1	94.1	56.7
260	96.6	96.4	60.0	94.7	94.7	94.7	57.0
265	97.8	97.8	60.4	95.7	96.1	95.9	58.2
270	98.6	98.8	60.6	95.9	97.1	96.5	57.9
275	99.4	99.2	61.2	96.5	97.3	96.9	58.7
280	100.2	99.6	61.4	97.1	97.7	97.4	59.1
285	100.8	100.0	62.0	97.9	98.4	98.2	59.4
290	101.6	100.6	62.4	98.7	98.9	98.8	59.2
295	102.5	101.4	62.6	99.8	99.7	99.8	59.7
300	103.2	102.8	63.1	100.3	101.3	100.8	60.4
305	103.8	103.8	63.4	100.9	102.3	101.6	61.1
310	105.0	104.6	63.6	101.7	103.1	102.4	62.5
315	105.8	105.4	64.2	102.7	104.1	103.4	61.7
320	106.0	106.0	64.6	102.9	104.5	103.7	61.9
325	106.8	106.4	65.0	103.9	104.9	104.4	62.4
330	108.4	107.6	65.4	105.3	106.3	105.8	64.3
335	109.0	108.4	66.0	105.9	106.9	106.4	63.9
340	110.2	109.6	66.4	106.9	108.5	107.7	63.7
345	111.0	110.8	67.2	107.9	109.3	108.6	64.3

Depth Interval Start (ft)	Depth Interval End (ft)	Interval Shear Velocity (ft/sec)	Interval Compressional Velocity (ft/sec)	Interval Poissons Ratio
0	15	1090	2110	0.32
15	36	1960	3700	0.30
36	99	2490	3970	0.18
99	215	2810	4900	0.25
215	345	6490	11180	0.25

RAS 1/10/01

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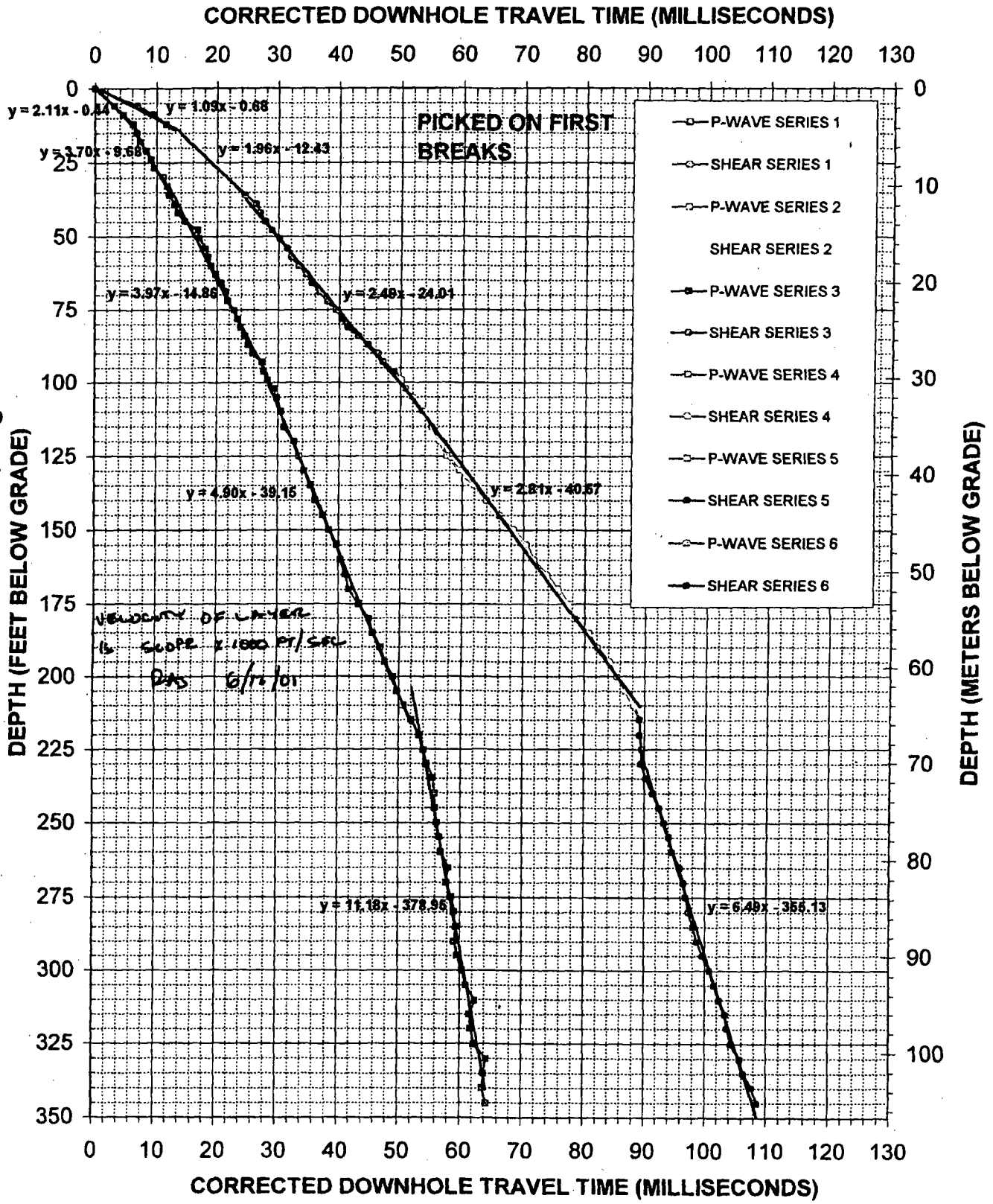
YMP EFS NPP BOREHOLE RF-13

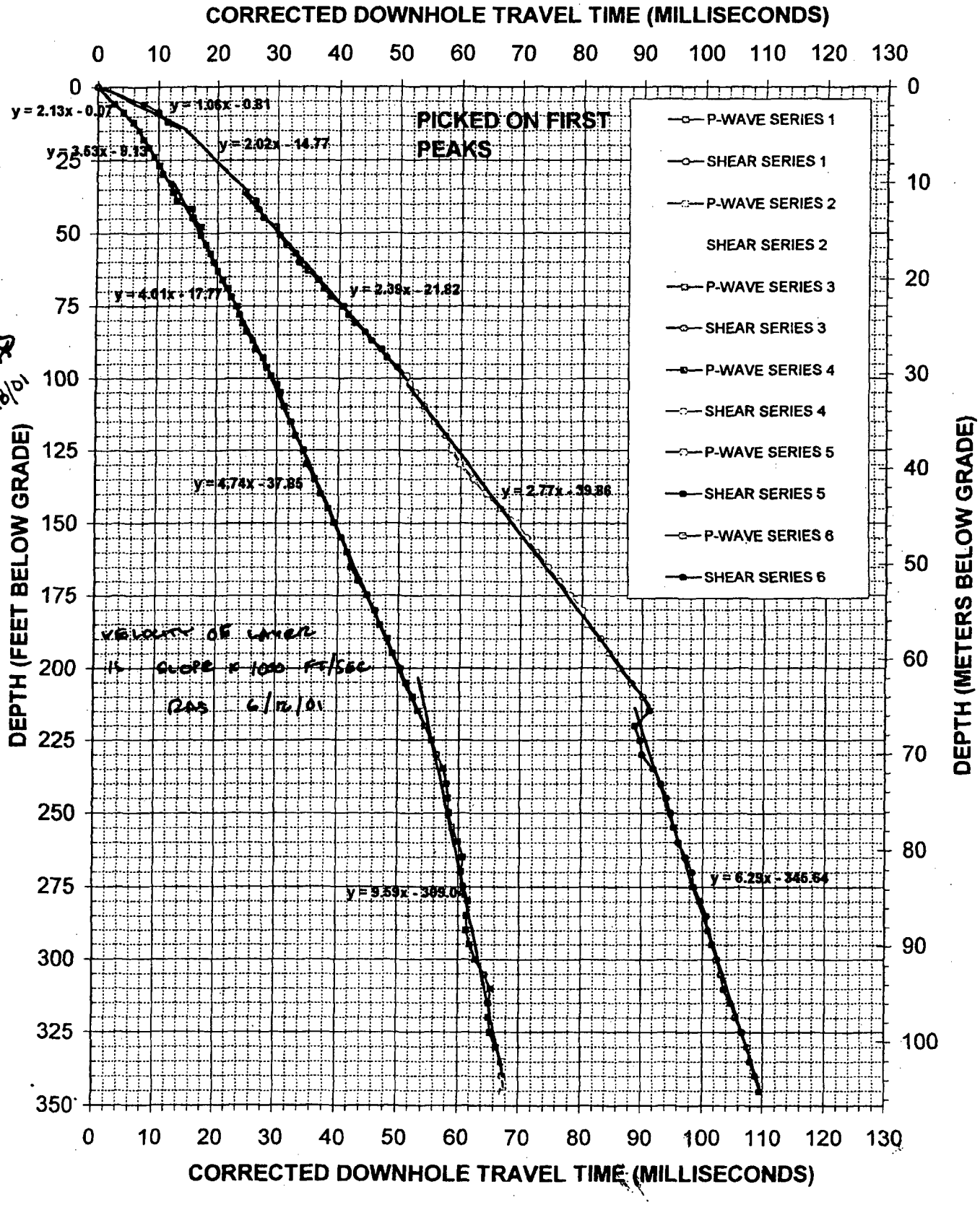


VELOCITY OF LAYER IS SLOPE x 1000 FT/SEC
DAS 6/15/01

DAS 1/19/01

49

YMP EFS NPP BOREHOLE RF-13



velocity of layer is slope x 1000 ft/sec
RAS 6/12/01

RAS 1/18/01

FURTHER COMMENTS ON PROCESSING OF DATA

1. INITIAL ACQUISITION PROCEDURE TO ACQUIRE RAW DATA ARE FULLY COVERED IN THE FIELD PROCEDURE P. 14 OF THIS SN.

2. THE RAW DATA IS IN THE FORM OF BINARY FILES *.ORG, ONE FOR EACH MEASUREMENT DEPTH. EACH FILE CARRIES A HEADER WITH DEPTH, TIME OF ACQUISITION, AND RECORDER PARAMETERS LISTED.

3. THESE *.ORG FILES CAN ONLY BE VIEWED BY PROPRIETARY OYO SOFTWARE. A VERSION OF THIS SOFTWARE IS EMBEDDED IN THE TEST EQUIPMENT AND IS USED TO VIEW DATA IN THE FIELD. THE SAME SOFTWARE ALSO EXISTS SEPARATELY AS PSLOG.

4. PSLOG IS USED TO VIEW THE DATA FILES AND MAKE ARRIVAL FILES. IT IS INCLUDED ON THE CDROM ACCOMPANYING THIS SN. THE OPERATION IS VERY SIMPLE, BUT SUMMARIZED HERE:

RAS 6/12/01

COMMANDS ARE ACROSS THE BOTTOM OF SCREEN:

"/"	OPENS MENU
← →	PAN THE MENU
<ENTER>	OPENS SELECTED (HIGHLITED) MENU
<TAB>	MOVES TO DIFFERENT FIELDS

SELECT THE CORRECT DIRECTORY, CHOOSE THE CORRECT *.SPS FILE.

NOTE: *.SPS FILES ARE THE "PICK" FILES. THESE ARE ASCII FILES THAT CAN BE READ BY ALMOST ANY PROGRAM.

SELECT AN *.SPS FILE AND <ENTER>. FIRST SCREEN IS TITLE SCREEN WITH NOTES. <PAGE DOWN> TO SEE RECORDS. SELECT A RECORD WITH ↑↓ KEYS, AND PUSH "T" TO VIEW TRACE. VERTICAL WHITE LINES ARE THE PICKS, AND CORRESPONDING PICK TIME IS AT LEFT. (IN MILLISEC)

<ESC> TO RETURN TO TABLE.

"F" DISPLAYS FILENAMES FOR EACH DEPTH.

5. VELOCITIES LISTED IN TABLE ARE NOT USED, AS THEY ARE CALCULATED USING CONSTANT 1.0 METER SPACING BETWEEN NEAR AND FAR RECEIVERS (FOR SUSPENSION MEASUREMENTS), AND DO NOT USE CORRECTED DEPTH DATA.

CORRECT DEPTH DATA IS CALCULATED, WITH ~~VELOCITIES~~, RAS 6/12/01 TRAVEL TIMES, IN EXCEL WORKSHEET ACCORDING TO PROCEDURE OUTLINED ON P. 4 OF THIS SN. DATA IS PLOTTED ON EXCEL WORKSHEET WITH LINE SEGMENT EQUATIONS DISPLAYING SLOPE. VELOCITY OF EACH SEGMENT (LAYER) IS EQUAL TO SLOPE TIMES 1000 FT/SEC, CONFORMING TO PROCEDURE ON P. 4 OF THIS SN. USING THIS LAYER VELOCITY DATA, POISSON'S RATIO IS CALCULATED, AS SPECIFIED ON P. 4 OF THIS SN, AND INCLUDED IN THE TABLES PRESENTED ON P. 39 AND P. 49 OF THIS SN.

END OF SN-M40-SCI-025-V1 SCIENTIFIC NOTEBOOK

Robt Stone

9-26-01 JRD

Activities towards closing out this scientific notebook began on September 18, 2001. No technical entries will be made following this date. Activities to facilitate final technical and compliance reviews are currently underway at this time. I consider this scientific notebook to be closed. With the satisfactory completion of any modifications or additional entries to respond to Compliance and/or Technical Reviews, this scientific notebook will be ready for submittal to the Records Processing Center.

9-26-01 JRD

Michael Luebbers

Michael Luebbers, Principal Investigator

Sept 18, 2001

Date

A copy of this scientific notebook is being submitted to the RPC to comply with the requirement in APS111.1Q to submit records every year. See records package transmittal forms on the following pages. Accession numbers are on page 56.

Cliff Horne 11-15-01 9-26-01

rest of page blank 9-26-01 JRD

9-26-01 JOD

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OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT
TRANSMITTAL/RECEIPT ACKNOWLEDGEMENT

1. QA: QA

Page: 1 of: 1

Complete Only Applicable Items

2. Record Date	3. Title/Subject/Description of Records	4. No. of Pages
09/21/01	Mark-up Draft Copy of Scientific Notebook: SN-M&O-SCI-025-V1,	
	Downhole Seismic Component of Geotechnical Investigation for a Potential Waste	
	Handling Building	54

5. Comments

6. Source of TRA	7. Organization	8. Mailstop	9. Date
Cliff Howard Cliff Howard	BSC	423	09/21/01
10. RPC Recipient		11. Date	
12. Sender	13. Organization	14. Mailstop	15. Date
16. Source of TRA		17. Date	
18. RPC Acceptance		19. Date	

10-02-01 JOD

10-4-01 JMD

55

OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT
RECORDS PACKAGE TABLE OF CONTENTS

1. QA: QA

Complete Only Applicable Items

2. Package Supplement? ☐ Yes ☑ No Package TOC Accession No.:	3. Traceability Designator	4. Total Page Count 54

5. Title/Description of Records Package
Scientific Notebook: SN-M&O-SCI-025-V1
Downhole Seismic Component of Geotechnical Investigation for a Potential Waste Handling Building

6. Record Date	7. Title/Subject/Description of Records	8. Pages
09/21/01	Records Package Table of Contents	1
10/18/00	Mark-up Draft Copy of Scientific Notebook: SN-M&O-SCI-025-V1,	
	Downhole Seismic Component of Geotechnical Investigation for a Potential Waste Handling Building	53
	9. Subtotal Page Count	54

10. Record Source (Print Name)	11. Record Source (Signature)	12. Date
Cliff Howard	Cliff Howard	09/21/01

10-4-01 JMD

56

9-26-01 JDD

Detraka_Calloway@notes.ymp.gov
09/26/01 08:52 AM

To: Robyn_Schapiro@urscorp.com
cc: Patricia_Thomas@urscorp.com
Subject: SN-025

Morning Ladies,

I received the latest package and I have some corrections that need to be made, first of all the Transmittal and Table of Contents are illegible. If possible could you please send me the original or a better copy. I need a QA designator on the 1st page of the notebook (either QA:QA or QA:N/A) There were several pages where the hole punch obliterated the inital and date. Could you please send me another copy with the initial and dates enhanced. The pages are: Pages 25, 26, 42 and 43.

By the way, your accession numbers are: MOL.20010926.0001 - MOL.20010926.0002

Thanks,
Didi

9-26-01
JDD

rest of page
blank
JDD
9-26-01

OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT
REVIEW RECORD

1. QA: QA
2. Page 1 of 2

3. Responsible Manager: Cliff Howard
3a. Originator/Comment Responder/Location: Cliff Howard/Las Vegas, Nevada
4. Technical Product or Data Title: Downhole Seismic Component of Geotechnical Investigation for a Potential Waste Handling Building
5. Technical Product or Data Identifier: SN-M&O-SCI-025-V1 (optional for Data)
6. Review Draft/Revision/Change: 00
7. Date: August 7, 2001
8. Governing Procedure Number: AP-SIII.1Q
9. Revision/Change: 1 / 0

REVIEW CRITERIA

10. ☐ Standard Review Criteria Apply _____ (e.g., 2, 11C)
11. ☑ Specific Review Criteria:
    - ☐ Source: _____
    - ☑ Attached: See page 2 of this document
    - ☐ Listed Below:
12. Comment Documentation:
    - ☑ Review Copy Mark-up
    - ☐ Master Copy Mark-up
    - ☐ Comment Sheets (hard copy) (Ref. AP-5.1Q) or
    - ☐ Electronic Method: _____ (e.g., Comment Sheets or e-mail)

13. REVIEW ORGANIZATIONS

Org./Discipline	Affected Org./ Discipline Manager	Review Criteria	Org./Discipline	Affected Org./ Discipline Manager	Review Criteria

COMMENTS DUE:

14. Due Date: September 1, 2001
15. Review Coordinator: Cliff Howard (Print Name)

REVIEW BY:

16. BRUCE REDPATH (Print Name)
17. REDPATH GEOPHYSICS (Org./Discipline)
18a. Mandatory Comments: ☐ Yes ☒ No
18b. Non-Mandatory Comments: ☒ Yes ☐ No

ORIGINATOR/COMMENT RESPONDER:

19. JOHN DIEHL (Print Name) 9-26-01 (Date)

CONCURRENCE:

20. Document Revision/Change: _____ Date: _____
21. Reviewer: _____ (Signature) _____ (Date)

DISPUTE RESOLUTION: (if applicable)

22. _____ (Affected Organization Manager Signature) _____ (Date)
23. _____ (Organization)

9-26-01 JD

9-26-01 JD

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9-26-01 JCD

Technical Review Criteria for SN-M&O-SCI-025-V1, *Downhole Seismic Component of Geotechnical Investigation for a Potential Waste Handling Building*

1. Is the approach used to generate the data clearly stated, such that the method and results could be duplicated by a technically equivalent person, without recourse to the original researcher?
2. Are the results correct and reasonable for the methods identified in the initial entry or planning document?
3. Are alternate interpretations of shear- and compression-wave velocities presented in depth intervals where the data may give multiple interpretations?
4. Are the data clearly identified and traceable?
5. Are any assumptions used in the interpretation of the data reasonable and clearly presented?
6. Are the requirements for data accuracy, precision and representativeness clearly identified in the initial entry or referenced planning document?
7. Do the data meet the requirements for accuracy, precision and representativeness?
8. Are the data legible and adequately labeled with respect to units, axis labels, etc.?
9. Are the calculations correct and described in sufficient detail to permit reproduction by the reviewer without recourse to the original researcher?
10. Are the following complete and accurate?
    a) Description of the work as it was performed?
    b) Results obtained?
    c) Names of the persons performing the work?
11. Are there any anomalies or typographical errors apparent in the data? Confirm that the electronic files have not been corrupted by spot checking against hard copies contained in the scientific notebook and or supplemental records.
12. Are the data completely and clearly summarized in the Summary Report?
13. Are possible sources of error and uncertainty in the data addressed?
14. Has the documentation regarding use of software been provided as required by AP-SI.1Q, Software Management, including identification of name, version, qualification status, inputs, outputs, computer type, and operating platform ?

Blank CH 11-15-01

9-26-01 JCD

9-26-01 JDD

Technical Review Criteria for SN-M&O-SCI-025-V1, *Downhole Seismic Component of Geotechnical Investigation for a Potential Waste Handling Building*

1. *Is the approach used to generate the data clearly stated, such that the method and results could be duplicated by a technically equivalent person, without recourse to the original researcher?*

Yes.

2. *Are the results correct and reasonable for the methods identified in the initial entry or planning document?*

Yes.

3. *Are alternate interpretations of shear- and compression-wave velocities presented in depth intervals where the data may give multiple interpretations?*

It is my opinion that the downhole records were consistently clear and unambiguous, and not subject to multiple interpretation(s).

4. *Are the data clearly identified and traceable?*

Yes.

5. *Are any assumptions used in the interpretation of the data reasonable and clearly presented?*

I do not believe that any assumptions were made or were necessary.

6. *Are the requirements for data accuracy, precision and representativeness clearly identified in the initial entry or referenced planning document?*

Yes.

7. *Do the data meet the requirements for accuracy, precision and representativeness?*

Yes.

8. *Are the data legible and adequately labeled with respect to units, axis labels, etc.?*

Yes.

9-26-01 JDD

9-26-01 JBD

(2) 2 JBD 9-26-01

9. *Are the calculations correct and described in sufficient detail to permit reproduction by the reviewer without recourse to the original researcher?*

Yes.

10. *Are the following complete and accurate?*
    a) *Description of work as it was performed?*
    b) *Results obtained?*
    c) *Names of the persons performing the work?*

The answers to all three is 'Yes'.

11. *Are there any anomalies or typographical errors apparent in the data? Confirm that the electronic files have not been corrupted by spot checking against hard copies contained in the scientific notebook and or supplemental records.*

No anomalies or typographical errors were apparent to me. I assume that the task of checking electronic files has been done by someone else.

12. *Are the data completely and clearly summarized in the Summary Report?*

I have not seen the Summary report and cannot answer this question.

13. *Are possible sources of error and uncertainty in the data addressed?*

Yes. Overall, the quality of the field work, the data and the data reduction is excellent. I believe that any uncertainties are trivial and have no adverse effect on the quality of the results. For example, there is a minor offset of shear-wave arrival times at a depth of about 220 ft in RF-13, but this results from the presence of multiple signals (due to complex geology) rather than from any error in interpretation; the final results are still valid.

14. *Has the documentation regarding use of software been provided as required by AP-SI.1Q, Software Management, including identification of name, version, qualification status, inputs, outputs, computer type and operating platform?*

See page 76 77 for more information to help address this question 14.

I cannot answer this question.

CH 1-28-02

Responses are not required to any of my comments above.

Bruce B. Redpath

Bruce B Redpath 29 Sept 2001

9-26-01 JBD

OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT
REVIEW RECORD

1. QA: QA
2. Page 1 of 2

3. Responsible Manager: Cliff Howard
3a. Originator/Comment Responder/Location: Cliff Howard/Las Vegas, Nevada
4. Technical Product or Data Title: Downhole Seismic Component of Geotechnical Investigation for a Potential Waste Handling Building
5. Technical Product or Data Identifier: SN-M&O-SCI-025-V1 (optional for Data)
6. Review Draft/Revision/Change: 00
7. Date: August 7, 2001
8. Governing Procedure Number: AP-SIII.1Q
9. Revision/Change: 1 / 0

REVIEW CRITERIA

10. ☐ Standard Review Criteria Apply _____ (e.g., 2, 11C)
11. ☑ Specific Review Criteria:
    - ☐ Source: _____
    - ☑ Attached: See page 2 of this document
    - ☐ Listed Below:
12. Comment Documentation:
    - ☑ Review Copy Mark-up
    - ☐ Master Copy Mark-up
    - ☐ Comment Sheets (hard copy) (Ref. AP-5.1Q) or
    - ☐ Electronic Method: _____ (e.g., Comment Sheets or e-mail)

13. REVIEW ORGANIZATIONS

Org./Discipline	Affected Org./ Discipline Manager	Review Criteria	Org./Discipline	Affected Org./ Discipline Manager	Review Criteria

COMMENTS DUE:

14. Due Date: September 1, 2001
15. Review Coordinator: Cliff Howard (Print Name)

REVIEW BY:

16. BRUCE REDPATH (Print Name)
17. REDPATH GEOPHYSICS (Org./Discipline)
18a. Mandatory Comments: ☐ Yes ☒ No
18b. Non-Mandatory Comments: ☒ Yes ☐ No

ORIGINATOR/COMMENT RESPONDER:

19. JOHN DIEHL (Print Name) 9-26-01 (Date)

CONCURRENCE:

20. Document Revision/Change: _____ Date: _____
21. Reviewer: Bruce B. Redpath (Signature) 22 OCT 2001 (Date)

DISPUTE RESOLUTION: (if applicable)

22. _____ (Affected Organization Manager Signature) _____ (Date)
23. _____ (Organization)

Cliff Howard 11-15-01

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Cliff Howard 11-15-01

Technical Review Criteria for SN-M&O-SCI-025-V1, *Downhole Seismic Component of Geotechnical Investigation for a Potential Waste Handling Building*

1. Is the approach used to generate the data clearly stated, such that the method and results could be duplicated by a technically equivalent person, without recourse to the original researcher?
2. Are the results correct and reasonable for the methods identified in the initial entry or planning document?
3. Are alternate interpretations of shear- and compression-wave velocities presented in depth intervals where the data may give multiple interpretations?
4. Are the data clearly identified and traceable?
5. Are any assumptions used in the interpretation of the data reasonable and clearly presented?
6. Are the requirements for data accuracy, precision and representativeness clearly identified in the initial entry or referenced planning document?
7. Do the data meet the requirements for accuracy, precision and representativeness?
8. Are the data legible and adequately labeled with respect to units, axis labels, etc.?
9. Are the calculations correct and described in sufficient detail to permit reproduction by the reviewer without recourse to the original researcher?
10. Are the following complete and accurate?
    a) Description of the work as it was performed?
    b) Results obtained?
    c) Names of the persons performing the work?
11. Are there any anomalies or typographical errors apparent in the data? Confirm that the electronic files have not been corrupted by spot checking against hard copies contained in the scientific notebook and or supplemental records.
12. Are the data completely and clearly summarized in the Summary Report?
13. Are possible sources of error and uncertainty in the data addressed?
14. Has the documentation regarding use of software been provided as required by AP-SI.1Q, Software Management, including identification of name, version, qualification status, inputs, outputs, computer type, and operating platform ?

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Jeff Howard 2-5-02

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URS

Memorandum

Cliff Howard 11-15-01

Date: October 22, 2001

To: Michael Luebbers

From: Patricia Thomas

Subject: **Yucca Mountain Project: Preparation and Submittal of Data from SN-M&O-SCI-025-V1 to the TDMS**

Under your direction as Principal Investigator, I have prepared and submitted the data from this notebook (SN-M&O-SCI-025-V1) to the TDMS. The data is considered final as a technical review of the notebook and data was performed and completed. The data, shear-wave and compression-wave velocity profiles, generated by the investigator already existed in electronic format. In preparation for submittal to the TDMS, the data were obtained and copied electronically from a cd which is "Attachment 2" to this notebook. Data were copied electronically into a Microsoft Excel file (downhole_rf13_rf17_final_tdms.xls) and the appropriate project-defined parameter headings were added. The data in the Excel file were then independently checked by Robyn Schapiro to verify that the data were unchanged. A printout of the Excel spreadsheet is attached. The Excel file was sent to Kelli Favela, Data Coordinator, for submittal to the TDMS in zipped format, following AP-SIII.3Q, *Submittal and Incorporation of Data to the Technical Data Management System*. Once the data appear in the TDMS, they will be checked against the data in the scientific notebook to verify correct processing. I will notify you when this is completed and supply you with the corresponding DTN.

1GWong for	11/9/01
Patricia A. Thomas	Date

I have performed an independent check of data from Scientific Notebook SN-M&O-SCI-025-V1 and verified that it was identical to that in the Excel Spreadsheet (downhole_rf13_rf17_final_tdms.xls).

RG Schapiro	11/09/01
Robyn Schapiro	Date

Enclosure: downhole_rf13_rf17_final_tdms.xls, 1 page

cc: Cliff Howard, M&O, Las Vegas, NV

Cliff Howard 11-15-01

Table 1: Shear-wave and Compression-wave Velocity Measurements from Borehole RF-13		
Attribute(C75): Depth Interval (ft)	Parameter(6818): Seismic S-wave Velocity (ft/sec)	Parameter(6819): Seismic P-wave Velocity (ft/sec)
0 - 15	1090	2110
15 - 36	1960	3700
36 - 99	2490	3970
99 - 215	2810	4900
215 - 345	6490	11180

Table 2: Shear-wave and Compression-wave Velocity Measurements from Borehole RF-17		
Attribute(C75): Depth Interval (ft)	Parameter(6818): Seismic S-wave Velocity (ft/sec)	Parameter(6819): Seismic P-wave Velocity (ft/sec)
0 - 15	1210	2510
15 - 30	1880	4160
30 - 100	2490	4060
100 - 400	3160	5580
400 - 500	3890	7190
500 - 620	4520	10210

This Scientific Notebook: SN-M&O-SCI-025-V1, Downhole Seismic Component of Geotechnical Investigation for a Potential Waste Handling Building, is technically complete and ready for closure. I believe the information contained in this scientific notebook to be accurate and complete. A technical review has been performed according to AP-2.14Q. Data acquired in this scientific notebook have been submitted to the TDMS in accordance with AP-SIII.3Q. It is understood, that upon completion of the final Compliance Review, the Compliance Review Worksheets will be included as part of the scientific notebook by the Responsible Manager, Cliff Howard.

This Scientific Notebook SN-M&O-SCI-025-V1, Downhole Seismic Component of Geotechnical Investigation for a Potential Waste Handling Building, is ready for final Compliance Review.

Robert Steller, Investigator — 10/30/2001 Date

Cliff Howard 11-15-01

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CH 1-31-02

INFORMATION ONLY

MOL. 20020110. 0102 67

BECHTEL SAIC COMPANY LLC

This letter is to designate the DTN for the technical data submittal. Cliff Howard 11-14-01

QA: N/A

October 24, 2001

Vincent R. Mattes
Bechtel SAIC Company, LLC
Site and Engineering Properties Database Administrator
1180 Town Center Drive
Las Vegas, Nevada 89144

Contract NO. DE-AC08-01RW12101
DOWNHOLE VELOCITY DATA FROM BOREHOLES RF-13 AND RF-17

DTN: MO0110DVDBOREH.000 TDIF: 312459

The subject data transmittal packages are being submitted to Site and Engineering Properties Database in Accordance with YMP Administrative Procedure AP-SIII.3Q. These data were technically reviewed.

If you have questions, please contact me at 295-0650 or through Lotus Notes to "Kelli Favela/YM/RWDOE@CRWMS"

Cliff Howard 11-15-01

Matthew F. Knop, Acting Manager
Technical Data Management

10/25/01
Date Signed

KF/gw- 1024010245

Enclosure:
Technical Data Information Form

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October 24, 2001
Page 2

page 1 was on page 67
CH 11-15-01

cc w/encl:
Patricia Thomas
USR Corporation / Seismic Hazards Branch
500 12th Street, Suite 200
Oakland, CA 94607
RPC = "3" pages

cc w/o encl:
J. M. White, DOE/YMSCO, Las Vegas, NV

Cliff Howard 11-15-01

Blank Cliff Howard
11-15-01

TDIF: 312459 Cliff Howard 11-15-01 QA: 69 QA

YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT
TECHNICAL DATA INFORMATION FORM

[X] ACQUIRED DATA DTN: M00110DVDBOREH.000

[ ] DEVELOPED DATA [ ] TPO Preliminary Data: ____

PART I Identification of Data

Title of Data: DOWNHOLE VELOCITY DATA FROM BOREHOLES RF-13 AND RF-17

Description of Data: DOWNHOLE S-WAVE (SHEAR-WAVE) AND P-WAVE (COMPRESSION-WAVE) VELOCITY DATA FROM BOREHOLES RF-13 AND RF-17, LOCATED WITHIN THE WASTE HANDLING BUILDING SITE CHARACTERIZATION AREA. DEPTH

Data Originator/Preparer: THOMAS, P A
Last Name First and Middle Initials

Data Originator/Preparer Organization: M&O/URSGWCFS

Qualification Status: [X] Q [ ] Un-Q [ ] Accepted

SCP Activity Number(s): ____

WBS Number(s): 1.2.22.6.T Governing Plan: DP

PART II Data Acquisition/Development Information

Method: DATA WERE ACQUIRED AND DOCUMENTED USING AP-SIII.1Q, SCIENTIFIC NOTEBOOKS. THE APPROACH, ACQUISITION, AND REVIEWS OF DATA ARE DOCUMENTED IN SCIENTIFIC NOTEBOOK SN-M&O-SCI-025-V1, DOWNHOLE SEISMIC COMPONENT OF GEOTECHNICAL STUDIES FOR A POTENTIAL WASTE HANDLING BUILDING.

TIC Number(s): ____

Location(s): WASTE HANDLING BUILDING SITE CHARACTERIZATION AREA

Period(s): 10/2/2000 to 9/18/2001
From: MM/DD/YY To: MM/DD/YY

Sample ID Number(s): ____

PART III Source Data DTN(s): **Source TIC Number(s):**

Comments

REPORT NUMBER: ANL-MGR-GE-000003, REV 00/ICN 00

Checked by: Kelli Fanelo 10/22/01
Signature Date

70

TDIF: 312459

YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT
TECHNICAL DATA INFORMATION
CONTINUATION SHEET

QA:QA

Description of Data (continued)

IS MEASURED FROM THE GROUND SURFACE AT THE LOCATION OF EACH BOREHOLE.

Blank Space Jeff Howard 11-15-01

Jeff Howard 11-15-01

I have reviewed this Scientific Notebook: SN-M&O-SCI-025-V1, Downhole Seismic Component of Geotechnical Investigation for a Potential Waste Handling Building, relative to the requirements of AP-SIII.1Q, Section 5.7.2. The requirements have been met to my satisfaction. Comments from the Technical Review have been adequately addressed with sign-off by the Technical Reviewer. I find this scientific notebook to be understandable, legible, and appropriate to the work accomplished. It is understood, that upon completion of the final Compliance Review, the Compliance Review Worksheets will be included as part of the scientific notebook.

This Scientific Notebook: SN-M&O-SCI-025-V1, Downhole Seismic Component of Geotechnical Investigation for a Potential Waste Handling Building, is ready for final Compliance Review.

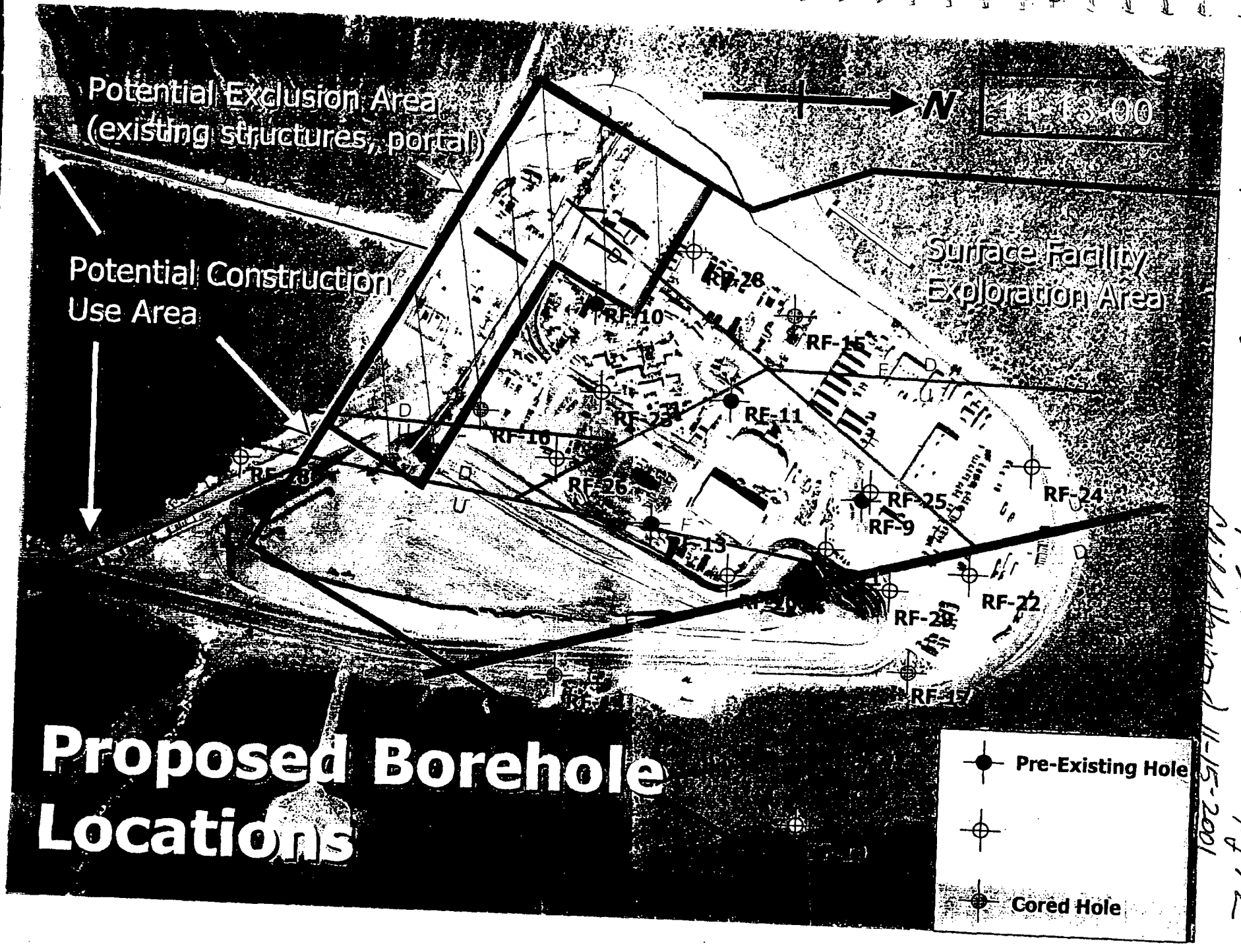
Cliff Howard — 11-15-01

Cliff Howard, Responsible Manager — Date

Cliff Howard 11-15-01

Blank

Cliff Howard 11-15-01



An improved image of that on page 21.

Philip Howard 11-15-2001

Pg 72

Waste Handling Building Data Management Documentation Form

1 **Description of Data to Be Prepared (data type, borehole number, etc):**
Data is borehole interval velocity data to be collected using the Downhole Method. The associated Scientific Notebook is SN-M&O-SCI-025-V1. The boreholes logged under this SN were RF-13 and RF-17.

2 **Dates Over Which Data Was Prepared:** Data collected from Dec 8-11, '00

3 **Data Analysis Dates:** Data was analyzed from Dec 15 '00 until Jun 12 '01

4 **Name/Date of Training to This Document and AP-SV.1Q:**
Name: John Diehl Date: Jan 22, 2001 via personal comm. With Cliff Howard

5 **Data Preparation Performed by:** Rob Steller and John Diehl, GEOVision

6 **Source Q Data File and Originating Source:**
Source data files were generated by seismograph OYO Model 3331 S/N 15014. This instrument was calibrated by Bechtel Nevada reference report 1000018202 dated Jun 6 "00 (see also SN p.20). Source files were stored on floppy diskette and labeled with data, preparer name, borehole number, and file sequence numbers referenced to the log sheet in the SN (Field Notes p.22 to 36).

7 **Comparison between source file(s) and working file(s) using signature file utility:**

File Name	Compare OK	Initial	Date
Diskette #1 contains *.org files:			
RF13_001-071_088-099			
Sig file name: RF13_001-071_088-099.sig	YES	JDD	1-17-01
Compare log: RF13_001-071_088-099.log	YES	JDD	1-17-01
NOTE: these files contained in Data			
Management directory on CD-ROM			
Attached to the SN-025			
Diskette #2 contains *.org files:			
RF17_001-100 dh			
Sig file name: RF17_001-100 dh.sig	YES	JDD	1-17-01
Compare log: RF17_001-100 dh.log	YES	JDD	1-17-01
Diskette #3 contains *.org files:			
RF17_101-141 dh			
Sig file name: RF17_101-141 dh.sig	YES	JDD	1-17-01
Compare log: RF17_101-141 dh.log	YES	JDD	1-17-01

 Cliff Howard 1-28-02

9 Intermediate Data File With Manipulation and Justification:

Rf13dwn1.sps, Rf13dwn2.sps, Rf17dwn1.sps, and Rf17dwn2.sps were generated by the program PSLOG, the same program that is embedded in the OYO Seismograph. PSLOG is used to save the pick times generated during analysis. The picks are not made by the software, but by the analyst. The pick times are sorted and stored in the *.sps files in ASCII format before being transferred to EXCEL. These files are stored on the CD-ROM attached to the SN-025 in the directory called Analysis by borehole (RF-13 and RF-17). The analysis procedure is fully described in SN-25 p.17, and further elaborated on p.45-52. The reason there are two files for each borehole is that the analyst performed the analysis using both "peaks" and "breaks" (see p.45 of SN-25).

10 Final Reduced Data File:

The ASCII data from the *.sps pick files is imported to Excel using Excel's standard import function. The Excel files are titled RF13DOWN PEAKS.xls, RF13DOWN BREAKS.xls, RF17DOWN PEAKS.xls, and RF17DOWN BREAKS.xls. Again, the reason there are two files for each borehole is that the analyst performed the analysis using both "peaks" and "breaks" (see p.45 of SN-25). This files contain the standard calculations used to determine the interval velocities by subtracting the travel time from one elevation to the other and dividing by the distance. The Excel spreadsheets also provide for the standard corrections near the surface for the geometry of the source relative to the borehole.

11 Comparison between files produced from this work and those for further processing or submission into the scientific notebook or work package manager using signature file utility:

File Name	Operation – Concatenation / reduction/ representative selection	Compare OK?	Initial	Date
Transmitted to M. Luebbers via email				
There are *.sig files for each of				
These. All these files are located				
in the Results directory on the CD-				
ROM attached to SN-025				
RF13DOWN PEAKS.xls	Reduction			
RF13DOWN PEAKS.sig		YES	JMB	1-19-01
RF13DOWN BREAKS.xls	Reduction			

Cliff Howard 1-28-02

RF13DOWN BREAKS.sig		YES	JW	1-19-01
RF17 DOWNHOLE - PEAKS.xls	Reduction			
RF17 DOWNHOLE - PEAKS.sig		YES	JW	1-16-01
RF17DOWNHOLE - BREAKS.xls	Reduction			
RF17DOWNHOLE - BREAKS.sig		YES	JW	1-16-01

12 The data files listed immediately above have been transferred to the test Principal Investigator for inclusion in scientific notebook number or the work package manager:

Destination for these files: M. Luebbers, URS Corp, Irvine, CA

Signed: JOHN G. OLEAR (data preparer), Date: 1-24-02

Signed: Michael Luebbers (PI or work package manager), Date: Jan. 25, 2002

Blank CH 1-28-02

CH 1-28-02

URS Memorandum

Date: January 25, 2002

To: Cliff Howard, Responsible Manager, WHB Geotechnical Site Investigation, YMP

From: Robyn Schapiro, URS Cliff Howard for Robyn Schapiro

Subject: **Yucca Mountain Project: Review of Supplement V controls in SN-M&O-SCI-025-V1**

Cliff Howard 1-28-02

Under your direction as Responsible Manager, I have reviewed the scientific notebook, SN-M&O-SCI-025-V1, *Downhole Seismic Component of Geotechnical Investigation for a Potential Waste Handling Building*, in regards to the control of electronic management of information required by AP-SV.1Q. The process for control of electronic data for the work documented in this notebook is described clearly in the initial entry of the scientific notebook, page 6. There is also a strict guideline (DataManagement.doc in "Data Management" directory) regarding the documentation of the handling of data. This is included on the CD-ROM that accompanies this notebook (Attachment #1).

Additional documentation that these data-handling controls were followed is found within the scientific notebook or CD in the following locations:

1) Throughout notebook:

At each downhole survey location, field notes in the scientific notebook indicate what the file numbers are for the data collected on that particular borehole. For instance, on pages 24-26, the unfiltered file numbers are indicated for each depth recorded. This raw data in the form of ".org" files were recorded on diskettes and labeled with borehole designation, record ID numbers, date, and tester name (see page 17 "Required Field Records").

2) Contained on the CD-ROM which accompanies the scientific notebook:

The raw data which was collected in the field on diskettes are reproduced here and are contained in the directory "Raw Diskettes". The raw data was collected in binary ".org" files on 3-1/2 inch floppy diskette in the field and transferred to hard disk for backup before leaving the site in accordance with the written procedure followed by GEOVision. Back in the office, the program PsigGen.exe was used to create ".sig" files on each diskette. These ".sig" files were then used to check the validity of the files stored on hard disk and used in the analysis. This verification is documented in logs generated when the program wsigCmp.exe was used to compare ".sig" files (see \Data Management\RF#13D 001-099.log for an example).

Processed data is also provided on the CD-ROM. The p- and shear wave arrival picks for each ".org" files are organized, sorted, and saved in ".sps" files by the program PSLOG (see below). These ".sps" files are in ASCII format and can be read by almost any program (see "the way data gets from PSLog into Excel" below). These files are located in the "Analysis" directory on the CD-ROM. The data from the ".sps" files is input into Excel (example worksheet is RF13DOWN PEAKS.xls in "Results" directory on CD-ROM). Once the data is in Excel, page 52 of the notebook explains how the final data is plotted on charts.

3) On page 73 through 75, is a form that documents and summarizes the electronic transfer of data. This form shows that all of the data files, starting from the field data, through to the final data on the CD of Attachment 1 were carefully checked for electronic transfer without alteration.

The question has been asked, how does data get from PSLog into Excel?

The way data gets from PSLog into Excel is very simple. Basically the *.sps file created by the program PSLOG.EXE is an ASCII file of the picks. This is described in the SN. To get the data into Excel, you just open the Excel spreadsheet you are using as a template, then open the correct *.sps file. Excel will start a text import wizard and ask how the data is delimited. Choose "space delimited" and click "Finished". The wizard will open a spreadsheet with the header and the picks. The header columns have to be moved over to line up with the pick columns. Then just select all the data, click "Copy" and then paste it into the correct cell of the worksheet. In the correct location, the raw data cell contents are used in the downhole velocity and depth correction calculations. The *.sps files are also appropriately named with the borehole designation, like "Rf17rr1.sps".

All of this is described in the SN in pages 50-52. Particularly, the SN describes the flow from raw data to the spreadsheet.

The description of what the Excel spreadsheet does in described on page 46 of SN-025. This description was not intended as a detailed software description, but the basic elements of what calculations are performed are provided. The spreadsheets are simply a tool for analysis. The calculations are very simple and easily checked by hand.

The following question was asked in the technical review: "Has the documentation regarding use of software been provided as required by AP-SI.1Q, Software Management, including identification of name, version, qualification status, inputs, outputs, computer type, and operating platform?"

To address this question, please note the following:

- A description of the software used to process the data is briefly described on page 5 of the initial entry of this notebook. Software programs used are:

  Microsoft Word for Windows, Version 97 SR-2 or more recent
  Microsoft Excel for Windows, Version 97 SR-2 or more recent

  Section 2.1.1 of AP-SI.1Q exempts Microsoft Word and Microsoft Excel from the qualification requirement.

- In addition to the above, proprietary OYO software is used to view the raw data collected in field. This software is embedded in the OYO seismograph. A version of this software exists separately as PSLOG (Version 1.0 or more recent) and is included on the CD-ROM (Attachment 1 to this notebook). PSLOG is used to graphically display the data that is digitally recorded in the field in order to facilitate "picking" the wave arrivals. The simple instructions to view the raw data are described on pages 50-51 of this notebook.

Chris Howard 1-28-02

URS

All of the software used during the operations discussed in the above paragraph are exempt from software qualification by the YMP (Section 2.1.3 of AP-SI.1Q) as it is built in or otherwise integral to the operation of the data collection system or test equipment.

My review of Scientific Notebook SN-M&O-SCI-025-V1, *Downhole Seismic Component of Geotechnical Investigation for a Potential Waste Handling Building*, indicates that this scientific notebook complies with AP-SV.1Q and AP-SIII.1Q in outlining and following controls for the electronic management of information. All data files are included on the CD-ROM (Attachment #1). These files allow any person at a later date to repeat the analysis and interpretation of the field data, if necessary.

Cliff Howard 1-28-02

Blank
CH 2-22-02

Page 79

Cliff Howard 2-14-02

URS Memorandum

Date: February 13, 2002

To: Cliff Howard

From: Robyn Schapiro

Subject: **Yucca Mountain Project: Preparation and Submittal of Data from SN-M&O-SCI-025-V1 to the TDMS**

Under your direction as Responsible Manager, I have prepared and submitted the data from this notebook (SN-M&O-SCI-025-V1) to the TDMS. The data is considered final as a technical review of the notebook and data was performed and completed. The data, downhole s-wave and p-wave interpreted arrival time data from boreholes RF#13 and RF#17, generated by the investigator already existed in electronic format.

In preparation for submittal to the TDMS, the data were obtained and copied electronically from a cd which is "Attachment 1" to this notebook. Data were copied electronically into a Microsoft Excel file (travel time_rf13_rf17_final_tdms.xls) and the appropriate project-defined parameter headings were added. The data in the Excel file were then independently checked by Melinda Lee to verify that the data were unchanged.

The Excel file was sent to Kelli Favela, Data Coordinator, for submittal to the TDMS in zipped format, following AP-SIII.3Q, *Submittal and Incorporation of Data to the Technical Data Management System*. Once the data appear in the TDMS, they will be checked against the data in the scientific notebook to verify correct processing.

RG Schapiro 2/13/02

Robyn Gerth Schapiro Date

I have performed an independent check of data from Scientific Notebook SN-M&O-SCI-025-V1 and verified that it was identical to that in the Excel Spreadsheet (travel time_rf13_rf17_final_tdms.xls).

Melinda L. Lee 2-13-02

Melinda Lee Date

Attachment follows: A sample worksheet from the excel file. This represents data from one borehole, RF #13.

Cliff Howard 2-14-02

S-wave offset (ft)	8.6
P-wave offset (ft):	10.5
S-wave offset (msec):	-2
P-wave offset (msec):	-2

Depth (ft)	Parameter 6962: S Wave Arrival Time on Downhole Horizontal Normal Receiver (msec)	Parameter 6962: S-Wave Arrival Time on Downhole Horizontal Reverse Receiver (msec)	Parameter 6962: P-Wave Arrival Time on Downhole Vertical Receiver (msec)	S-Wave Arrival Time at Surface Horizontal Receiver (Normal Polarity) (msec)	S-Wave Arrival Time at Surface Horizontal Receiver (Reverse Polarity) (msec)	P-Wave Arrival Time at Surface Horizontal Receiver (msec)	P-Wave Adjusted Travel Time (msec)	S-Wave Adjusted Travel Time (msec)
5.91	16.2	13.4	8.8	3.7	3.6	4.6	3.22	6.96
8.86	16.8	14.2	9	3.4	3.6	4.25	4.59	9.43
12.14	17.6	15.4	9.2	3.25	3.6	3.3	6.26	11.61
15.09	18.95	16.6	9.9	3	3.2	3.95	6.83	13.75
18.04	20.4	18	10.8	2.7	3.3	4.65	7.37	15.66
21.00	21.1	19.2	11.55	2.85	3.25	4.6	8.34	16.89
23.95	22.15	21.6	11.9	2.9	3.1	4.3	9.14	18.84
26.90	23.9	23	12.5	2.9	3.1	4.55	9.62	20.57
29.86	24.5	23.8	12.8	2.7	3.3	3.5	11.01	21.43
33.14	25.9	25.1	14	2.9	3.2	4	11.80	22.84
36.09	27.7	26.5	15	2.6	3.2	4.8	12.07	24.66
39.04	29.4	28.1	14.6	2.9	2.8	3.5	13.01	26.41
41.99	30.4	28.9	16.4	3.2	3.2	4.75	13.61	27.04
44.95	30.85	29.9	17.3	3.1	3.2	4.55	14.73	27.87
47.90	32.4	30.3	18.6	2.9	3.2	3.65	16.92	28.98
50.85	33.8	31.4	19.5	3.1	3.2	4.4	17.11	30.17
54.13	34.6	32.6	20.25	2.8	3	4.15	18.14	31.45
57.09	35.75	33.4	20.9	3.2	3.2	4.35	18.61	32.16
60.04	36.4	34.8	22.1	3.1	3	5.1	19.08	33.36
62.99	37.5	36.2	23.1	3.1	3	5.3	19.90	34.63
65.94	38.3	37.4	23.3	3.1	3.2	4.55	20.86	35.55
68.90	39.1	38.8	22.1	2.8	3.2	2.75	21.48	36.81
71.85	40.5	39.8	23.9	3.1	2.8	4.2	21.84	38.08
75.13	42.7	40.9	24.6	3.3	3.1	3.9	22.85	39.49
78.08	43.9	41.5	25.7	3.1	3.25	4.4	23.46	40.43
81.04	44.9	42.5	26.3	3	3.3	4.5	23.97	41.46
83.99	46.6	44.1	26.4	2.9	3.2	3.85	24.73	43.22
86.94	47.85	45.9	27.75	2.8	3.2	4.75	25.19	44.80
89.90	49.4	47.5	28.7	3.1	2.9	4.95	25.95	46.39
92.85	50.2	48.3	28.9	3	2.9	3.7	27.40	47.24
96.13	51.8	50.45	29.8	3	3	4.3	27.71	49.08
99.08	52.8	50.85	30.9	2.7	2.6	4.8	28.32	50.13
102.03	54	51.8	31.7	3.2	2.8	4.5	29.42	50.87
104.99	54.7	53.4	32.4	3.1	3	4.8	29.83	51.97
109.91	56.1	55	31.7	2.8	3.1	3.4	30.54	53.58
115.16	58.1	56.6	33.6	3.2	3.1	4.75	31.10	55.19

travel time_rf13_rf17_final_tdms.xlsRF13

120.08	59.9	57.7	34.2	3.3	3.4	3.8	32.65	56.45
125.00	60.9	58.7	36.2	3.1	3.3	4.9	33.56	57.61
129.92	62.65	61.3	35.1	3.4	3.2	3	34.36	59.69
134.84	64.6	64	37.6	3.4	3.3	4.5	35.37	61.97
140.09	66.2	65.8	38.4	2.8	3.2	4.5	36.17	64.03
145.01	67.8	68.2	39.8	2.9	3	4.65	37.43	66.08
149.93	70.2	70.2	39.2	3.2	2.6	3	38.48	68.33
154.86	71.8	72.2	42	2.6	2.4	4.5	39.78	70.54
160.10	73.8	73.6	42.6	3.4	2.6	4.5	40.39	71.74
165.03	75.6	75.6	42.6	3	2.8	3.7	41.19	73.75
169.95	78.1	77.2	44	3	3.1	4.5	41.79	75.65
174.87	80.6	78.6	45.6	3.2	3.2	4.5	43.40	77.45
180.12	81.4	79.8	46.8	3.2	3.4	4	45.10	78.36
185.04	83.8	82.6	48.2	3.6	3.4	4.7	45.80	80.76
189.96	85.6	83.4	49	3.8	2.9	4.3	47.00	82.21
194.88	88.2	84.8	48.8	3.6	3	3.3	47.81	84.26
200.13	88.6	86.8	49.8	3.5	3	2.9	49.21	85.52
205.05	90.4	88	52.2	3.4	3.2	4.7	49.81	86.97
209.97	91.8	88.8	53.4	3.2	3	4.9	50.81	88.27
214.90	92.8	90	54.6	3.2	3.2	4.8	52.11	89.28
220.14	93.2	90	54.2	3.8	3	3.1	53.41	89.28
225.07	93	90.6	56.4	3.6	2.9	4.6	54.12	89.63
229.99	92.4	90.6	57	3.2	3	4.7	54.62	89.48
234.91	93.2	91.4	58.2	3.6	2.4	4.9	55.62	90.39
240.16	94.1	92.8	58.2	3.6	2.6	4.6	55.92	91.44
245.08	95.2	93.6	58.2	3.4	2.5	4.5	56.02	92.54
250.00	95.6	94.6	58.4	3	2.6	4.4	56.32	93.39
254.92	95.8	95.6	58.8	3	2.4	4.4	56.73	94.09
259.84	96.6	96.4	60	3.2	2.6	5.3	57.03	94.70
265.09	97.8	97.8	60.4	3.4	2.6	4.5	58.23	95.90
270.01	98.6	98.8	60.6	4	2.6	5	57.93	96.50
274.93	99.4	99.2	61.2	4.2	2.8	4.8	58.73	96.90
279.86	100.2	99.6	61.4	4.4	2.8	4.6	59.13	97.40
285.10	100.8	100	62	4.2	2.5	4.9	59.43	98.15
290.03	101.6	100.6	62.4	4.2	2.6	5.5	59.24	98.80
294.95	102.5	101.4	62.6	4	2.6	5.2	59.74	99.75
299.87	103.2	102.8	63.1	4.2	2.4	5	60.44	100.81
305.12	103.8	103.8	63.4	4.2	2.4	4.6	61.14	101.61
310.04	105	104.6	63.6	4.6	2.4	3.4	62.54	102.41
314.96	105.8	105.4	64.2	4.4	2.2	4.8	61.74	103.41
319.88	106	106	64.6	4.4	2.4	5	61.94	103.71
325.13	106.8	106.4	65	4.2	2.4	4.9	62.44	104.41
330.05	108.4	107.8	65.4	4.4	2.4	3.4	64.34	105.81
334.97	109	108.4	66	4.4	2.4	4.4	63.94	106.41
339.90	110.2	109.8	66.4	4.6	2.2	5	63.74	107.71
345.14	111	110.8	67.2	4.4	2.4	5.2	64.34	108.61

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OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT
SCIENTIFIC NOTEBOOK
COMPLIANCE REVIEW WORKSHEET

QA: QA
Page: 1 Of: 4

Scientific Notebook Identifier: (from Scientific Notebook Register)	Investigator:
SN-M&O-SCI-025-V1	MICHAEL LUEBBERS

Scientific Notebook Title: DOWNHOLE SEISMIC COMPONENT OF GEOTECHNICAL INVESTIGATION FOR A POTENTIAL WASTE HANDLING BUILDING

Reviewed by: Print Name:	Signature:	Organization:	Date:
JON ZEISLOFT	Jon Zeisloft	IMTPI Dept.	02-11-02

Review Comment Resolution Satisfactory: Print Name:	Signature:	Organization:	Date:
JON ZEISLOFT	Jon Zeisloft	IMTPI Dept.	2-22-02

Review Acceptance *(to be signed by Responsible Manager or PI after the Compliance Review is complete)*: Print Name:	Signature:	Organization:	Date:
Cliff Howard	Cliff Howard	Testing	2-22-02

Type of Compliance Review: Scientific Notebook page range reviewed 1 to 81

1. Initial Entry Review — ☐ *Complete Parts 1 and 2*
2. Interim Review — ☐ *Complete Parts 1 and 3*
3. Closure Review — ☒ *Complete Parts 1, 3, and 4*

Additional Implementing Documents Identification *(e.g., technical procedures, APs, etc., if applicable)*:
SEE PAGES 14-18 of notebook

Instructions for Completing This Form:

1. If any part of a compound question in the Requirements/Criteria column cannot be answered **YES**, then mark the entire requirement **NO**, and provide an explanation in the **COMMENTS** column.
2. Marking the **N/A** box means the criteria is not applicable to this notebook. If the N/A box is checked, provide a brief justification in the **COMMENTS** column.
3. All criteria marked **NO** require an explanation in the **COMMENTS** column and will be considered a non-compliance issue that the investigator must address in comment response.
4. The Review Acceptance box above will be completed by the Responsible Manager or PI only after the Reviewer has signed above for satisfactory Comment Resolution.

Requirements/Criteria and Relevant Paragraph [AP-SIII.1Q, Para. No.]	CRITERIA MET Yes	No	N/A	Comments
PART 1: GENERAL/IDENTIFICATION AND CONTROL OF SCIENTIFIC NOTEBOOKS				
1. Use of bound notebook? [5.1.2]	✓			
2. Continuous pagination? [5.1.2]	✓			
3. Loose material securely attached? [5.1.3]	✓			
4. Any excessive blank spaces? [5.1.4]	✓			
5. Are supplemental records properly cross-referenced? [5.1.5]	✓			
6. Have all entries been dated, and initialed or signed? [5.1.7]	✓			
7. Are corrections lined through, initialed and dated, and explained if appropriate? [5.1.8]	✓			
8. Is the notebook sufficiently legible for imaging? [5.1.8]	✓			
9. Is Table of Contents adequate? [5.1.10]	✓			
10. Is there a unique Scientific Notebook Register ID number located on the first page or cover? [5.2a)]	✓			
11. Reference to a preceding and/or following notebook (as appropriate)? [5.2c)]			✓	Single volume investigation

Cliff Howard 2-22-02

OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT
SCIENTIFIC NOTEBOOK
COMPLIANCE REVIEW WORKSHEET

QA: QA

Scientific Notebook: (from Scientific Notebook Register)
SCI-M&O-SCI-025-V1

Requirements/Criteria and Relevant Paragraph [AP-SIII.1Q, Para. No.]	CRITERIA MET Yes	No	N/A	Comments
PART 2: SCIENTIFIC NOTEBOOK INITIAL ENTRY				
12. Is there an approved planning document included or referenced? [5.3.1a)]				
13. Are all criteria of 5.3.1a) adequately discussed? [5.3.1a)]				
14. List of samples to be used? [5.3.1a) 2)]				
15. List of equipment to be used? [5.3.1a) 3)]				
16. List of measuring and test equipment needing calibration and the calibration details/methods? [5.3.1a) 3)]				
17. List of needed procurements? [5.3.1a) 4)]				
18. Has all required information of [5.3.1a) 5)] been provided?				
19. List of standards and criteria to be used? [5.3.1a) 6)]				
20. List of special training and/or qualification requirements? [5.3.1a) 7)]				
21. ID of prerequisites or special or unique environmental conditions required? [5.3.1a) 7)]				
22. Accuracy, precision or representativeness of results requirements identified? [5.3.1a) 7)]				
23. Potential sources of error? [5.3.1a) 7)]				This Page Not used for Final Compliance Review 2-21-02
24. Has any miscellaneous relevant information necessary to understand the research been included? [5.3.1a) 8)]				
25. List citations of all work referenced in the notebook? [5.3.1a) 9)]				
26. Are there provisions for controls of any electronically managed data? [5.3.1a) 10)]				
27. Has planning been coordinated with those providing input to or using the results from scientific notebook? [5.3.1a) 11)]				
28. List of personnel contributing to the notebook with their signatures and initials? [5.3.1b)]				
29. Are there cross-linking statements between preceding, succeeding, and concurrent scientific notebooks? [5.3.1c)]				
30. Initial entry signed and dated? [5.3.1a)]				
31. Acceptance of the initial-entry compliance review including resolution of comments? [5.3.2a)]				
32. Is completion of initial-entry compliance review documented in the notebook? [5.3.2c)]				

Cliff Howard 2-22-02

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OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT
SCIENTIFIC NOTEBOOK
COMPLIANCE REVIEW WORKSHEET

QA: QA

Scientific Notebook: (from Scientific Notebook Register)
SN-M&O-SCI-025-V1

Requirements/Criteria and Relevant Paragraph [AP-SIII.1Q, Para. No.]	CRITERIA MET Yes	No	N/A	Comments
PART 3: SCIENTIFIC NOTEBOOK IN-PROCESS ENTRIES/SUBMITTAL AND TRACEABILITY OF DATA				
33. Description of the step-by-step work performed? [5.4a) 1)]	✓			
34. Accomplishment of prerequisite actions and/or deviations from planned actions? [5.4a) 1)]	✓			
35. Conditions described that might adversely affect the research? [5.4a) 2)]	✓			p. 16
36. Are samples that will be used properly identified? [5.4a) 3)]			✓	no samples used
37. Identify any calibrations done? [5.4a) 3)]	✓			p. 20
38. Is listed computer information given? [5.4a) 3)]	✓			
39. Are sets of resulting data or samples linked to properly identified M&TE? [5.4a) 5)]	✓			
40. Has ID been given for accepted data used in the investigation? [5.4a) 6)]			✓	all newly generated data
41. Have "rejected" or non-Q data, if known, been identified? [5.4a) 7)]			✓	no data rejected
42. Have investigation results been given? [5.4a) 8)]	✓			
43. Are interim/preliminary conclusions given and labeled as such? [5.4a) 9)]			✓	only final results given
44. Are any amendments to initial entry adequate? [5.4a) 10)]			✓	no ammendments
45. Are supplemental records adequately referenced in scientific notebook entries? [5.4a) 11)]	✓			
46. For new volumes, is original or updated initial entry copied into or referenced at the beginning of the volume? [5.4b) 1)]			✓	single volume investigation
47. Adequate controls followed for electronically managed data? [5.5.3a) 5)]	✓			
48. Were input data obtained from the TDMS or TIC? [5.6a)]			✓	generated new data

Cliff Howard 2-22-02

OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT
SCIENTIFIC NOTEBOOK
COMPLIANCE REVIEW WORKSHEET

QA: QA

Scientific Notebook: (from Scientific Notebook Register)
SN-M10-SCI-026-V1

Requirements/Criteria and Relevant Paragraph [AP-SIII.1Q, Para. No.]	CRITERIA MET			Comments
	Yes	No	N/A	
49. Have TDMS Data Tracking Numbers or TIC catalog numbers been noted for data used? [5.6b)]			✓	all newly generated data
50. Is there documentation in the scientific notebook showing that the data generated by the investigation have been submitted to the TDMS? [5.6c)]	✓			
PART 4. CLOSURE OF SCIENTIFIC NOTEBOOKS				
51. Has statement of conclusion been entered? [5.7.1b)]	✓			
52. Is there a non-collection of data statement, if appropriate? [5.7.1b)]			✓	
53. Is there an entry that the Technical Reviewer accepts all comments as resolved? [5.7.2a) 2)]	✓			p 60
54. Is the Table of Contents complete? [5.7.2a) 3)]	✓			
55. Have all supplementary records referenced in the notebook been provided for the closure compliance review? [5.7.3c) 1)]	✓			

Cliff Howard 2-22-02

TDIF: 312826 CH 2-22-02 Pg 86 QA: QA

YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT
TECHNICAL DATA INFORMATION FORM

INFORMATION ONLY

[X] ACQUIRED DATA DTN: MO0202DWAVEATD.000

[ ] DEVELOPED DATA [ ] TPO Preliminary Data: N/A

PART I Identification of Data

Title of Data: DOWNHOLE S-WAVE AND P-WAVE INTERPRETED ARRIVAL TIME DATA FROM BOREHOLES RF#13 AND RF#17.

Description of Data: DOWNHOLE S-WAVE (SHEAR-WAVE) AND P-WAVE (COMPRESSION-WAVE) TRAVEL TIME DATA FROM BOREHOLES RF#13 AND RF#17, LOCATED WITHIN THE WASTE HANDLING BUILDING SITE CHARATERIZATION AREA.

Data Originator/Preparer: LUEBBERS, M J
Last Name First and Middle Initials

Data Originator/Preparer Organization: M&O/URSGWCFS

Qualification Status: [X] Q [ ] Un-Q [ ] Accepted

SCP Activity Number(s): N/A

WBS Number(s): 1.2.22.6.T Governing Plan: DP

PART II Data Acquisition/Development Information

Method: DATA WERE ACQUIRED AND DOCUMENTED USING AP-SIII.1Q, SCIENTIFIC NOTEBOOKS. THE APPROACH, ACQUISITION, AND REVIEWS OF DATA ARE DOCUMENTED IN SCIENTIFIC NOTEBOOK SN-M&O-SCI-025-V1, DOWNHOLE SEISMIC COMPONENT OF GEOTECHNICAL STUDIES FOR A POTENTIAL WASTE HANDLING BUILDING.

TIC Number(s): N/A

Location(s): WASTE HANDLING BUILDING SITE CHARACTERIZATION AREA

Period(s): 10/2/2000 to 9/18/2001
From: MM/DD/YY To: MM/DD/YY

Sample ID Number(s): N/A

PART III Source Data DTN(s): N/A

Source TIC Number(s): N/A

Comments

WE RECOMMEND ALSO VIEWING DOWNHOLE VELOCITY DATA FROM BOREHOLES RF#13 AND RF#17 (DTN: MO0110DVDBOREH.000). REPORT NUMBER: ANL-MGR-GE-000003, REV 00/ICN 00.

Checked by: Kelli Ferrela 2/19/02
Signature Date

2-22-02 CH

Pg 87

312826

YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT
TECHNICAL DATA INFORMATION
CONTINUATION SHEET

Description of Data (continued)

DEPTH IS MEASURED FROM THE GROUND SURFACE AT THE LOCATION OF EACH BOREHOLE.

OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT
SPECIAL INSTRUCTION SHEET

1. QA: QA

Complete Only Applicable Items

This is a placeholder page for records that cannot be scanned.

2. Record Date 09/21/2001	3. Accession Number ATT TO: MOL.20020228.0297
4. Author Name(s) MICHAEL J. LUEBBERS	5. Author Organization N/A

6. Title/Description
SN-M&O-SCI-025-VI DOWNHOLE SEISMIC COMPONENT OF GEOTECHNICAL INVESTIGATION FOR A POTENTIAL WASTE HANDLING BUILDING
ATTACHMENT 1 SUPPLEMENTAL DOCUMENT
ATTACHMENT 2 SUMMARY DATA REPORT DOWNHOLE SEISMIC

7. Document Number(s) N/A	8. Version Designator N/A
9. Document Type DATA	10. Medium DISK

11. Access Control Code
PUB

12. Traceability Designator
SN-M&O-SCI-025-VI (ATTACHMENT 1 & 2)

13. Comments
THIS DATA SUBMITTAL TO THE RECORDS PROCESSING CENTER IS FOR ARCHIVE PURPOSES ONLY, AND IS NOT AVAILABLE FOR VIEWING OR REPRODUCTION

Software required:
MS EXCEL
MS WORD
MS ACCESS
ADOBE ACROBAT
wSigGen, Version 1.0.0
wSigCmp, Version 1.1.0

Also see ReadMe File for listing of CD-Rom Contents

SN-M&O-SCI-025-V1 Supplemental Record 1 (MOL.20020228.0297)				
File Name	Size (Bytes)	Date Modified	Time Modified	Associated Directory
List of Files on Compact Disk	243,712	1/5/06	2:25 PM	D:\
_wSigCmp Logs	0	1/5/2006	9:28 AM	D:\SCI-025-V1\Data Management\
Analysis	0	1/5/2006	9:28 AM	D:\SCI-025-V1\
AP-SV.1Q.1form.doc	49,152	11/17/2000	2:11 AM	D:\SCI-025-V1\Data Management\
AP-SV1Qr0i2.pdf	60,764	11/17/2000	2:11 AM	D:\SCI-025-V1\Data Management\
Ascipsch.exe	203,464	2/21/1992	9:45 AM	D:\SCI-025-V1\Analysis\
Bde.exe	103,968	11/12/1991	10:09 AM	D:\SCI-025-V1\Analysis\
Bdrv.pdt	135,864	4/12/1991	6:10 AM	D:\SCI-025-V1\Analysis\
Data Management	0	1/5/2006	9:28 AM	D:\SCI-025-V1\
DataManagement-completed.DOC	72,704	1/23/2002	4:45 AM	D:\SCI-025-V1\Data Management\
DataManagement.DOC	38,400	11/17/2000	2:11 AM	D:\SCI-025-V1\Data Management\
FileSigProcedure.DOC	51,200	11/17/2000	2:15 AM	D:\SCI-025-V1\Data Management\
Ps.exe	208,138	12/5/1991	5:32 AM	D:\SCI-025-V1\Analysis\
PsigGen.exe	439,296	11/17/2000	2:15 AM	D:\SCI-025-V1\Data Management\
Pslog.exe	345,110	1/23/1993	2:50 AM	D:\SCI-025-V1\Analysis\
Pslog.ini	154	8/29/1997	1:34 AM	D:\SCI-025-V1\Analysis\
Pslog.PIF	967	9/17/2001	3:22 AM	D:\SCI-025-V1\Analysis\
Raw Data Diskettes	0	1/5/2006	9:28 AM	D:\SCI-025-V1\
Readme.doc	26,112	1/23/2002	4:04 AM	D:\SCI-025-V1\
Results	0	1/5/2006	9:28 AM	D:\SCI-025-V1\
RF#13D 001-099.log	6,373	1/31/2001	4:22 AM	D:\SCI-025-V1\Data Management\
RF#17D 001-100.log	7,651	1/31/2001	4:22 AM	D:\SCI-025-V1\Data Management\
RF#17D 101-141.log	3,223	1/31/2001	4:23 AM	D:\SCI-025-V1\Data Management\
Rf13	0	1/5/2006	9:28 AM	D:\SCI-025-V1\Analysis\
RF13 DOWNHOLE LOG PROCESSING FORM.xls	61,440	1/18/2001	6:17 AM	D:\SCI-025-V1\Analysis\RF13\
Rf13_001-071_088-099	0	1/5/2006	9:28 AM	D:\SCI-025-V1\Raw Data Diskettes\
RF13_001-071_088-099.log	6,372	1/17/2001	5:31 AM	D:\SCI-025-V1\Data Management_wSigCmp Logs\
RF13_001-071_088-099.sig	5,474	1/12/2001	1:42 AM	D:\SCI-025-V1\Raw Data Diskettes\RF13_001-071_088-099\
RF13DOWN BREAKS.sig	281	1/18/2001	11:45 PM	D:\SCI-025-V1\Results\
RF13DOWN BREAKS.xls	218,112	1/18/2001	5:45 AM	D:\SCI-025-V1\Analysis\RF13\
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RF13DOWN PEAKS.sig	279	1/18/2001	11:45 PM	D:\SCI-025-V1\Results\
RF13DOWN PEAKS.xls	218,112	1/18/2001	6:10 AM	D:\SCI-025-V1\Analysis\RF13\
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Rf13dwn1.sps	8,980	1/18/2001	5:22 AM	D:\SCI-025-V1\Analysis\RF13\
Rf13dwn2.sps	8,980	1/18/2001	6:10 AM	D:\SCI-025-V1\Analysis\RF13\
Rf17	0	1/5/2006	9:28 AM	D:\SCI-025-V1\Analysis\
RF17 DOWNHOLE - PEAKS.sig	293	1/16/2001	8:16 AM	D:\SCI-025-V1\Results\
RF17 DOWNHOLE - PEAKS.xls	254,976	1/18/2001	12:45 AM	D:\SCI-025-V1\Results\
RF17 DOWNHOLE LOG PROCESSING FORM.xls	69,120	1/16/2001	3:53 AM	D:\SCI-025-V1\Analysis\RF17\
RF17_001-100 dh	0	1/5/2006	9:28 AM	D:\SCI-025-V1\Raw Data Diskettes\
RF17_001-100 dh.log	7,650	1/17/2001	5:56 AM	D:\SCI-025-V1\Data Management_wSigCmp Logs\
RF17_001-100 dh.sig	6,562	1/12/2001	1:29 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_001-100 dh\
RF17_101-141 dh	0	1/5/2006	9:28 AM	D:\SCI-025-V1\Raw Data Diskettes\
RF17_101-141 dh.log	3,222	1/17/2001	5:56 AM	D:\SCI-025-V1\Data Management_wSigCmp Logs\
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RF17DOWN PEAKS.xls	254,976	1/16/2001	3:46 AM	D:\SCI-025-V1\Analysis\RF17\
RF17DOWNHOLE - BREAKS.sig	293	1/16/2001	8:16 AM	D:\SCI-025-V1\Results\

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Rf17dwn2.sps	14,694	1/16/2001	3:41 AM	D:\SCI-025-V1\Analysis\RF17\
Root.md5	141,186	1/5/2006	9:28 AM	D:\
Sample.lnk	1,425	10/3/1991	2:38 AM	D:\SCI-025-V1\Analysis\
Sample.mdl	645	11/29/1991	2:41 PM	D:\SCI-025-V1\Analysis\
Sample.uht	1,919	10/3/1991	2:38 AM	D:\SCI-025-V1\Analysis\
Sci-025-v1	0	1/5/2006	9:28 AM	D:\
Selectp.exe	57,560	9/22/1991	1:47 AM	D:\SCI-025-V1\Analysis\
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Suspe001.org	13,312	12/8/2000	5:03 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe001.org	13,312	12/9/2000	5:12 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe001.org	13,312	12/8/2000	5:03 AM	D:\SCI-025-V1\Raw Data Diskettes\RF13_001-071_088-099\
Suspe001.org	13,312	12/9/2000	5:12 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_001-100 dh\
Suspe002.flt	13,312	1/18/2001	5:08 AM	D:\SCI-025-V1\Analysis\RF13\
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Suspe002.org	13,312	12/9/2000	5:16 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe002.org	13,312	12/8/2000	5:06 AM	D:\SCI-025-V1\Raw Data Diskettes\RF13_001-071_088-099\
Suspe002.org	13,312	12/9/2000	5:16 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_001-100 dh\
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Suspe006.org	13,312	12/9/2000	5:29 AM	D:\SCI-025-V1\Analysis\RF17\
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Suspe007.org	13,312	12/9/2000	5:31 AM	D:\SCI-025-V1\Analysis\RF17\

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Suspe008.flt	13,312	1/15/2001	11:56 PM	D:\SCI-025-V1\Analysis\RF17\
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Suspe008.org	13,312	12/9/2000	5:35 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe008.org	13,312	12/8/2000	5:24 AM	D:\SCI-025-V1\Raw Data Diskettes\RF13_001-071_088-099\
Suspe008.org	13,312	12/9/2000	5:35 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_001-100 dh\
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Suspe009.flt	13,312	1/15/2001	11:56 PM	D:\SCI-025-V1\Analysis\RF17\
Suspe009.org	13,312	12/8/2000	5:27 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe009.org	13,312	12/9/2000	5:39 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe009.org	13,312	12/8/2000	5:27 AM	D:\SCI-025-V1\Raw Data Diskettes\RF13_001-071_088-099\
Suspe009.org	13,312	12/9/2000	5:39 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_001-100 dh\
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Suspe010.flt	13,312	1/15/2001	11:56 PM	D:\SCI-025-V1\Analysis\RF17\
Suspe010.org	13,312	12/8/2000	5:31 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe010.org	13,312	12/9/2000	5:40 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe010.org	13,312	12/8/2000	5:31 AM	D:\SCI-025-V1\Raw Data Diskettes\RF13_001-071_088-099\
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Suspe011.org	13,312	12/9/2000	5:42 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe011.org	13,312	12/8/2000	5:37 AM	D:\SCI-025-V1\Raw Data Diskettes\RF13_001-071_088-099\
Suspe011.org	13,312	12/9/2000	5:42 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_001-100 dh\
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Suspe012.flt	13,312	1/15/2001	11:56 PM	D:\SCI-025-V1\Analysis\RF17\
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Suspe012.org	13,312	12/9/2000	5:44 AM	D:\SCI-025-V1\Analysis\RF17\
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Suspe014.org	13,312	12/8/2000	5:45 AM	D:\SCI-025-V1\Raw Data Diskettes\RF13_001-071_088-099\
Suspe014.org	13,312	12/9/2000	5:48 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_001-100 dh\

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Suspe015.org	13,312	12/9/2000	5:50 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe015.org	13,312	12/8/2000	5:48 AM	D:\SCI-025-V1\Raw Data Diskettes\RF13_001-071_088-099\
Suspe015.org	13,312	12/9/2000	5:50 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_001-100 dh\
Suspe016.flt	13,312	1/18/2001	5:11 AM	D:\SCI-025-V1\Analysis\RF13\
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Suspe017.org	13,312	12/8/2000	5:56 AM	D:\SCI-025-V1\Raw Data Diskettes\RF13_001-071_088-099\
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Suspe018.org	13,312	12/9/2000	5:55 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_001-100 dh\
Suspe019.flt	13,312	1/18/2001	5:11 AM	D:\SCI-025-V1\Analysis\RF13\
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Suspe020.org	13,312	12/9/2000	5:58 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_001-100 dh\
Suspe021.flt	13,312	1/18/2001	5:11 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe021.flt	13,312	1/15/2001	11:58 PM	D:\SCI-025-V1\Analysis\RF17\
Suspe021.org	13,312	12/8/2000	6:08 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe021.org	13,312	12/9/2000	6:00 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe021.org	13,312	12/8/2000	6:08 AM	D:\SCI-025-V1\Raw Data Diskettes\RF13_001-071_088-099\
Suspe021.org	13,312	12/9/2000	6:00 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_001-100 dh\
Suspe022.flt	13,312	1/18/2001	5:11 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe022.flt	13,312	1/15/2001	11:58 PM	D:\SCI-025-V1\Analysis\RF17\
Suspe022.org	13,312	12/8/2000	6:11 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe022.org	13,312	12/9/2000	6:01 AM	D:\SCI-025-V1\Analysis\RF17\

Suspe022.org	13,312	12/8/2000	6:11 AM	D:\SCI-025-V1\Raw Data Diskettes\RF13_001-071_088-099\
Suspe022.org	13,312	12/9/2000	6:01 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_001-100 dh\
Suspe023.flt	13,312	1/18/2001	5:11 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe023.flt	13,312	1/15/2001	11:58 PM	D:\SCI-025-V1\Analysis\RF17\
Suspe023.org	13,312	12/8/2000	6:14 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe023.org	13,312	12/9/2000	6:04 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe023.org	13,312	12/8/2000	6:14 AM	D:\SCI-025-V1\Raw Data Diskettes\RF13_001-071_088-099\
Suspe023.org	13,312	12/9/2000	6:04 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_001-100 dh\
Suspe024.flt	13,312	1/18/2001	5:12 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe024.flt	13,312	1/15/2001	11:58 PM	D:\SCI-025-V1\Analysis\RF17\
Suspe024.org	13,312	12/8/2000	6:16 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe024.org	13,312	12/9/2000	6:06 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe024.org	13,312	12/8/2000	6:16 AM	D:\SCI-025-V1\Raw Data Diskettes\RF13_001-071_088-099\
Suspe024.org	13,312	12/9/2000	6:06 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_001-100 dh\
Suspe025.flt	13,312	1/18/2001	5:12 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe025.flt	13,312	1/15/2001	11:59 PM	D:\SCI-025-V1\Analysis\RF17\
Suspe025.org	13,312	12/8/2000	6:19 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe025.org	13,312	12/9/2000	6:07 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe025.org	13,312	12/8/2000	6:19 AM	D:\SCI-025-V1\Raw Data Diskettes\RF13_001-071_088-099\
Suspe025.org	13,312	12/9/2000	6:07 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_001-100 dh\
Suspe026.flt	13,312	1/18/2001	5:12 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe026.flt	13,312	1/15/2001	11:59 PM	D:\SCI-025-V1\Analysis\RF17\
Suspe026.org	13,312	12/8/2000	6:22 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe026.org	13,312	12/9/2000	6:09 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe026.org	13,312	12/8/2000	6:22 AM	D:\SCI-025-V1\Raw Data Diskettes\RF13_001-071_088-099\
Suspe026.org	13,312	12/9/2000	6:09 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_001-100 dh\
Suspe027.flt	13,312	1/18/2001	5:12 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe027.flt	13,312	1/15/2001	11:59 PM	D:\SCI-025-V1\Analysis\RF17\
Suspe027.org	13,312	12/8/2000	6:24 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe027.org	13,312	12/9/2000	6:10 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe027.org	13,312	12/8/2000	6:24 AM	D:\SCI-025-V1\Raw Data Diskettes\RF13_001-071_088-099\
Suspe027.org	13,312	12/9/2000	6:10 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_001-100 dh\
Suspe028.flt	13,312	1/18/2001	5:12 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe028.flt	13,312	1/15/2001	11:59 PM	D:\SCI-025-V1\Analysis\RF17\
Suspe028.org	13,312	12/8/2000	6:26 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe028.org	13,312	12/9/2000	6:12 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe028.org	13,312	12/8/2000	6:26 AM	D:\SCI-025-V1\Raw Data Diskettes\RF13_001-071_088-099\
Suspe028.org	13,312	12/9/2000	6:12 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_001-100 dh\
Suspe029.flt	13,312	1/18/2001	5:12 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe029.flt	13,312	1/15/2001	11:59 PM	D:\SCI-025-V1\Analysis\RF17\
Suspe029.org	13,312	12/8/2000	6:28 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe029.org	13,312	12/9/2000	6:15 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe029.org	13,312	12/8/2000	6:28 AM	D:\SCI-025-V1\Raw Data Diskettes\RF13_001-071_088-099\
Suspe029.org	13,312	12/9/2000	6:15 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_001-100 dh\

Suspe030.flt	13,312	1/18/2001	5:12 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe030.flt	13,312	1/15/2001	11:59 PM	D:\SCI-025-V1\Analysis\RF17\
Suspe030.org	13,312	12/8/2000	6:30 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe030.org	13,312	12/9/2000	6:17 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe030.org	13,312	12/8/2000	6:30 AM	D:\SCI-025-V1\Raw Data Diskettes\RF13_001-071_088-099\
Suspe030.org	13,312	12/9/2000	6:17 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_001-100 dh\
Suspe031.flt	13,312	1/18/2001	5:12 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe031.flt	13,312	1/15/2001	11:59 PM	D:\SCI-025-V1\Analysis\RF17\
Suspe031.org	13,312	12/8/2000	6:32 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe031.org	13,312	12/9/2000	6:19 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe031.org	13,312	12/8/2000	6:32 AM	D:\SCI-025-V1\Raw Data Diskettes\RF13_001-071_088-099\
Suspe031.org	13,312	12/9/2000	6:19 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_001-100 dh\
Suspe032.flt	13,312	1/18/2001	5:12 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe032.flt	13,312	1/15/2001	11:59 PM	D:\SCI-025-V1\Analysis\RF17\
Suspe032.org	13,312	12/8/2000	6:34 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe032.org	13,312	12/9/2000	6:21 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe032.org	13,312	12/8/2000	6:34 AM	D:\SCI-025-V1\Raw Data Diskettes\RF13_001-071_088-099\
Suspe032.org	13,312	12/9/2000	6:21 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_001-100 dh\
Suspe033.flt	13,312	1/18/2001	5:12 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe033.flt	13,312	1/15/2001	11:59 PM	D:\SCI-025-V1\Analysis\RF17\
Suspe033.org	13,312	12/8/2000	6:36 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe033.org	13,312	12/9/2000	6:23 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe033.org	13,312	12/8/2000	6:36 AM	D:\SCI-025-V1\Raw Data Diskettes\RF13_001-071_088-099\
Suspe033.org	13,312	12/9/2000	6:23 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_001-100 dh\
Suspe034.flt	13,312	1/18/2001	5:12 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe034.flt	13,312	1/15/2001	11:59 PM	D:\SCI-025-V1\Analysis\RF17\
Suspe034.org	13,312	12/8/2000	6:38 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe034.org	13,312	12/9/2000	6:24 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe034.org	13,312	12/8/2000	6:38 AM	D:\SCI-025-V1\Raw Data Diskettes\RF13_001-071_088-099\
Suspe034.org	13,312	12/9/2000	6:24 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_001-100 dh\
Suspe035.flt	13,312	1/18/2001	5:12 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe035.flt	13,312	1/15/2001	11:59 PM	D:\SCI-025-V1\Analysis\RF17\
Suspe035.org	13,312	12/8/2000	6:40 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe035.org	13,312	12/9/2000	6:26 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe035.org	13,312	12/8/2000	6:40 AM	D:\SCI-025-V1\Raw Data Diskettes\RF13_001-071_088-099\
Suspe035.org	13,312	12/9/2000	6:26 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_001-100 dh\
Suspe036.flt	13,312	1/18/2001	5:12 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe036.flt	13,312	1/15/2001	11:59 PM	D:\SCI-025-V1\Analysis\RF17\
Suspe036.org	13,312	12/8/2000	6:43 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe036.org	13,312	12/9/2000	6:28 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe036.org	13,312	12/8/2000	6:43 AM	D:\SCI-025-V1\Raw Data Diskettes\RF13_001-071_088-099\
Suspe036.org	13,312	12/9/2000	6:28 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_001-100 dh\
Suspe037.flt	13,312	1/18/2001	5:13 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe037.flt	13,312	1/15/2001	11:59 PM	D:\SCI-025-V1\Analysis\RF17\
Suspe037.org	13,312	12/8/2000	6:45 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe037.org	13,312	12/9/2000	6:30 AM	D:\SCI-025-V1\Analysis\RF17\

Suspe037.org	13,312	12/8/2000	6:45 AM	D:\SCI-025-V1\Raw Data Diskettes\RF13_001-071_088-099\
Suspe037.org	13,312	12/9/2000	6:30 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_001-100 dh\
Suspe038.flt	13,312	1/18/2001	5:13 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe038.flt	13,312	1/16/2001	12:00 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe038.org	13,312	12/8/2000	6:47 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe038.org	13,312	12/9/2000	6:32 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe038.org	13,312	12/8/2000	6:47 AM	D:\SCI-025-V1\Raw Data Diskettes\RF13_001-071_088-099\
Suspe038.org	13,312	12/9/2000	6:32 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_001-100 dh\
Suspe039.flt	13,312	1/18/2001	5:13 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe039.flt	13,312	1/16/2001	12:00 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe039.org	13,312	12/8/2000	6:49 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe039.org	13,312	12/9/2000	6:33 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe039.org	13,312	12/8/2000	6:49 AM	D:\SCI-025-V1\Raw Data Diskettes\RF13_001-071_088-099\
Suspe039.org	13,312	12/9/2000	6:33 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_001-100 dh\
Suspe040.flt	13,312	1/18/2001	5:13 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe040.flt	13,312	1/16/2001	12:00 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe040.org	13,312	12/8/2000	6:51 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe040.org	13,312	12/9/2000	6:38 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe040.org	13,312	12/8/2000	6:51 AM	D:\SCI-025-V1\Raw Data Diskettes\RF13_001-071_088-099\
Suspe040.org	13,312	12/9/2000	6:38 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_001-100 dh\
Suspe041.flt	13,312	1/18/2001	5:13 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe041.flt	13,312	1/16/2001	12:00 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe041.org	13,312	12/8/2000	6:53 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe041.org	13,312	12/9/2000	6:40 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe041.org	13,312	12/8/2000	6:53 AM	D:\SCI-025-V1\Raw Data Diskettes\RF13_001-071_088-099\
Suspe041.org	13,312	12/9/2000	6:40 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_001-100 dh\
Suspe042.flt	13,312	1/18/2001	5:13 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe042.flt	13,312	1/16/2001	12:00 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe042.org	13,312	12/8/2000	6:55 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe042.org	13,312	12/9/2000	6:41 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe042.org	13,312	12/8/2000	6:55 AM	D:\SCI-025-V1\Raw Data Diskettes\RF13_001-071_088-099\
Suspe042.org	13,312	12/9/2000	6:41 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_001-100 dh\
Suspe043.flt	13,312	1/18/2001	5:13 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe043.flt	13,312	1/16/2001	12:00 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe043.org	13,312	12/8/2000	6:57 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe043.org	13,312	12/9/2000	6:43 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe043.org	13,312	12/8/2000	6:57 AM	D:\SCI-025-V1\Raw Data Diskettes\RF13_001-071_088-099\
Suspe043.org	13,312	12/9/2000	6:43 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_001-100 dh\
Suspe044.flt	13,312	1/18/2001	5:13 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe044.flt	13,312	1/16/2001	12:00 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe044.org	13,312	12/8/2000	6:59 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe044.org	13,312	12/9/2000	6:45 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe044.org	13,312	12/8/2000	6:59 AM	D:\SCI-025-V1\Raw Data Diskettes\RF13_001-071_088-099\
Suspe044.org	13,312	12/9/2000	6:45 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_001-100 dh\

Suspe045.flt	13,312	1/18/2001	5:13 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe045.flt	13,312	1/16/2001	12:00 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe045.org	13,312	12/8/2000	7:01 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe045.org	13,312	12/9/2000	6:46 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe045.org	13,312	12/8/2000	7:01 AM	D:\SCI-025-V1\Raw Data Diskettes\RF13_001-071_088-099\
Suspe045.org	13,312	12/9/2000	6:46 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_001-100 dh\
Suspe046.flt	13,312	1/18/2001	5:13 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe046.flt	13,312	1/16/2001	12:00 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe046.org	13,312	12/8/2000	7:04 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe046.org	13,312	12/9/2000	6:48 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe046.org	13,312	12/8/2000	7:04 AM	D:\SCI-025-V1\Raw Data Diskettes\RF13_001-071_088-099\
Suspe046.org	13,312	12/9/2000	6:48 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_001-100 dh\
Suspe047.flt	13,312	1/18/2001	5:13 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe047.flt	13,312	1/16/2001	12:00 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe047.org	13,312	12/8/2000	7:06 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe047.org	13,312	12/9/2000	6:50 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe047.org	13,312	12/8/2000	7:06 AM	D:\SCI-025-V1\Raw Data Diskettes\RF13_001-071_088-099\
Suspe047.org	13,312	12/9/2000	6:50 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_001-100 dh\
Suspe048.flt	13,312	1/18/2001	5:13 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe048.flt	13,312	1/16/2001	12:00 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe048.org	13,312	12/8/2000	7:09 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe048.org	13,312	12/9/2000	6:52 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe048.org	13,312	12/8/2000	7:09 AM	D:\SCI-025-V1\Raw Data Diskettes\RF13_001-071_088-099\
Suspe048.org	13,312	12/9/2000	6:52 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_001-100 dh\
Suspe049.flt	13,312	1/18/2001	5:13 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe049.flt	13,312	1/16/2001	12:00 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe049.org	13,312	12/8/2000	7:17 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe049.org	13,312	12/9/2000	6:54 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe049.org	13,312	12/8/2000	7:17 AM	D:\SCI-025-V1\Raw Data Diskettes\RF13_001-071_088-099\
Suspe049.org	13,312	12/9/2000	6:54 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_001-100 dh\
Suspe050.flt	13,312	1/18/2001	5:14 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe050.flt	13,312	1/16/2001	12:01 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe050.org	13,312	12/8/2000	7:19 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe050.org	13,312	12/9/2000	6:56 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe050.org	13,312	12/8/2000	7:19 AM	D:\SCI-025-V1\Raw Data Diskettes\RF13_001-071_088-099\
Suspe050.org	13,312	12/9/2000	6:56 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_001-100 dh\
Suspe051.flt	13,312	1/18/2001	5:14 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe051.flt	13,312	1/16/2001	12:01 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe051.org	13,312	12/8/2000	7:21 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe051.org	13,312	12/9/2000	6:58 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe051.org	13,312	12/8/2000	7:21 AM	D:\SCI-025-V1\Raw Data Diskettes\RF13_001-071_088-099\
Suspe051.org	13,312	12/9/2000	6:58 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_001-100 dh\
Suspe052.flt	13,312	1/18/2001	5:14 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe052.flt	13,312	1/16/2001	12:01 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe052.org	13,312	12/8/2000	7:23 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe052.org	13,312	12/9/2000	7:00 AM	D:\SCI-025-V1\Analysis\RF17\

Suspe052.org	13,312	12/8/2000	7:23 AM	D:\SCI-025-V1\Raw Data Diskettes\RF13_001-071_088-099\
Suspe052.org	13,312	12/9/2000	7:00 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_001-100 dh\
Suspe053.flt	13,312	1/18/2001	5:14 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe053.flt	13,312	1/16/2001	12:01 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe053.org	13,312	12/8/2000	7:26 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe053.org	13,312	12/9/2000	7:02 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe053.org	13,312	12/8/2000	7:26 AM	D:\SCI-025-V1\Raw Data Diskettes\RF13_001-071_088-099\
Suspe053.org	13,312	12/9/2000	7:02 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_001-100 dh\
Suspe054.flt	13,312	1/18/2001	5:14 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe054.flt	13,312	1/16/2001	12:01 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe054.org	13,312	12/8/2000	7:30 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe054.org	13,312	12/9/2000	7:03 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe054.org	13,312	12/8/2000	7:30 AM	D:\SCI-025-V1\Raw Data Diskettes\RF13_001-071_088-099\
Suspe054.org	13,312	12/9/2000	7:03 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_001-100 dh\
Suspe055.flt	13,312	1/18/2001	5:14 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe055.flt	13,312	12/18/2000	12:48 PM	D:\SCI-025-V1\Analysis\RF17\
Suspe055.org	13,312	12/8/2000	7:32 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe055.org	13,312	12/9/2000	7:06 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe055.org	13,312	12/8/2000	7:32 AM	D:\SCI-025-V1\Raw Data Diskettes\RF13_001-071_088-099\
Suspe055.org	13,312	12/9/2000	7:06 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_001-100 dh\
Suspe056.flt	13,312	1/18/2001	5:14 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe056.flt	13,312	1/16/2001	12:02 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe056.org	13,312	12/8/2000	7:33 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe056.org	13,312	12/9/2000	7:07 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe056.org	13,312	12/8/2000	7:33 AM	D:\SCI-025-V1\Raw Data Diskettes\RF13_001-071_088-099\
Suspe056.org	13,312	12/9/2000	7:07 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_001-100 dh\
Suspe057.flt	13,312	1/18/2001	5:14 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe057.flt	13,312	1/16/2001	12:02 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe057.org	13,312	12/8/2000	7:36 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe057.org	13,312	12/9/2000	7:09 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe057.org	13,312	12/8/2000	7:36 AM	D:\SCI-025-V1\Raw Data Diskettes\RF13_001-071_088-099\
Suspe057.org	13,312	12/9/2000	7:09 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_001-100 dh\
Suspe058.flt	13,312	1/18/2001	5:14 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe058.flt	13,312	1/16/2001	12:02 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe058.org	13,312	12/8/2000	7:38 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe058.org	13,312	12/9/2000	7:12 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe058.org	13,312	12/8/2000	7:38 AM	D:\SCI-025-V1\Raw Data Diskettes\RF13_001-071_088-099\
Suspe058.org	13,312	12/9/2000	7:12 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_001-100 dh\
Suspe059.flt	13,312	1/18/2001	5:14 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe059.org	13,312	12/8/2000	7:40 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe059.org	13,312	12/11/2000	12:54 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe059.org	13,312	12/8/2000	7:40 AM	D:\SCI-025-V1\Raw Data Diskettes\RF13_001-071_088-099\
Suspe059.org	13,312	12/11/2000	12:54 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_001-100 dh\
Suspe060.flt	13,312	1/18/2001	5:15 AM	D:\SCI-025-V1\Analysis\RF13\

Suspe060.flt	13,312	1/16/2001	12:02 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe060.org	13,312	12/8/2000	7:43 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe060.org	13,312	12/11/2000	12:57 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe060.org	13,312	12/8/2000	7:43 AM	D:\SCI-025-V1\Raw Data Diskettes\RF13_001-071_088-099\
Suspe060.org	13,312	12/11/2000	12:57 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_001-100 dh\
Suspe061.flt	13,312	1/18/2001	5:16 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe061.flt	13,312	1/16/2001	12:02 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe061.org	13,312	12/8/2000	7:46 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe061.org	13,312	12/11/2000	1:00 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe061.org	13,312	12/8/2000	7:46 AM	D:\SCI-025-V1\Raw Data Diskettes\RF13_001-071_088-099\
Suspe061.org	13,312	12/11/2000	1:00 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_001-100 dh\
Suspe062.flt	13,312	1/18/2001	5:16 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe062.flt	13,312	1/16/2001	12:02 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe062.org	13,312	12/8/2000	7:48 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe062.org	13,312	12/11/2000	1:04 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe062.org	13,312	12/8/2000	7:48 AM	D:\SCI-025-V1\Raw Data Diskettes\RF13_001-071_088-099\
Suspe062.org	13,312	12/11/2000	1:04 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_001-100 dh\
Suspe063.flt	13,312	1/18/2001	5:16 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe063.flt	13,312	1/16/2001	12:03 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe063.org	13,312	12/8/2000	7:59 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe063.org	13,312	12/11/2000	1:06 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe063.org	13,312	12/8/2000	7:59 AM	D:\SCI-025-V1\Raw Data Diskettes\RF13_001-071_088-099\
Suspe063.org	13,312	12/11/2000	1:06 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_001-100 dh\
Suspe064.flt	13,312	1/18/2001	5:16 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe064.flt	13,312	1/16/2001	12:03 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe064.org	13,312	12/8/2000	8:02 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe064.org	13,312	12/11/2000	1:08 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe064.org	13,312	12/8/2000	8:02 AM	D:\SCI-025-V1\Raw Data Diskettes\RF13_001-071_088-099\
Suspe064.org	13,312	12/11/2000	1:08 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_001-100 dh\
Suspe065.flt	13,312	1/18/2001	5:16 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe065.flt	13,312	1/16/2001	12:03 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe065.org	13,312	12/8/2000	8:04 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe065.org	13,312	12/11/2000	1:11 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe065.org	13,312	12/8/2000	8:04 AM	D:\SCI-025-V1\Raw Data Diskettes\RF13_001-071_088-099\
Suspe065.org	13,312	12/11/2000	1:11 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_001-100 dh\
Suspe066.flt	13,312	1/18/2001	5:16 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe066.flt	13,312	1/16/2001	12:03 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe066.org	13,312	12/8/2000	8:07 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe066.org	13,312	12/11/2000	1:13 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe066.org	13,312	12/8/2000	8:07 AM	D:\SCI-025-V1\Raw Data Diskettes\RF13_001-071_088-099\
Suspe066.org	13,312	12/11/2000	1:13 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_001-100 dh\
Suspe067.flt	13,312	1/18/2001	5:16 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe067.flt	13,312	1/16/2001	12:03 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe067.org	13,312	12/8/2000	8:10 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe067.org	13,312	12/11/2000	1:15 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe067.org	13,312	12/8/2000	8:10 AM	D:\SCI-025-V1\Raw Data

				Diskettes\RF13_001-071_088-099\
Suspe067.org	13,312	12/11/2000	1:15 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_001-100 dh\
Suspe068.flt	13,312	1/18/2001	5:16 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe068.flt	13,312	1/16/2001	12:03 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe068.org	13,312	12/8/2000	8:12 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe068.org	13,312	12/11/2000	1:17 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe068.org	13,312	12/8/2000	8:12 AM	D:\SCI-025-V1\Raw Data Diskettes\RF13_001-071_088-099\
Suspe068.org	13,312	12/11/2000	1:17 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_001-100 dh\
Suspe069.flt	13,312	1/18/2001	5:16 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe069.flt	13,312	1/16/2001	12:03 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe069.org	13,312	12/8/2000	8:14 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe069.org	13,312	12/11/2000	1:19 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe069.org	13,312	12/8/2000	8:14 AM	D:\SCI-025-V1\Raw Data Diskettes\RF13_001-071_088-099\
Suspe069.org	13,312	12/11/2000	1:19 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_001-100 dh\
Suspe070.flt	13,312	1/16/2001	12:03 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe070.org	13,312	12/9/2000	12:29 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe070.org	13,312	12/11/2000	1:21 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe070.org	13,312	12/9/2000	12:29 AM	D:\SCI-025-V1\Raw Data Diskettes\RF13_001-071_088-099\
Suspe070.org	13,312	12/11/2000	1:21 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_001-100 dh\
Suspe071.flt	13,312	1/18/2001	5:17 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe071.flt	13,312	1/16/2001	12:03 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe071.org	13,312	12/9/2000	12:36 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe071.org	13,312	12/11/2000	1:23 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe071.org	13,312	12/9/2000	12:36 AM	D:\SCI-025-V1\Raw Data Diskettes\RF13_001-071_088-099\
Suspe071.org	13,312	12/11/2000	1:23 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_001-100 dh\
Suspe072.flt	13,312	1/16/2001	12:03 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe072.org	13,312	12/11/2000	1:25 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe072.org	13,312	12/11/2000	1:25 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_001-100 dh\
Suspe073.flt	13,312	1/16/2001	12:03 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe073.org	13,312	12/11/2000	1:28 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe073.org	13,312	12/11/2000	1:28 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_001-100 dh\
Suspe074.flt	13,312	1/16/2001	12:03 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe074.org	13,312	12/11/2000	1:29 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe074.org	13,312	12/11/2000	1:29 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_001-100 dh\
Suspe075.flt	13,312	1/16/2001	12:04 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe075.org	13,312	12/11/2000	1:32 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe075.org	13,312	12/11/2000	1:32 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_001-100 dh\
Suspe076.flt	13,312	1/16/2001	12:04 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe076.org	13,312	12/11/2000	1:34 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe076.org	13,312	12/11/2000	1:34 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_001-100 dh\
Suspe077.flt	13,312	1/16/2001	12:04 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe077.org	13,312	12/11/2000	1:38 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe077.org	13,312	12/11/2000	1:38 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_001-100 dh\
Suspe078.flt	13,312	1/16/2001	12:04 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe078.org	13,312	12/11/2000	1:40 AM	D:\SCI-025-V1\Analysis\RF17\

Suspe078.org	13,312	12/11/2000	1:40 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_001-100 dh\
Suspe079.flt	13,312	1/16/2001	12:04 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe079.org	13,312	12/11/2000	1:42 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe079.org	13,312	12/11/2000	1:42 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_001-100 dh\
Suspe080.flt	13,312	1/16/2001	12:04 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe080.org	13,312	12/11/2000	1:45 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe080.org	13,312	12/11/2000	1:45 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_001-100 dh\
Suspe081.flt	13,312	1/16/2001	12:04 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe081.org	13,312	12/11/2000	1:47 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe081.org	13,312	12/11/2000	1:47 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_001-100 dh\
Suspe082.flt	13,312	1/16/2001	12:04 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe082.org	13,312	12/11/2000	1:49 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe082.org	13,312	12/11/2000	1:49 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_001-100 dh\
Suspe083.flt	13,312	1/16/2001	12:04 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe083.org	13,312	12/11/2000	1:50 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe083.org	13,312	12/11/2000	1:50 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_001-100 dh\
Suspe084.flt	13,312	1/16/2001	12:04 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe084.org	13,312	12/11/2000	1:52 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe084.org	13,312	12/11/2000	1:52 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_001-100 dh\
Suspe085.flt	13,312	1/16/2001	12:04 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe085.org	13,312	12/11/2000	1:55 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe085.org	13,312	12/11/2000	1:55 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_001-100 dh\
Suspe086.flt	13,312	1/16/2001	12:04 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe086.org	13,312	12/11/2000	1:57 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe086.org	13,312	12/11/2000	1:57 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_001-100 dh\
Suspe087.flt	13,312	1/16/2001	12:04 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe087.org	13,312	12/11/2000	2:00 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe087.org	13,312	12/11/2000	2:00 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_001-100 dh\
Suspe088.flt	13,312	1/18/2001	5:17 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe088.flt	13,312	1/16/2001	12:04 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe088.org	13,312	12/9/2000	12:40 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe088.org	13,312	12/11/2000	2:02 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe088.org	13,312	12/9/2000	12:40 AM	D:\SCI-025-V1\Raw Data Diskettes\RF13_001-071_088-099\
Suspe088.org	13,312	12/11/2000	2:02 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_001-100 dh\
Suspe089.flt	13,312	1/18/2001	5:17 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe089.flt	13,312	1/16/2001	12:04 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe089.org	13,312	12/9/2000	12:43 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe089.org	13,312	12/11/2000	2:04 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe089.org	13,312	12/9/2000	12:43 AM	D:\SCI-025-V1\Raw Data Diskettes\RF13_001-071_088-099\
Suspe089.org	13,312	12/11/2000	2:04 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_001-100 dh\
Suspe090.flt	13,312	1/18/2001	5:17 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe090.flt	13,312	1/16/2001	12:05 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe090.org	13,312	12/9/2000	12:47 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe090.org	13,312	12/11/2000	2:06 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe090.org	13,312	12/9/2000	12:47 AM	D:\SCI-025-V1\Raw Data Diskettes\RF13_001-071_088-099\

Suspe090.org	13,312	12/11/2000	2:06 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_001-100 dh\
Suspe091.flt	13,312	1/18/2001	5:17 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe091.flt	13,312	1/16/2001	12:05 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe091.org	13,312	12/9/2000	12:49 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe091.org	13,312	12/11/2000	2:09 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe091.org	13,312	12/9/2000	12:49 AM	D:\SCI-025-V1\Raw Data Diskettes\RF13_001-071_088-099\
Suspe091.org	13,312	12/11/2000	2:09 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_001-100 dh\
Suspe092.flt	13,312	1/18/2001	5:17 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe092.flt	13,312	1/16/2001	12:05 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe092.org	13,312	12/9/2000	12:52 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe092.org	13,312	12/11/2000	2:12 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe092.org	13,312	12/9/2000	12:52 AM	D:\SCI-025-V1\Raw Data Diskettes\RF13_001-071_088-099\
Suspe092.org	13,312	12/11/2000	2:12 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_001-100 dh\
Suspe093.flt	13,312	1/18/2001	5:17 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe093.flt	13,312	1/16/2001	12:05 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe093.org	13,312	12/9/2000	12:55 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe093.org	13,312	12/11/2000	2:14 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe093.org	13,312	12/9/2000	12:55 AM	D:\SCI-025-V1\Raw Data Diskettes\RF13_001-071_088-099\
Suspe093.org	13,312	12/11/2000	2:14 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_001-100 dh\
Suspe094.flt	13,312	1/18/2001	5:17 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe094.flt	13,312	1/16/2001	12:05 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe094.org	13,312	12/9/2000	12:57 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe094.org	13,312	12/11/2000	2:16 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe094.org	13,312	12/9/2000	12:57 AM	D:\SCI-025-V1\Raw Data Diskettes\RF13_001-071_088-099\
Suspe094.org	13,312	12/11/2000	2:16 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_001-100 dh\
Suspe095.flt	13,312	1/18/2001	5:17 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe095.flt	13,312	1/16/2001	12:05 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe095.org	13,312	12/9/2000	1:00 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe095.org	13,312	12/11/2000	2:18 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe095.org	13,312	12/9/2000	1:00 AM	D:\SCI-025-V1\Raw Data Diskettes\RF13_001-071_088-099\
Suspe095.org	13,312	12/11/2000	2:18 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_001-100 dh\
Suspe096.flt	13,312	1/18/2001	5:17 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe096.flt	13,312	1/16/2001	12:05 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe096.org	13,312	12/9/2000	1:03 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe096.org	13,312	12/11/2000	2:32 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe096.org	13,312	12/9/2000	1:03 AM	D:\SCI-025-V1\Raw Data Diskettes\RF13_001-071_088-099\
Suspe096.org	13,312	12/11/2000	2:32 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_001-100 dh\
Suspe097.flt	13,312	1/18/2001	5:17 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe097.flt	13,312	1/16/2001	12:06 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe097.org	13,312	12/9/2000	1:07 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe097.org	13,312	12/11/2000	2:35 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe097.org	13,312	12/9/2000	1:07 AM	D:\SCI-025-V1\Raw Data Diskettes\RF13_001-071_088-099\
Suspe097.org	13,312	12/11/2000	2:35 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_001-100 dh\
Suspe098.flt	13,312	1/18/2001	5:17 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe098.flt	13,312	1/16/2001	12:06 AM	D:\SCI-025-V1\Analysis\RF17\

Suspe098.org	13,312	12/9/2000	1:11 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe098.org	13,312	12/11/2000	2:38 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe098.org	13,312	12/9/2000	1:11 AM	D:\SCI-025-V1\Raw Data Diskettes\RF13_001-071_088-099\
Suspe098.org	13,312	12/11/2000	2:38 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_001-100 dh\
Suspe099.flt	13,312	1/18/2001	5:17 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe099.flt	13,312	1/16/2001	12:06 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe099.org	13,312	12/9/2000	1:14 AM	D:\SCI-025-V1\Analysis\RF13\
Suspe099.org	13,312	12/11/2000	2:40 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe099.org	13,312	12/9/2000	1:14 AM	D:\SCI-025-V1\Raw Data Diskettes\RF13_001-071_088-099\
Suspe099.org	13,312	12/11/2000	2:40 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_001-100 dh\
Suspe100.flt	13,312	1/16/2001	12:06 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe100.org	13,312	12/11/2000	2:43 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe100.org	13,312	12/11/2000	2:43 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_001-100 dh\
Suspe101.flt	13,312	1/16/2001	12:06 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe101.org	13,312	12/11/2000	2:46 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe101.org	13,312	12/11/2000	2:46 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_101-141 dh\
Suspe102.flt	13,312	1/16/2001	12:06 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe102.org	13,312	12/11/2000	2:49 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe102.org	13,312	12/11/2000	2:49 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_101-141 dh\
Suspe103.flt	13,312	1/16/2001	12:06 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe103.org	13,312	12/11/2000	2:51 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe103.org	13,312	12/11/2000	2:51 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_101-141 dh\
Suspe104.flt	13,312	1/16/2001	12:06 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe104.org	13,312	12/11/2000	2:53 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe104.org	13,312	12/11/2000	2:53 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_101-141 dh\
Suspe105.flt	13,312	1/16/2001	12:06 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe105.org	13,312	12/11/2000	2:58 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe105.org	13,312	12/11/2000	2:58 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_101-141 dh\
Suspe106.flt	13,312	1/16/2001	12:06 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe106.org	13,312	12/11/2000	3:00 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe106.org	13,312	12/11/2000	3:00 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_101-141 dh\
Suspe107.org	13,312	12/11/2000	3:03 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe107.org	13,312	12/11/2000	3:03 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_101-141 dh\
Suspe108.flt	13,312	1/16/2001	12:06 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe108.org	13,312	12/11/2000	3:06 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe108.org	13,312	12/11/2000	3:06 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_101-141 dh\
Suspe109.flt	13,312	1/16/2001	12:06 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe109.org	13,312	12/11/2000	3:09 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe109.org	13,312	12/11/2000	3:09 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_101-141 dh\
Suspe110.flt	13,312	1/16/2001	12:06 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe110.org	13,312	12/11/2000	3:12 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe110.org	13,312	12/11/2000	3:12 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_101-141 dh\
Suspe111.flt	13,312	1/16/2001	12:06 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe111.org	13,312	12/11/2000	3:15 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe111.org	13,312	12/11/2000	3:15 AM	D:\SCI-025-V1\Raw Data

				Diskettes\RF17_101-141 dh\
Suspe112.flt	13,312	1/16/2001	12:07 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe112.org	13,312	12/11/2000	3:18 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe112.org	13,312	12/11/2000	3:18 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_101-141 dh\
Suspe113.flt	13,312	1/16/2001	12:07 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe113.org	13,312	12/11/2000	3:20 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe113.org	13,312	12/11/2000	3:20 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_101-141 dh\
Suspe114.flt	13,312	1/16/2001	12:07 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe114.org	13,312	12/11/2000	3:22 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe114.org	13,312	12/11/2000	3:22 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_101-141 dh\
Suspe115.flt	13,312	1/16/2001	12:07 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe115.org	13,312	12/11/2000	3:25 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe115.org	13,312	12/11/2000	3:25 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_101-141 dh\
Suspe116.flt	13,312	1/16/2001	12:07 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe116.org	13,312	12/11/2000	3:27 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe116.org	13,312	12/11/2000	3:27 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_101-141 dh\
Suspe117.flt	13,312	1/16/2001	12:07 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe117.org	13,312	12/11/2000	3:30 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe117.org	13,312	12/11/2000	3:30 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_101-141 dh\
Suspe118.flt	13,312	1/16/2001	12:07 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe118.org	13,312	12/11/2000	3:31 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe118.org	13,312	12/11/2000	3:31 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_101-141 dh\
Suspe119.flt	13,312	1/16/2001	12:07 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe119.org	13,312	12/11/2000	3:35 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe119.org	13,312	12/11/2000	3:35 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_101-141 dh\
Suspe120.flt	13,312	1/16/2001	12:07 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe120.org	13,312	12/11/2000	3:40 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe120.org	13,312	12/11/2000	3:40 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_101-141 dh\
Suspe121.org	13,312	12/11/2000	3:53 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe121.org	13,312	12/11/2000	3:53 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_101-141 dh\
Suspe122.flt	13,312	1/16/2001	12:07 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe122.org	13,312	12/11/2000	3:55 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe122.org	13,312	12/11/2000	3:55 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_101-141 dh\
Suspe123.flt	13,312	1/15/2001	7:18 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe123.org	13,312	12/11/2000	4:03 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe123.org	13,312	12/11/2000	4:03 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_101-141 dh\
Suspe124.flt	13,312	1/16/2001	12:07 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe124.org	13,312	12/11/2000	4:09 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe124.org	13,312	12/11/2000	4:09 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_101-141 dh\
Suspe125.flt	13,312	1/16/2001	12:08 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe125.org	13,312	12/11/2000	4:21 AM	D:\SCI-025-V1\Analysis\RF17\
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Suspe126.flt	13,312	1/16/2001	12:08 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe126.org	13,312	12/11/2000	4:26 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe126.org	13,312	12/11/2000	4:26 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_101-141 dh\

Suspe127.flt	13,312	1/16/2001	12:08 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe127.org	13,312	12/11/2000	4:31 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe127.org	13,312	12/11/2000	4:31 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_101-141 dh\
Suspe128.flt	13,312	1/16/2001	12:08 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe128.org	13,312	12/11/2000	4:36 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe128.org	13,312	12/11/2000	4:36 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_101-141 dh\
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Suspe129.org	13,312	12/11/2000	4:39 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe129.org	13,312	12/11/2000	4:39 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_101-141 dh\
Suspe130.flt	13,312	1/16/2001	12:08 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe130.org	13,312	12/11/2000	4:42 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe130.org	13,312	12/11/2000	4:42 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_101-141 dh\
Suspe131.flt	13,312	1/16/2001	12:08 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe131.org	13,312	12/11/2000	4:45 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe131.org	13,312	12/11/2000	4:45 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_101-141 dh\
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Suspe132.org	13,312	12/11/2000	4:48 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe132.org	13,312	12/11/2000	4:48 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_101-141 dh\
Suspe133.flt	13,312	1/16/2001	12:08 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe133.org	13,312	12/11/2000	4:52 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe133.org	13,312	12/11/2000	4:52 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_101-141 dh\
Suspe134.flt	13,312	1/16/2001	12:08 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe134.org	13,312	12/11/2000	4:56 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe134.org	13,312	12/11/2000	4:56 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_101-141 dh\
Suspe135.flt	13,312	1/16/2001	12:08 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe135.org	13,312	12/11/2000	4:59 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe135.org	13,312	12/11/2000	4:59 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_101-141 dh\
Suspe136.flt	13,312	1/16/2001	12:08 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe136.org	13,312	12/11/2000	5:02 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe136.org	13,312	12/11/2000	5:02 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_101-141 dh\
Suspe137.flt	13,312	1/16/2001	12:08 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe137.org	13,312	12/11/2000	5:08 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe137.org	13,312	12/11/2000	5:08 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_101-141 dh\
Suspe138.flt	13,312	1/16/2001	12:08 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe138.org	13,312	12/11/2000	5:11 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe138.org	13,312	12/11/2000	5:11 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_101-141 dh\
Suspe139.flt	13,312	1/16/2001	12:08 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe139.org	13,312	12/11/2000	5:14 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe139.org	13,312	12/11/2000	5:14 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_101-141 dh\
Suspe140.flt	13,312	1/16/2001	12:08 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe140.org	13,312	12/11/2000	5:16 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe140.org	13,312	12/11/2000	5:16 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_101-141 dh\
Suspe141.flt	13,312	1/16/2001	12:08 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe141.org	13,312	12/11/2000	5:19 AM	D:\SCI-025-V1\Analysis\RF17\
Suspe141.org	13,312	12/11/2000	5:19 AM	D:\SCI-025-V1\Raw Data Diskettes\RF17_101-141 dh\

wsigCmp.exe	496,640	11/17/2000	2:15 AM	D:\SCI-025-V1\Data Management\

* *Click on the accession # to view additional record information.*

Accession #	Type	Title *(1 to 1 of 1)*
MOL.20020228.0297	NOTEBOOK DATA	SCIENTIFIC NOTEBOOK SN-M&O-SCI-025-VI DOWNHOLE SEISMIC COMPONENT OF GEOTECHNICAL INVESTIGATION FOR A POTENTIAL WASTE HANDLING BUILDING, WITH ATTACHMENT 1 SUPPLEMENTAL DOCUMENT AND ATTACHMENT 2 SUMMARY DATA REPORT DOWNHOLE SEISMIC, THIS IS A CORRECTION TO AND REPLACEMENT OF MOL.20010926.0002 (C)

SN-M&O-SCI-025-V1 Supplemental Record 2 (MOL.20020228.0297)				
File Name	Size (Bytes)	Date Modified	Time Modified	Associated Directory
List of Files on Compact Disk	23,040	1/5/06	2:13 PM	D:\
Root.md5	2,094	1/5/2006	9:55 AM	D:\
SCI-025 Downhole Data Report .pdf	684,819	9/24/2001	3:37 AM	D:\SCI-025-V1 Summary Data Report\
SCI-025-V1 Summary Data Report	0	1/5/2006	9:56 AM	D:\
Word docs	0	1/5/2006	9:56 AM	D:\SCI-025-V1 Summary Data Report\
yuccacov.doc	97,792	9/24/2001	2:51 AM	D:\SCI-025-V1 Summary Data Report\Word docs\
yuccacov.pdf	136,433	9/24/2001	2:51 AM	D:\SCI-025-V1 Summary Data Report\Word docs\
yuccatoc.doc	47,616	9/24/2001	3:22 AM	D:\SCI-025-V1 Summary Data Report\Word docs\
yuccatoc.pdf	44,486	9/24/2001	3:22 AM	D:\SCI-025-V1 Summary Data Report\Word docs\
yuccattl.doc	25,600	9/24/2001	2:55 AM	D:\SCI-025-V1 Summary Data Report\Word docs\
yuccattl.pdf	43,939	9/24/2001	2:55 AM	D:\SCI-025-V1 Summary Data Report\Word docs\
yuccatxt.doc	982,528	9/24/2001	3:36 AM	D:\SCI-025-V1 Summary Data Report\Word docs\
yuccatxt.pdf	419,415	9/24/2001	3:36 AM	D:\SCI-025-V1 Summary Data Report\Word docs\