51.4-73

S

OCT 26 1998 ENGINEERING DATA TRANSMITTAL

Page 1 of 1

1. EDT 625688

2. To: (Receiving Organization)	3. From: (Originating Organization)	4. Related EDT No.:
W Root Hanford Tanks Initiative	Numatec Hanford Co., Project Definition	N/A
5. Proj./Prog./Dept./Div.:	**6. Design Authority/ Design Agent/Cog. Engr.:**	**7. Purchase Order No.:**
Waste Management	DF Iwatate	N/A
8. Originator Remarks:		**9. Equip./Component No.:**
Transmittal of document for information and release to HTI project files.		N/A
		10. System/Bldg./Facility: N/A
11. Receiver Remarks: 11A. Design Baseline Document? [ ] Yes [X] No		**12. Major Assm. Dwg. No.:** N/A
		13. Permit/Permit Application No.: N/A
		14. Required Response Date: N/A

15. DATA TRANSMITTED

(A) Item No.	(B) Document/Drawing No.	(C) Sheet No.	(D) Rev. No.	(E) Title or Description of Data Transmitted	(F) Approval Designator	(G) Reason for Transmittal	(H) Originator Disposition	(I) Receiver Disposition
1	HNF-3550, Rev. 0		0	Completion of HTI Characterization Milestone T04-98-523	N/A	2		

16. KEY

Approval Designator (F)	Reason for Transmittal (G)	Disposition (H) & (I)
E, S, Q, D or N/A (see WHC-CM-3-5, Sec.12.7)	1. Approval 2. Release 3. Information 4. Review 5. Post-Review 6. Dist. (Receipt Acknow. Required)	1. Approved 2. Approved w/comment 3. Disapproved w/comment 4. Reviewed no/comment 5. Reviewed w/comment 6. Receipt acknowledged

17. SIGNATURE/DISTRIBUTION
(See Approval Designator for required signatures)

(G) Reason	(H) Disp.	(J) Name (K) Signature (L) Date (M) MSIN	(G) Reason	(H) Disp.	(J) Name (K) Signature (L) Date (M) MSIN
2	1	DF Iwatate (HTI/CP Applications R2-89 DF Iwatate 10-23-98			
2	1	AF Noonan (HTI/Characterization) R2-89			

18. DF Iwatate Signature of EDT Originator / Date	19. Authorized Representative for Receiving Organization / Date	20. AF Noonan Cognizant Manager / Date 10/23/98	21. DOE APPROVAL (if required) Ctrl. No. [ ] Approved [ ] Approved w/comments [ ] Disapproved w/comments

BD-7400-172-2 (05/96) GEF097

Completion of Hanford Tanks Initiative Characterization Milestone T04-98-523

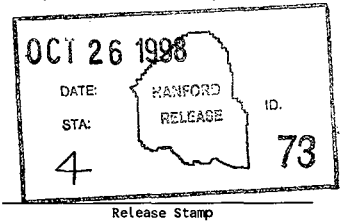
DF Iwatate
Numatec Hanford Company, Richland, WA 99352-1300
U.S. Department of Energy Contract DE-AC06-96RL13200

EDT/ECN: 625688 UC: 2030
Org Code: 73500 CACN: 103262 (CP Probe Deployment Prep)
B&R Code: EW3130010 Total Pages: 84

Key Words: Single-Shell Tanks, waste, leakage plume, cone penetrometer, CP, gamma, xray fluorescence, vadose zone, soil, soil sampling, AX-104, training, development testing

Abstract: The HTI subsurface characterization task will use the Hanford Cone Penetrometer platform (CPP) to deploy soil sensor and sampling probes into the vadose zone/soils around AX-104 during FY-99. This document provides copies of the first data collected from the HTI sensor probes during vendor field developmental tests performed at a cold test site in the Hanford 200 East area. Conduct of the initial test also established completion of a major contractor milestone of the HTI Characterization task (MS T04-98-523: Complete preparation of the HTICP probes and transfer to Hanford/HTI. Conduct an initial MSP push using the CPP).

(MS523rpt.CVR)



10/23/98
Release Approval Date

Release Stamp

Approved for Public Release

APPLIED RESEARCH ASSOCIATES, INC.
Engineering and Applied Science

September 28, 1998

Deborah Iwatate
Numatech Hanford
Richland, WA 99352-1300

Dear Deborah:

Subject: Contract No. MJG-SLB-A52807

Enclosed is a draft report documenting the data that we took during the penetration of the MSP to a depth of 25.5 feet on September 24th, 1998. This report contains printouts of the cone penetrometer profiles, the gamma and XRF spectrums as well as all the calibration and verification documents. Also included in the report is the test plan that was used to guide the penetration. Detailed analysis of the data has not been preformed at this time, but is currently on going. Please do not hesitate to contact me if you have any questions.

Sincerely,

Wesley L. Bratton, Ph.D, P.E.
Senior Engineer

Enclosure (1)

3250 PORT OF BENTON BLVD ■ RICHLAND, WA 99352
(509) 371-9600 ■ FAX (509) 371-9037

HANFORD TANK INITIATIVE CHARACTERIZATION TASK:
Subsurface Characterization Demonstration Using Cone Penetrometer

Completion of HTI Characterization DOE Milestone T04-98-523

Applied Research Associates, Inc.

Contract Number MJG-SLB-A52807

Work Element #3

1.0 INTRODUCTION

1.1 Purpose

On September 24, 1998, the initial penetration of the Hanford Multi-sensor Probe #1 was conducted at the ILAW area of 200 East on the Hanford Facility. The penetration was conducted to both perform development testing as well as satisfy the 9/25/98 DOE milestone. The penetration was conducted to a tip depth of 25.5 feet below grade. This report documents the data obtained during this penetration.

1.2 Report Outline

The report is broken down into a series of appendixes containing the various data collected during the penetration. A brief discussion of the testing sequence as well and the lessons learned is presented in Section 2 of the report. This section is followed by a series of appendices that contain the measured data.

Appendix A: contains profile plots of all the CPT data as a function of depth. These also include gross gamma information as well as profile plots of the regions of interest for both the gamma and XRF spectrums

Appendix B: contains printouts of the gamma spectrums at each of the measurement depths. These are the accumulated, temperature corrected spectrums. The individual raw spectrums (each only 30 seconds long) are not print here, but have been saved and exist electronically for future reference. There are over 200 of these files.

Appendix C contains the X-ray Fluorescence spectrums that were recorded during the penetration. Each spectrum was collected for 300 seconds of real time.

Appendix D contains the calibration plots for each sensor as well as the verification sheets to confirm the calibrations. The verifications were conducted on 9/23. The baseline values for the CPT sensors were noted both after verification of 9/23, prior to the penetration of 9/24 and then again after the penetration. This information is presented in table 1 of Appendix D.

Appendix E contains the test plan used to guide the testing. The penetration

depth was increased from 20 feet to 26 feet to permit the XRF sensor to reach a depth of 20 ft. Spectrum measurements were made every 1.5 feet to reduce the overall test time.

2.0 TEST SUMMARY

The testing was initiated on the afternoon of September 23, 1998 with verification of all the CPT sensors. All the sensors were verified, indicating the current calibrations were still correct. The gamma sensor was confirmed operational, cooled to approximately 24 C and energy calibration performed. Next, the X-ray sensor was checked. The check of the X-ray sensor indicated that the sensor was not responding. Additional testing the following morning indicated that the sensing element for the X-ray sensor had stopped functioning. The sensor element was replaced and the sensor returned to operating. The probe was again cooled and Gamma response set using and energy calibration. The X-ray system was also energy calibrated. The basely responses for the Cone sensors were noted to confirm they were still operational.

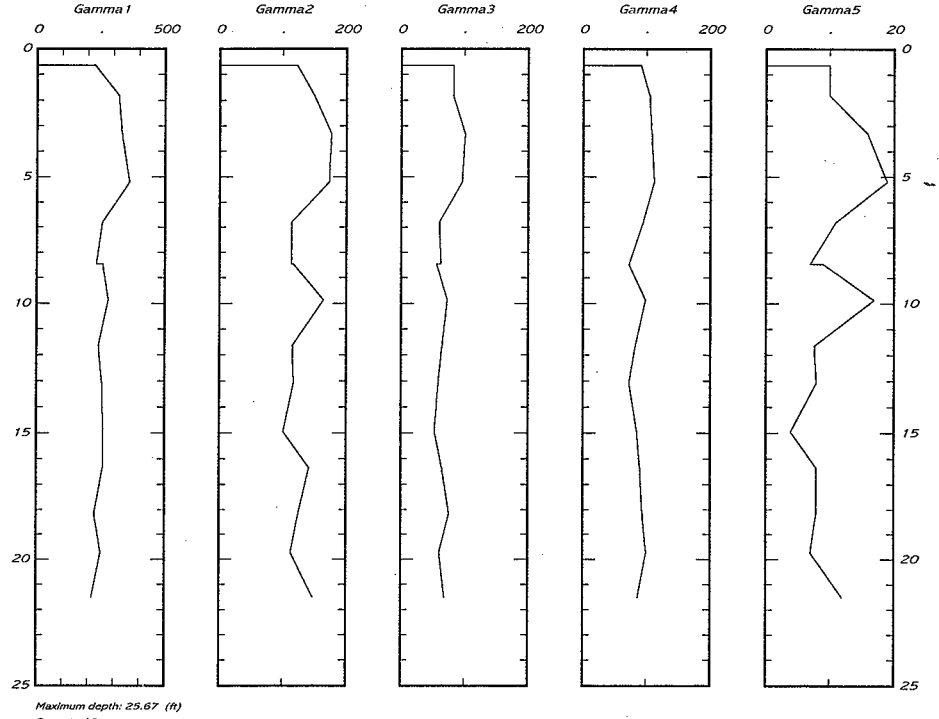
A penetration was started and once the second rod was added, the gamma and X-ray sensor stopped responding. This was identified as a connector problem on the umbilical and was rectified. The penetration was then restarted. The initial penetration started out several degrees off vertical and was stopped at 2 feet. An additional guide tube section was added to reduce the unsupported the length under the Platform. The push point was also moved back about three inches to align over the started hole. The penetration was then resumed.

The penetration continued under normal conditions to a depth of approximately 12 feet and then the X-ray sensor stopped operating. The probe was pushed an additional 1.5 feet and another spectrum collected. Again, the X-ray was not responding. A power reset was performed on the X-ray sensor and it began responding. We are unsure why this occurred, other than the sensor reached an overload condition of some type. This occurred twice more during the penetration but was corrected with a power reset each time. Analysis of the data indicates that the reset does not effect the calibration of the sensor.

Concluding the penetration, the baseline responses for the CPT sensors were again noted and they were confirmed to be operating normally.

Appendix A

Applied Research Associates South Royalton, VT 05068 802-763-8348 Email: cpt@ned.ara.com http://www.ara.com	Northing: Easting: Elevation:	Date: 24/Sep/1998 Test ID: Milestone2 Project: 4627
	Client: Site: ILAW	



Maximum depth: 25.67 (ft)

Page 1 of 2

Test ID: Milestone2
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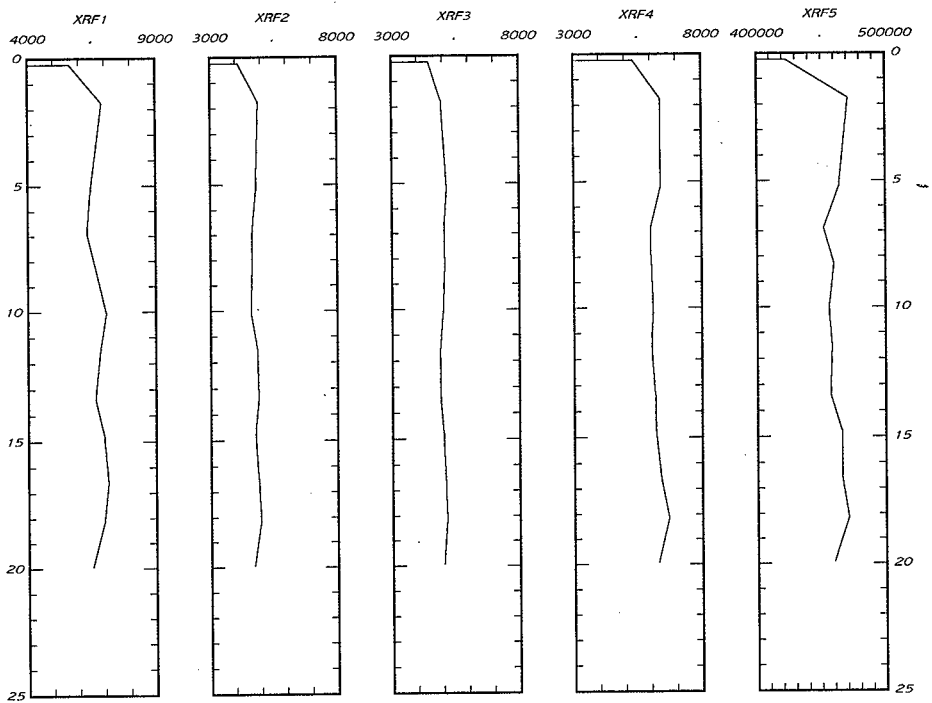
Applied Research Associates
South Royalton, VT 05068
802-763-8348
Email: cpt@ned.ara.com
http://www.ara.com

Northing:
Easting:
Elevation:

Date: 24/Sep/1998
Test ID: Milestone2
Project: 4627

Client:
Site: ILAW



Maximum depth: 25.67 (ft)

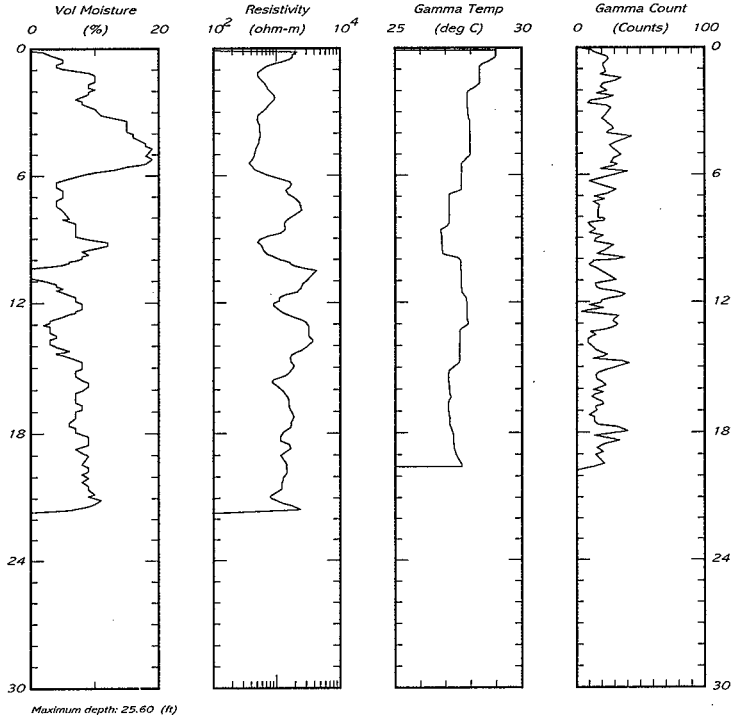
Test ID: Milestone2
File: 224s98D4.xxt.rwl

Applied Research Associates
South Royalton, VT 05068
802-763-8348
Email: cpt@ned.ara.com
http://www.ara.com

Northing:
Easting:
Elevation:

Date: 24/Sep/1998
Test ID: 4627
Project: Milestone

Client: HTI Vadose Characterization
Site: ILAW



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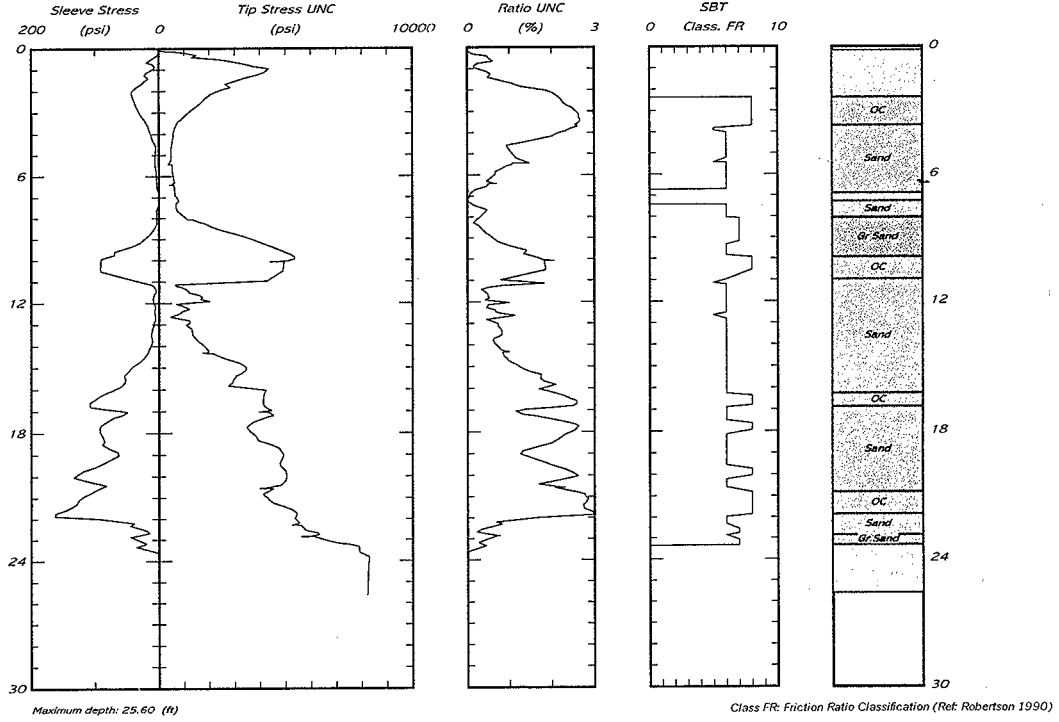
Applied Research Associates
South Royalton, VT 05068
802-763-8348
Email: cpt@ned.ara.com
http://www.ara.com

Northing:
Easting:
Elevation:

Date: 24/Sep/1998
Test ID: 4627
Project: Milestone

Client: HTI Vadose Characterization
Site: ILAW



Maximum depth: 25.60 (ft)

Class FR: Friction Ratio Classification (Ref: Robertson 1990)

Test ID: 4627
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Applied Research Associates
South Royalton, VT 05068
802-763-8348
Email: cpt@ned.ara.com
http://www.ara.com

Northing:
Easting:
Elevation:

Date: 24/Sep/1998
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Project: Milestone

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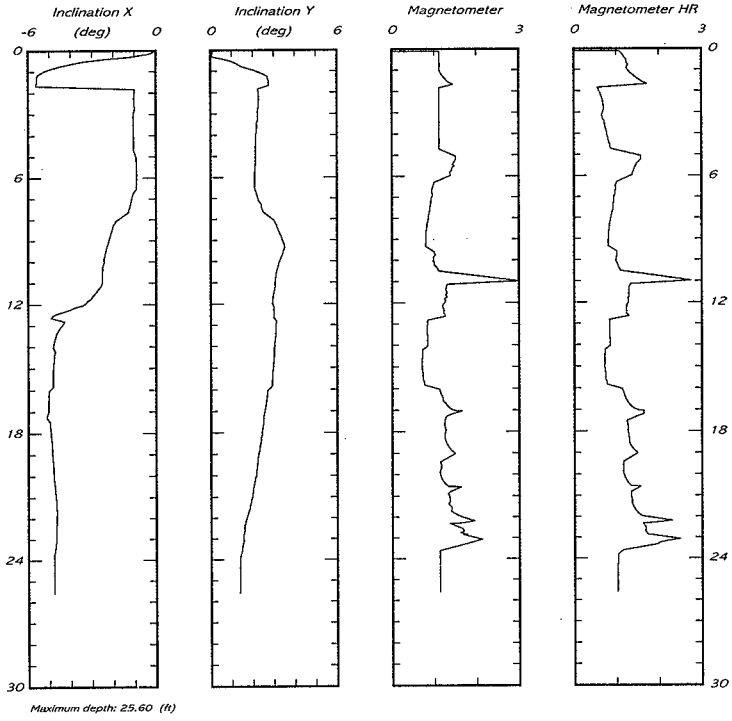
Site: ILAW



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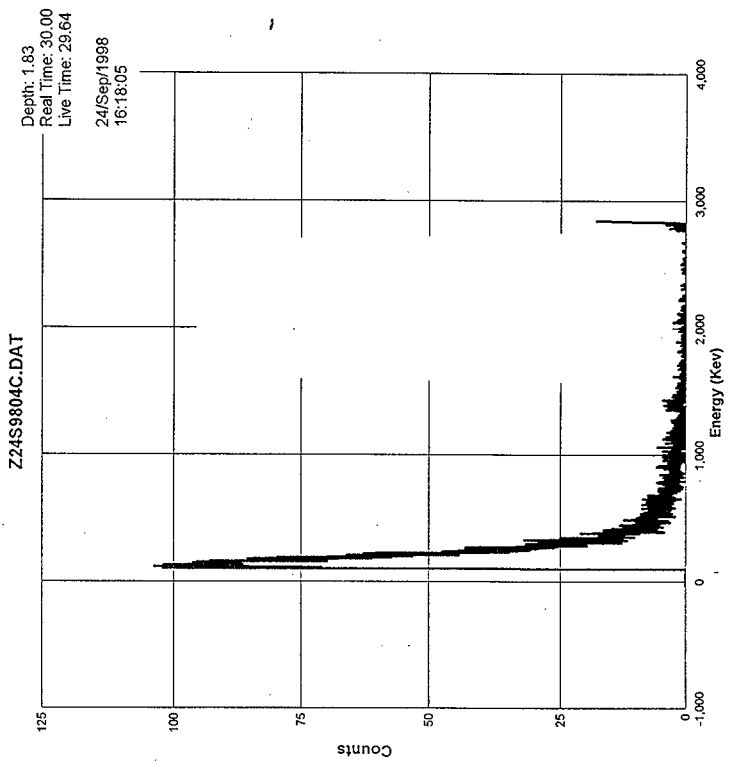
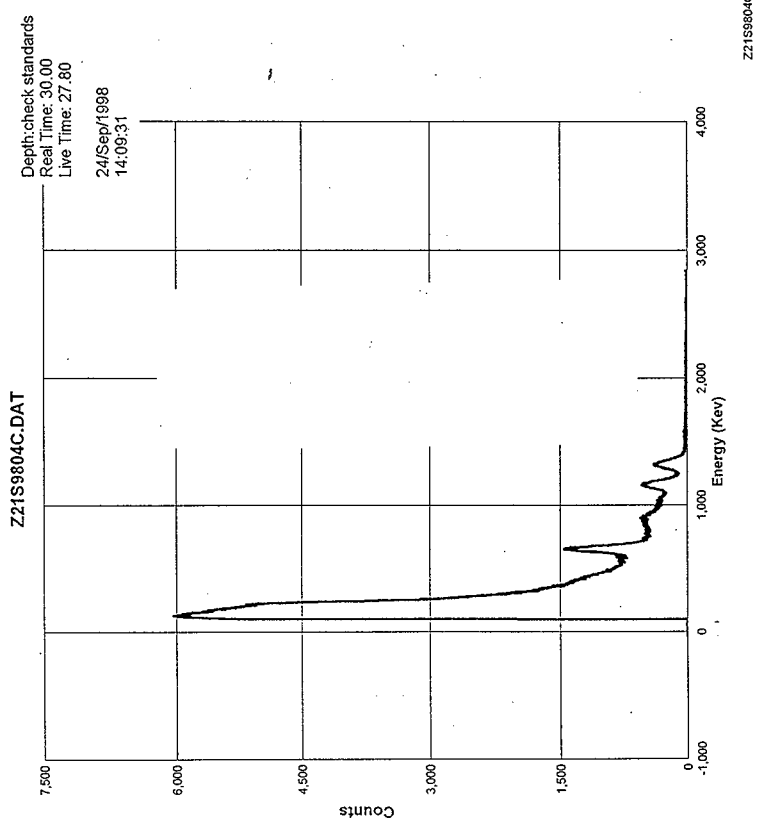
Appendix B

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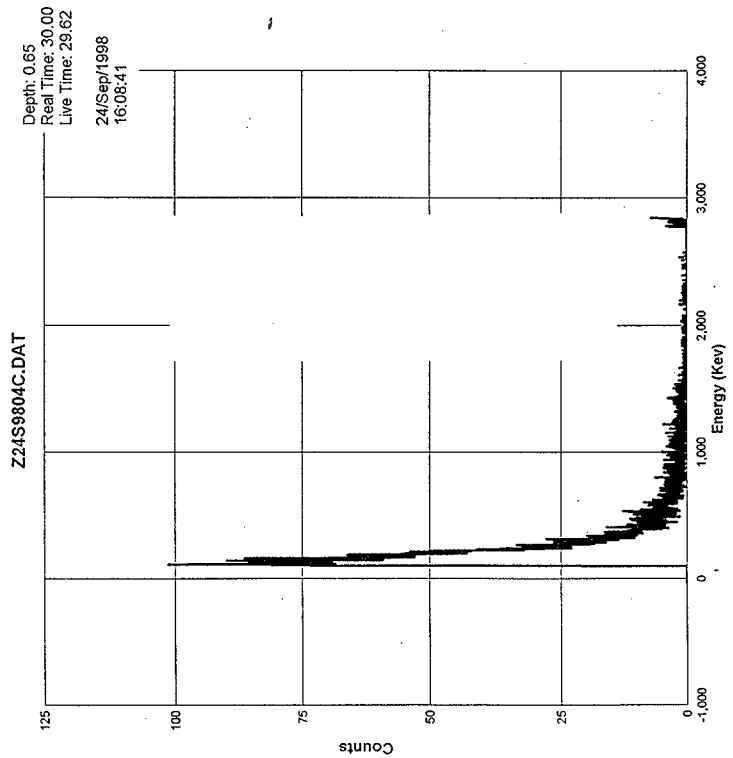

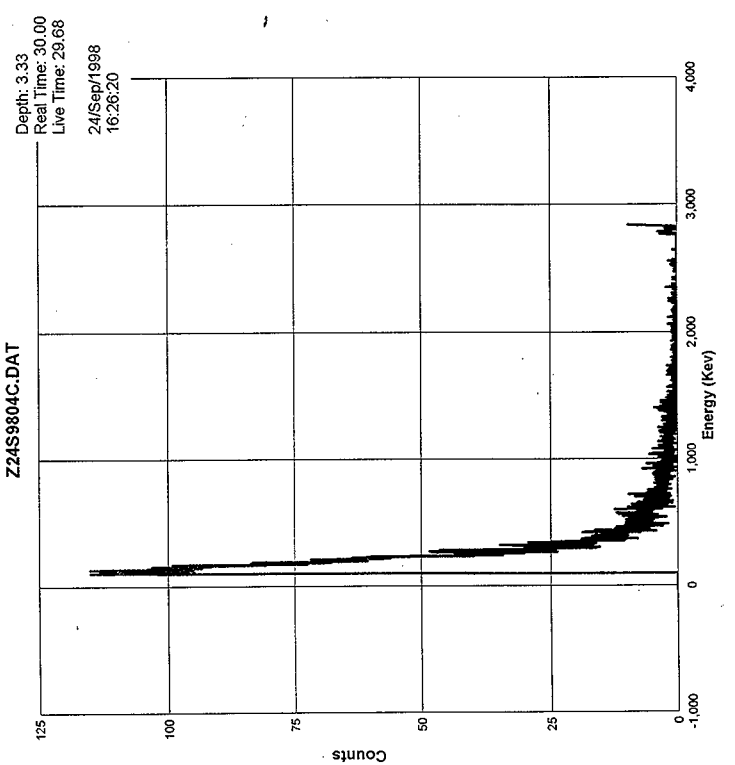

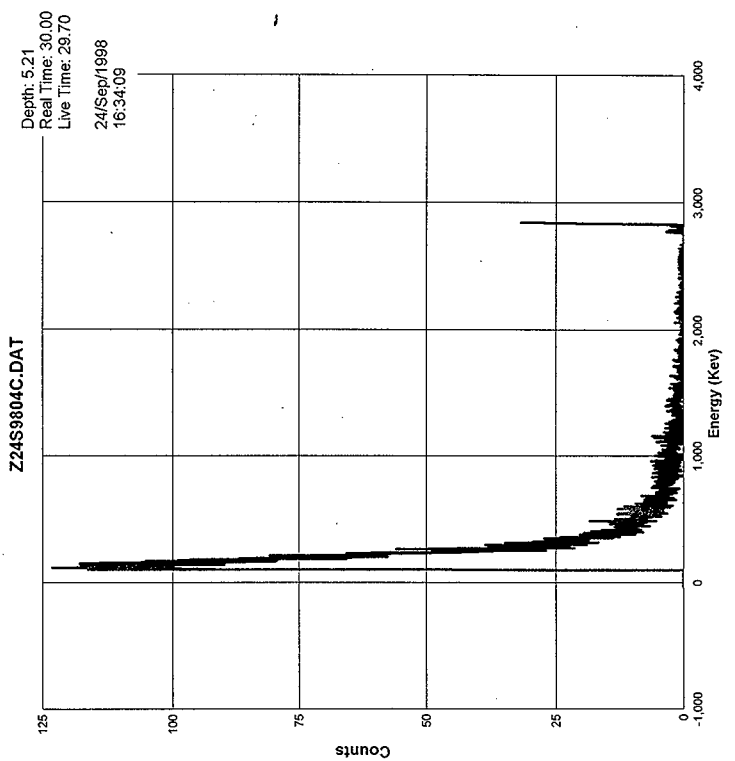

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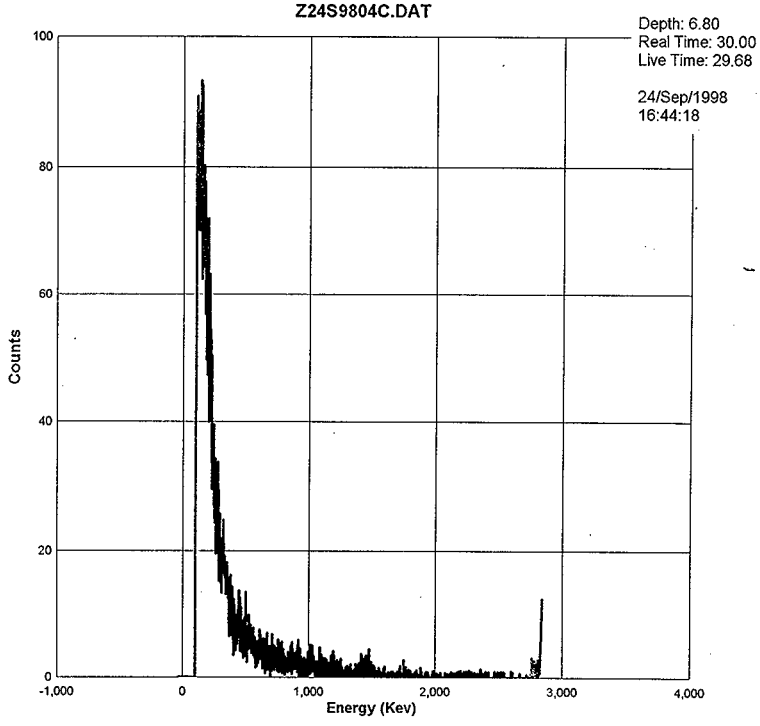

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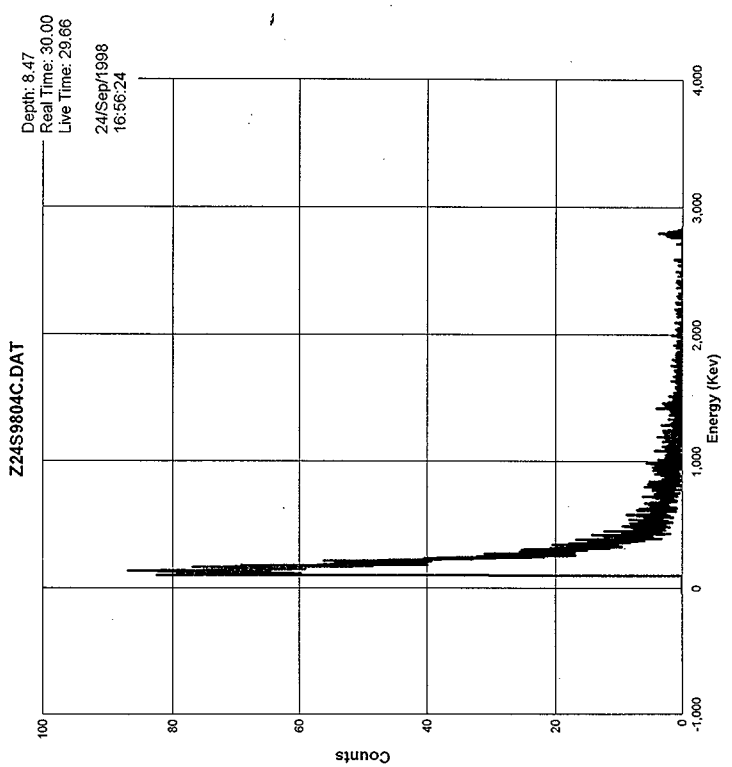

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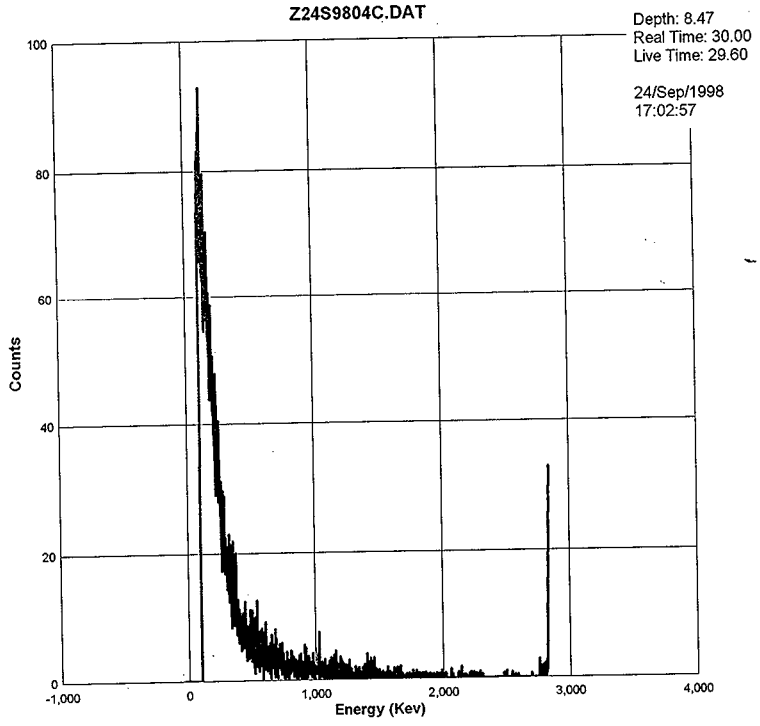

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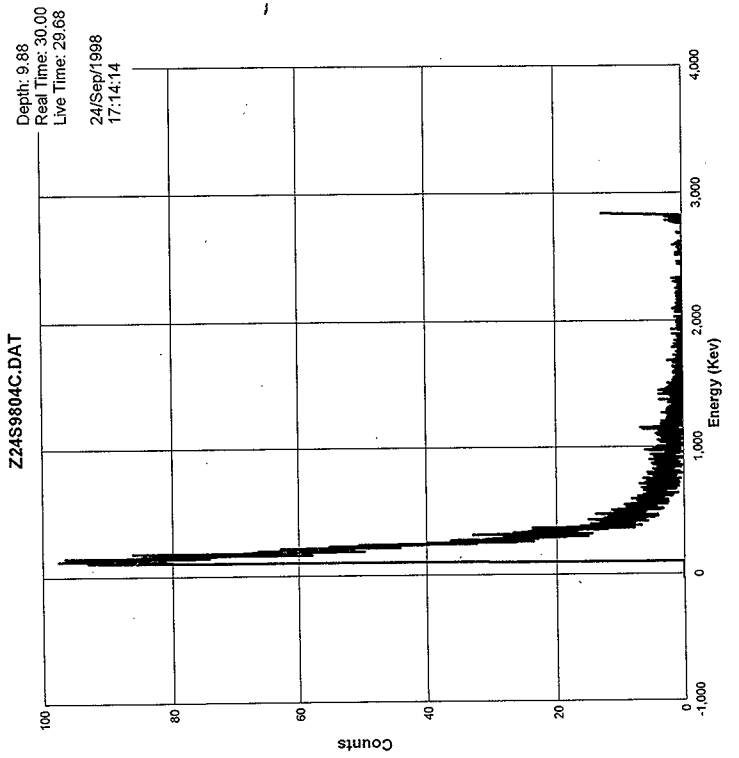

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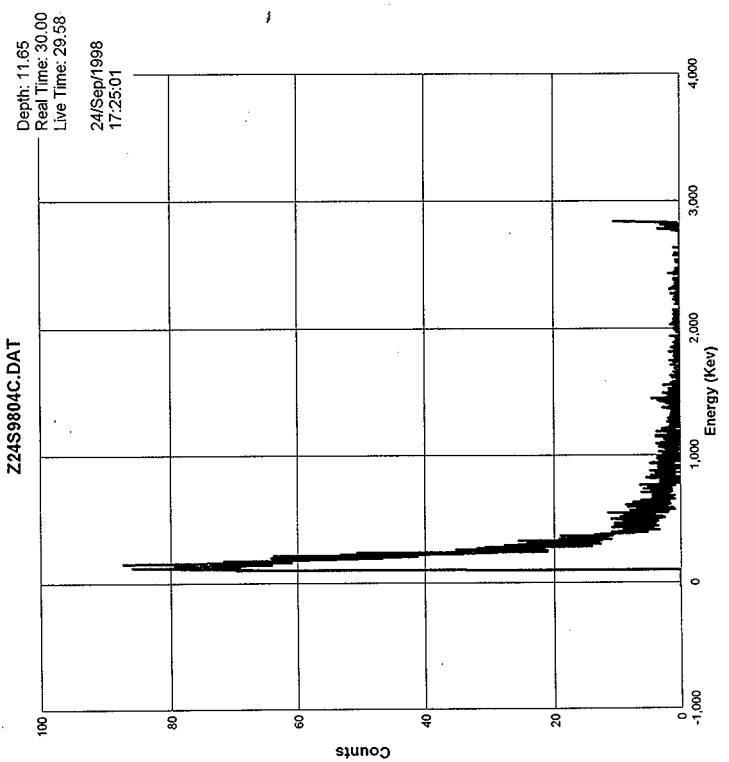

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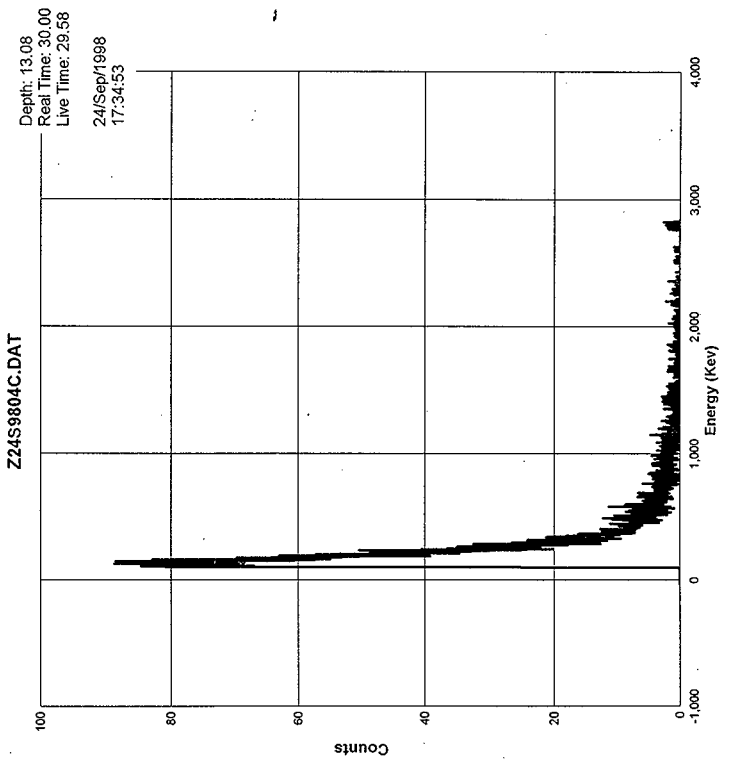

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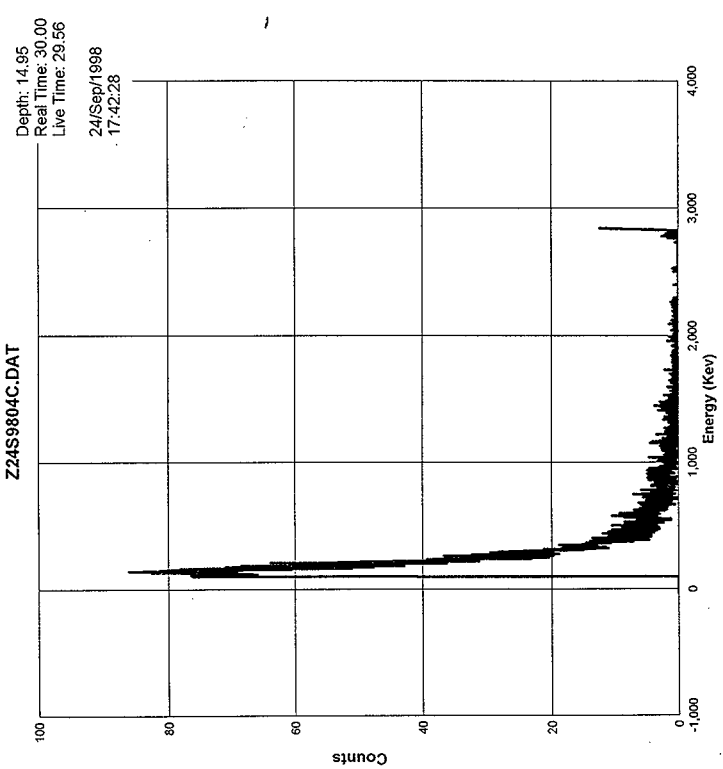

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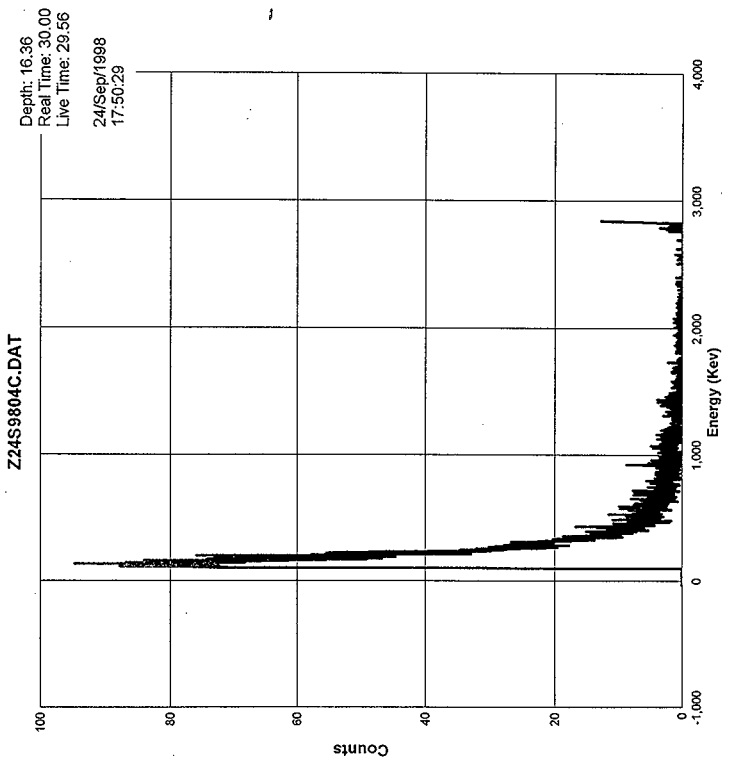

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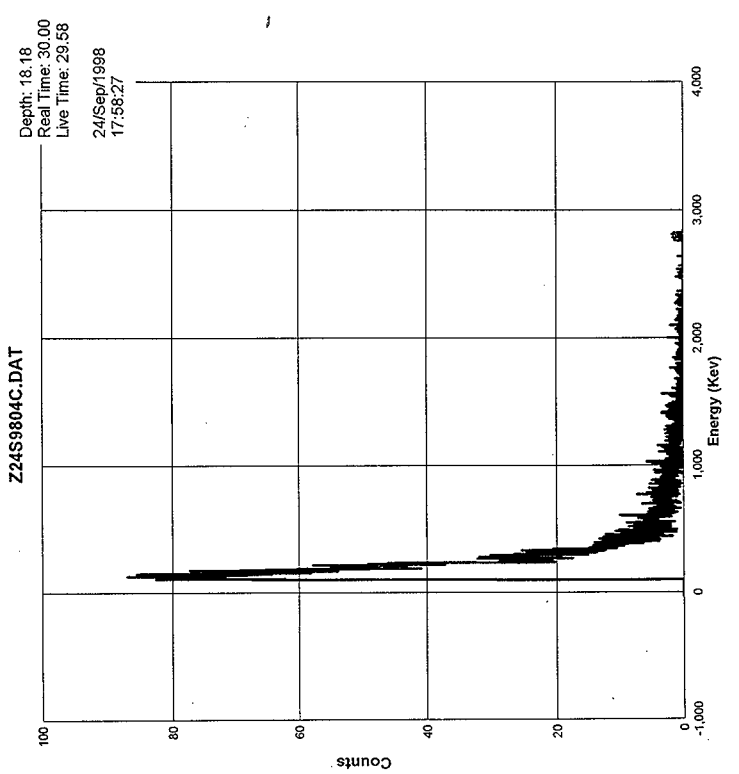

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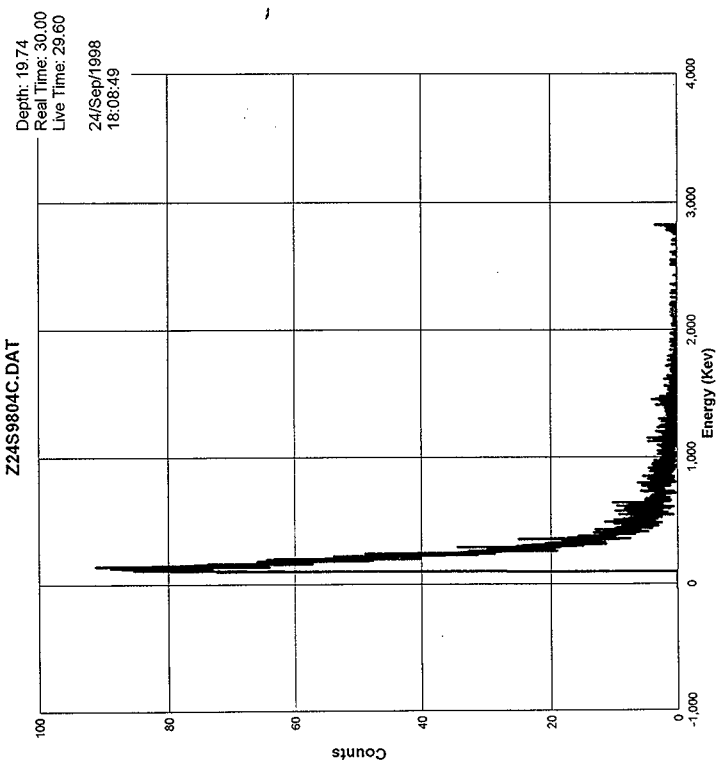

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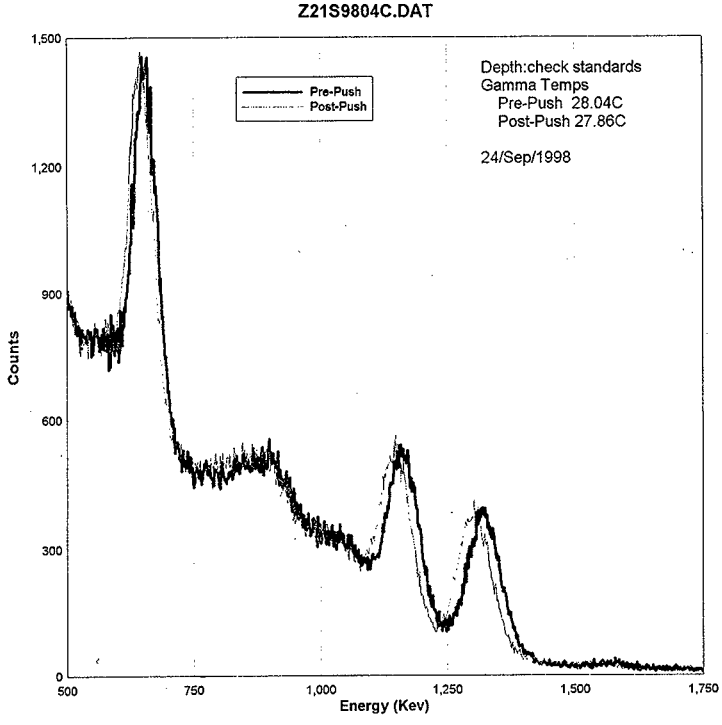

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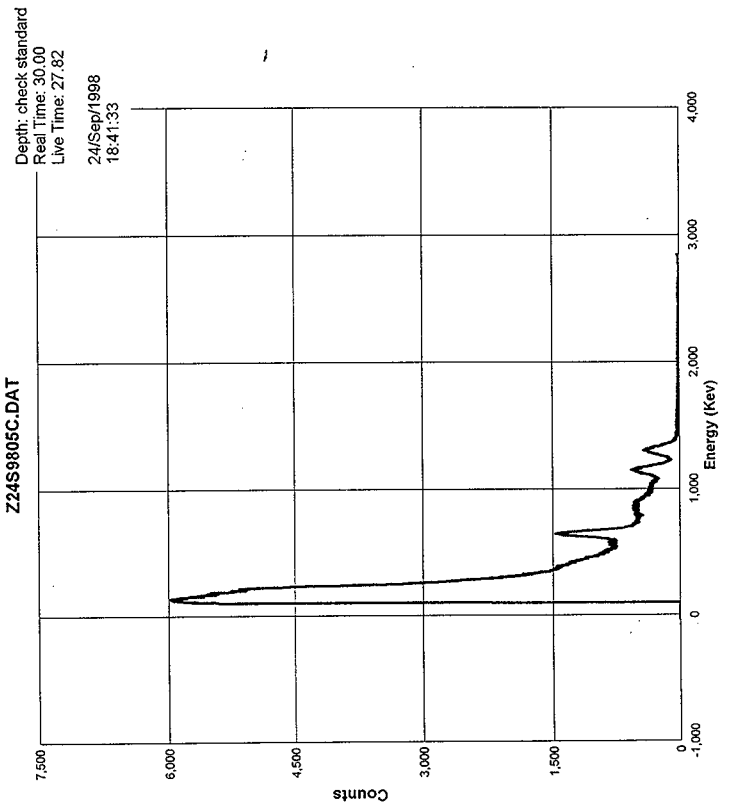

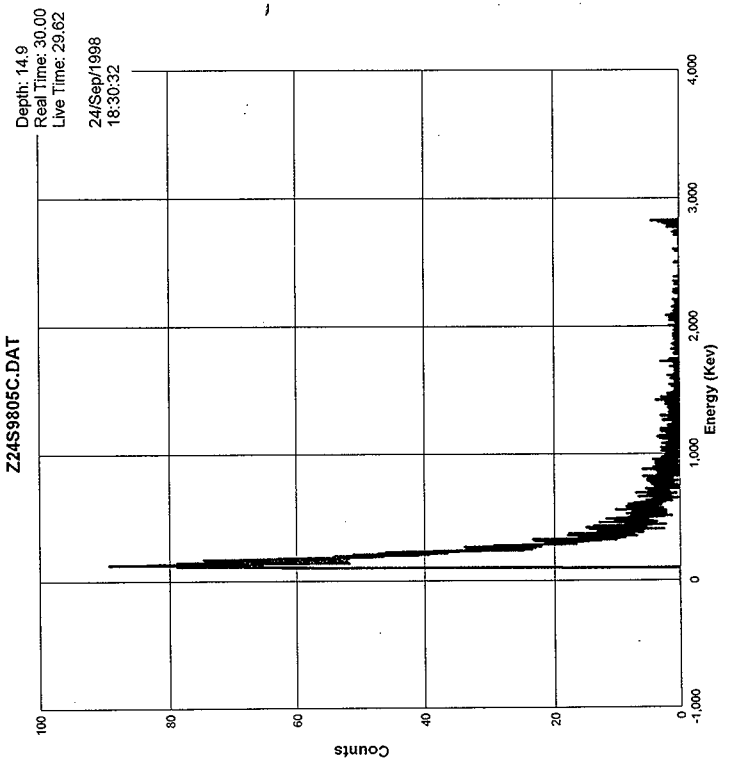

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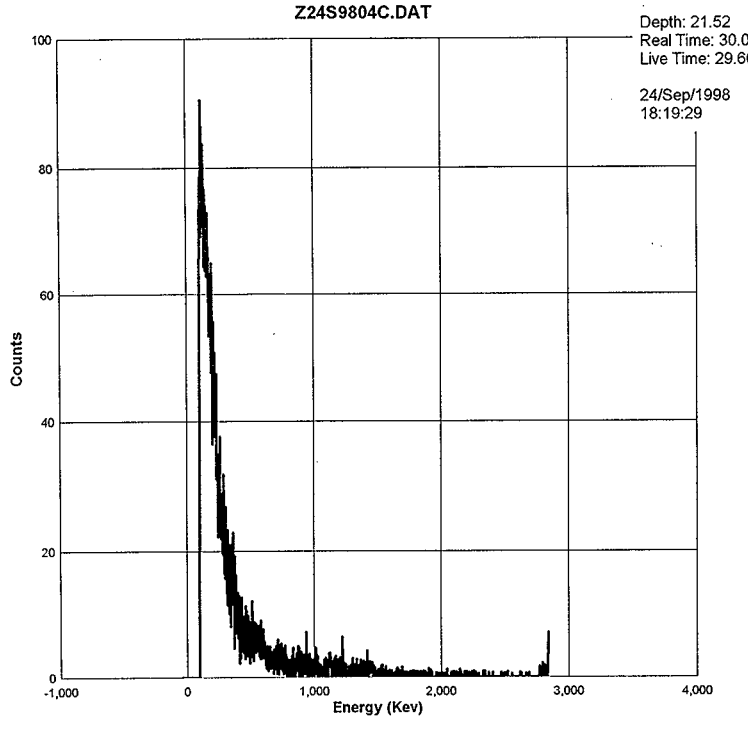

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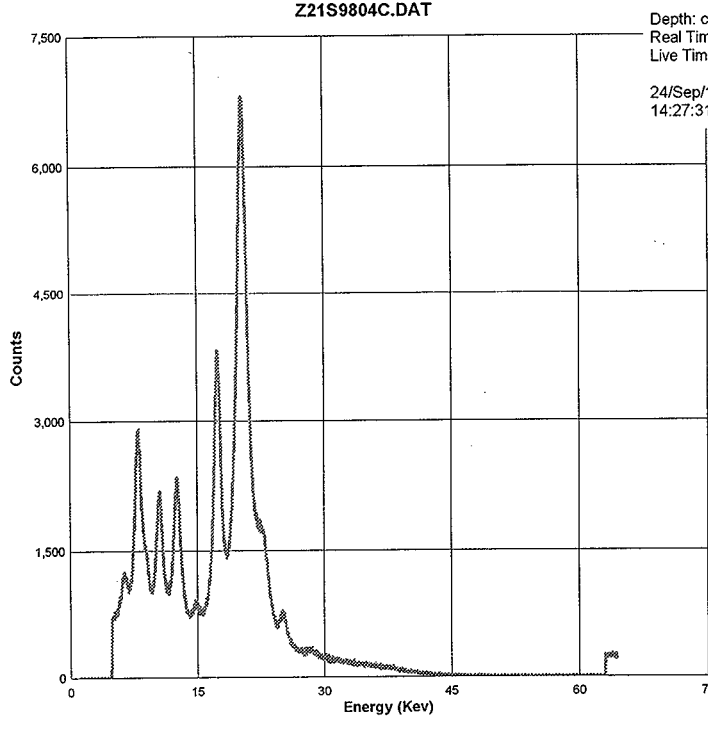

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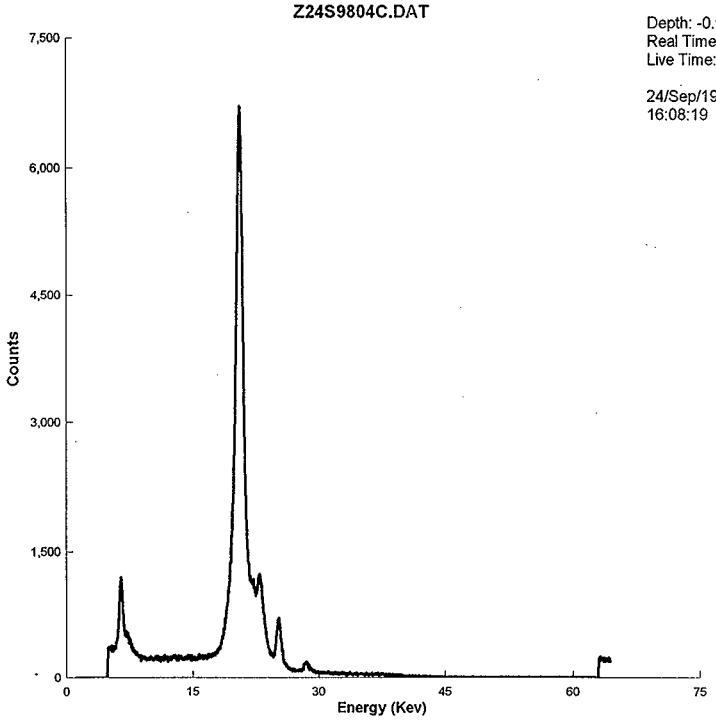
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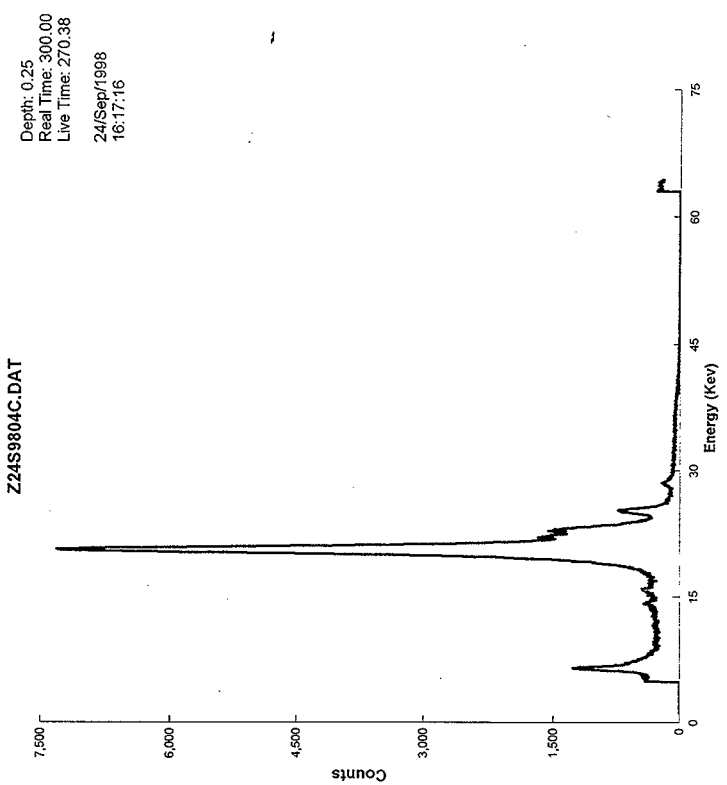

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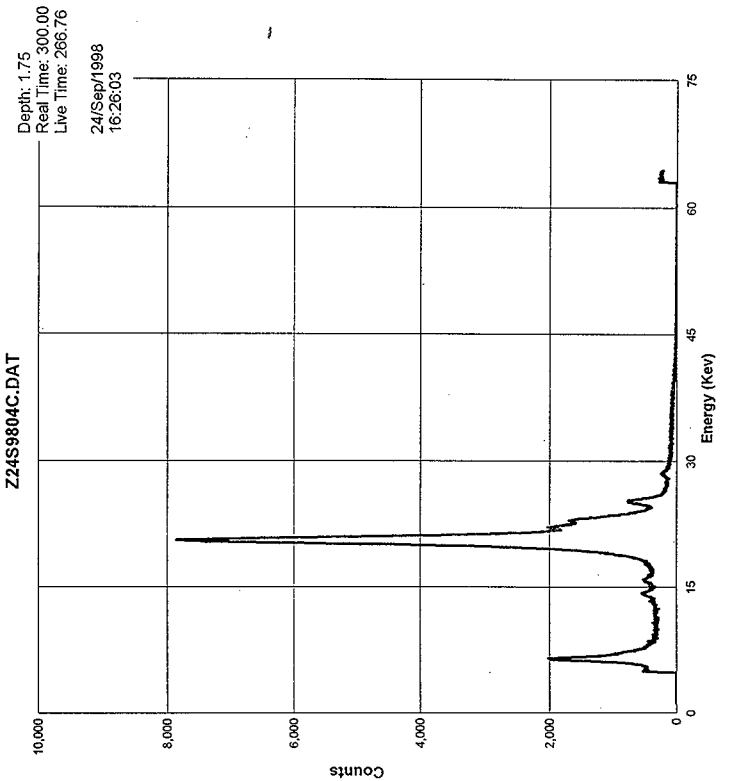

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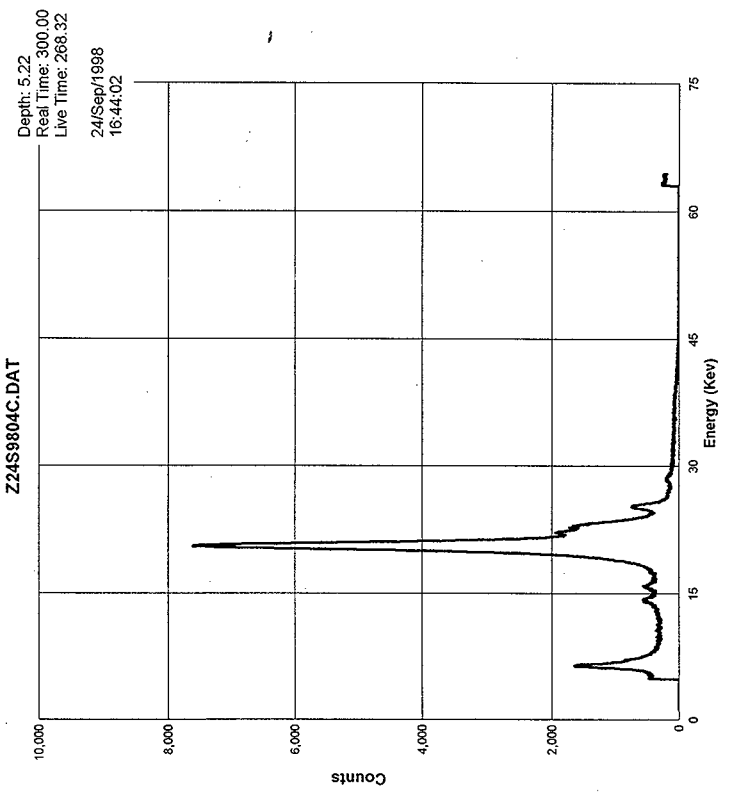

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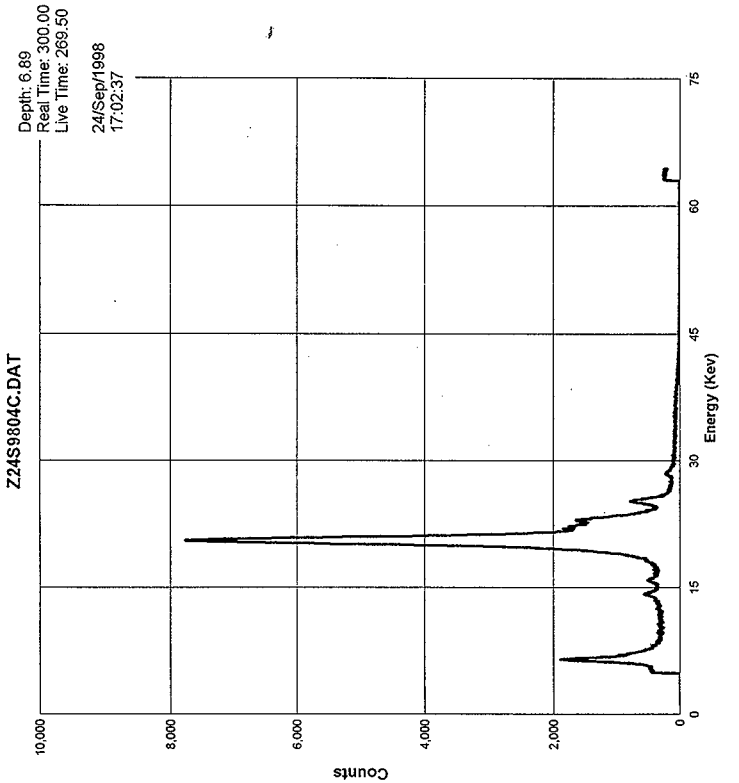

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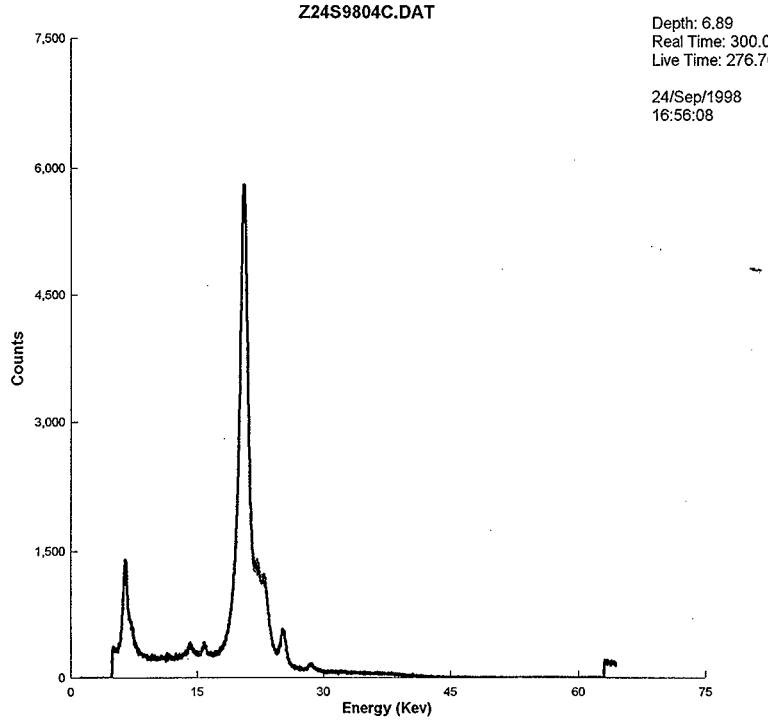

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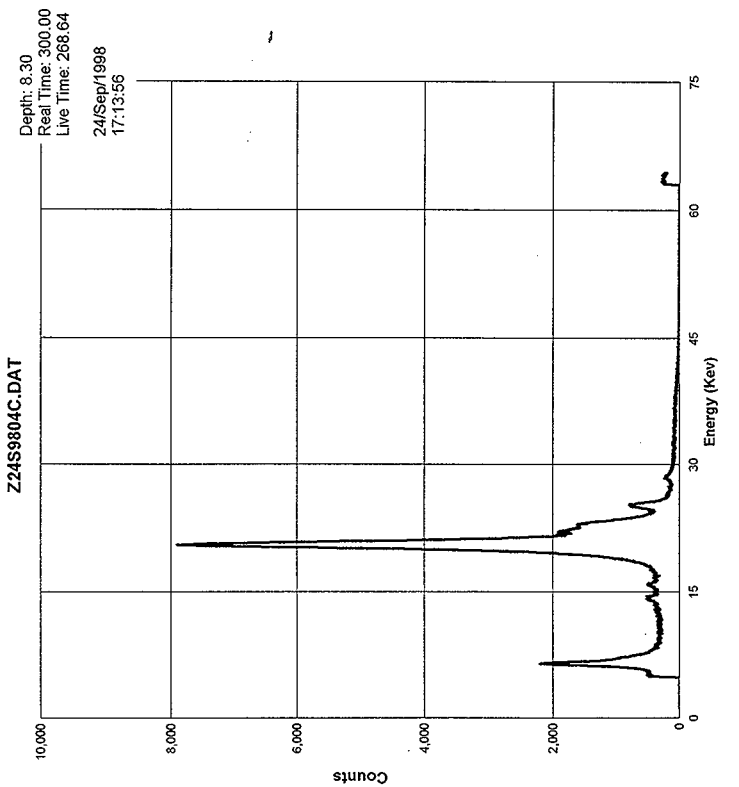

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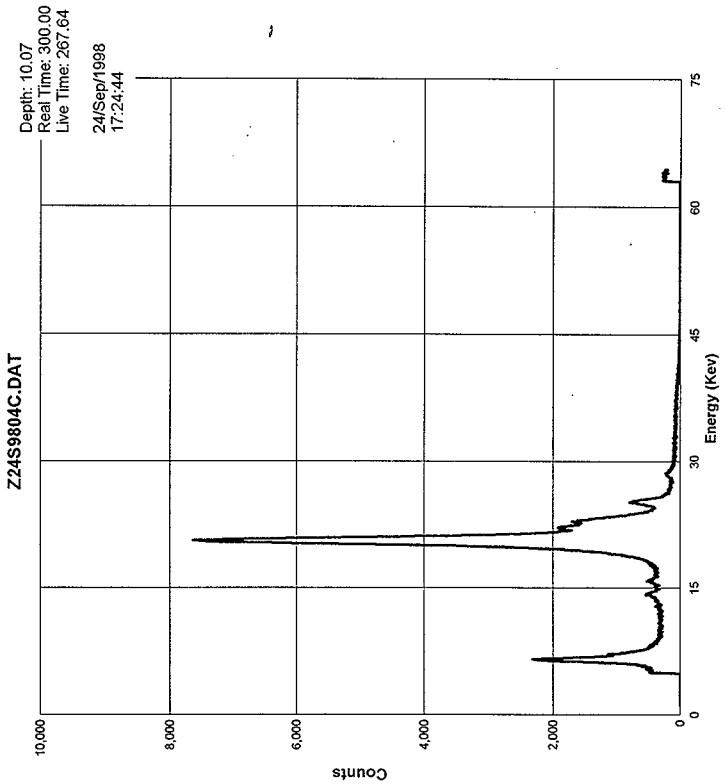

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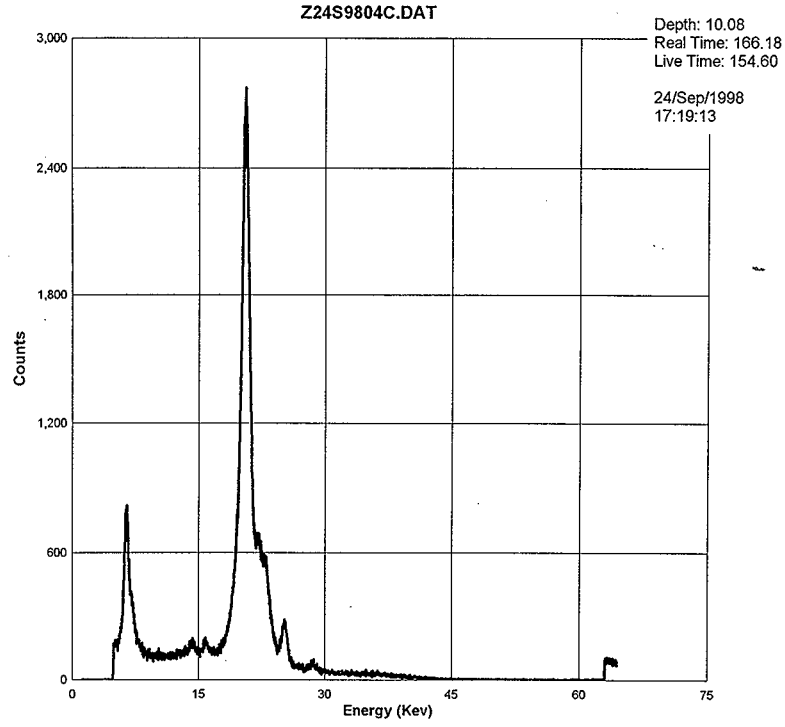

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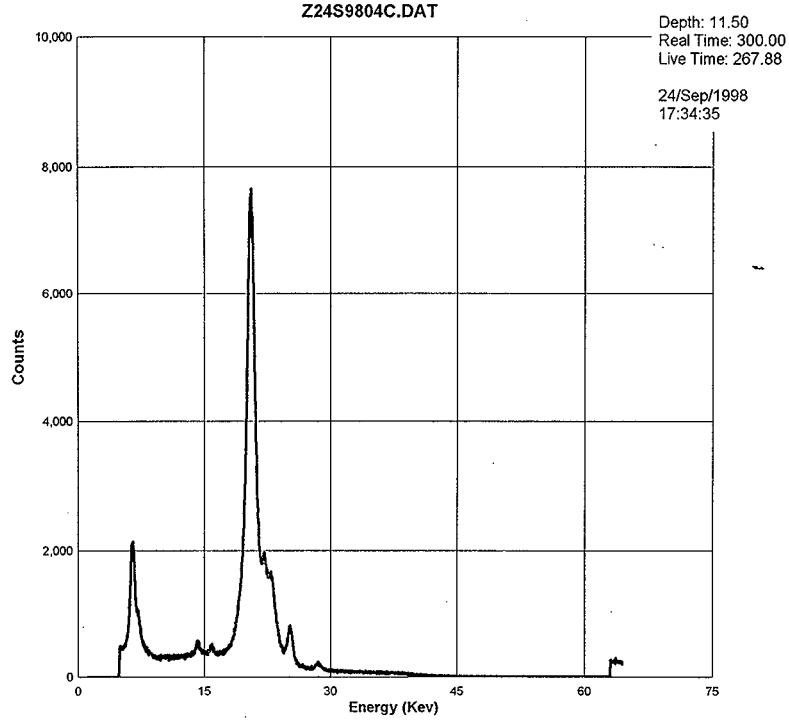
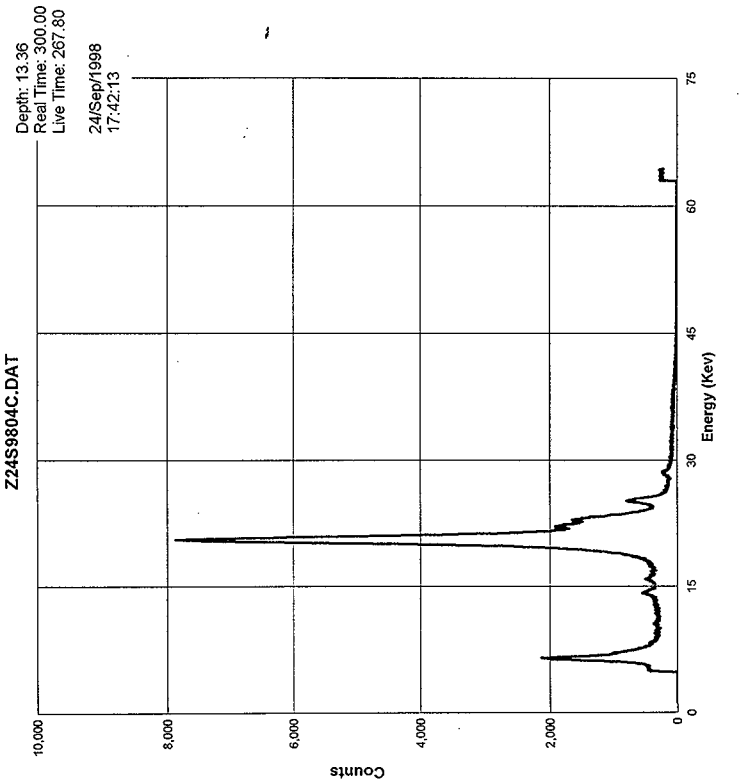
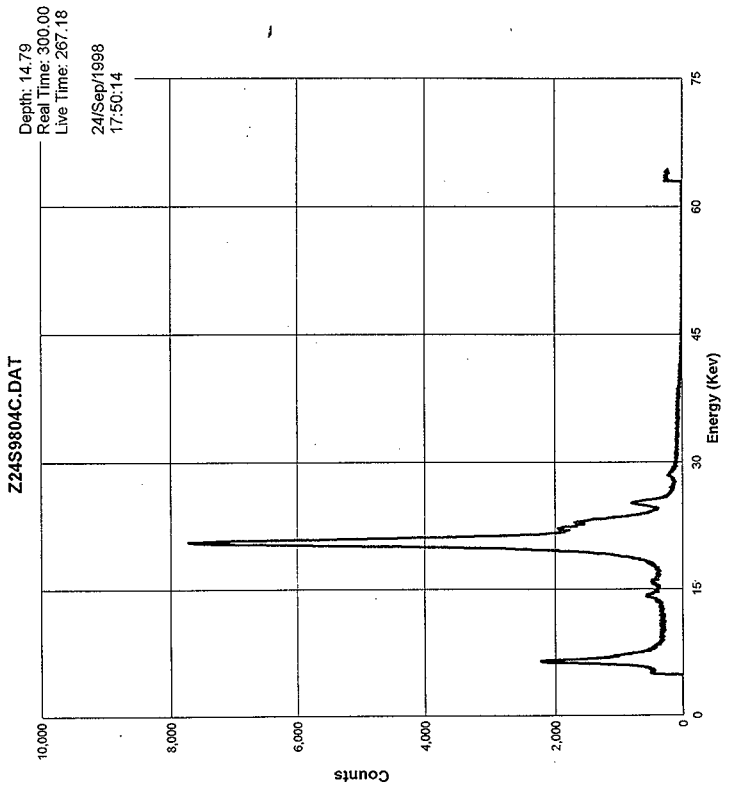


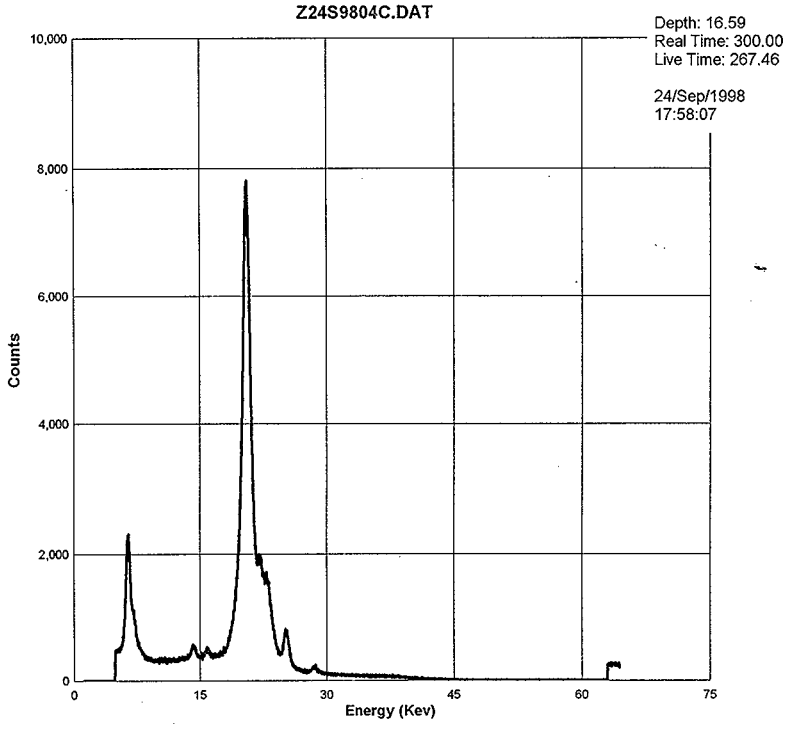
Z24S9804X--052--153A.grf



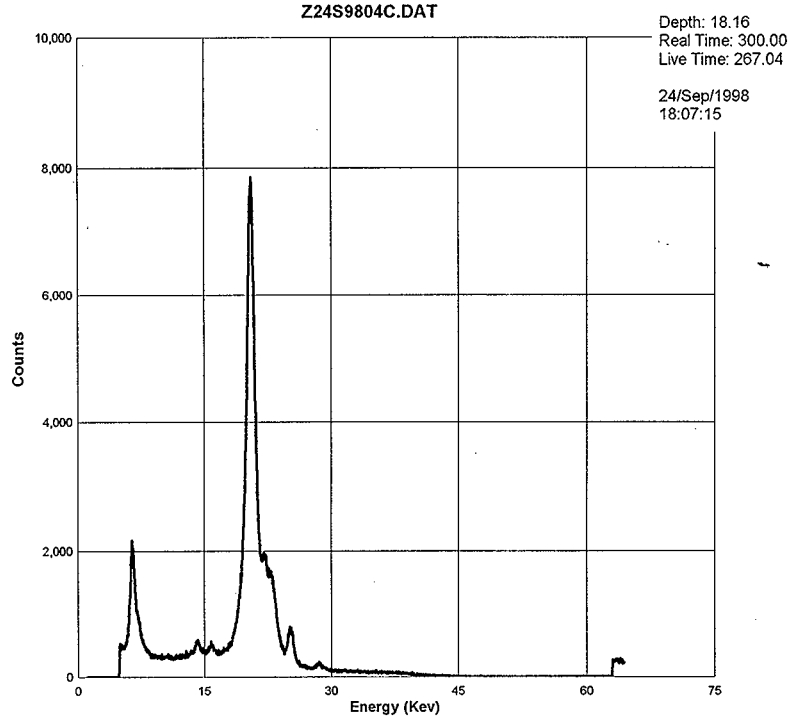
Z24S9804X--050--171A-g



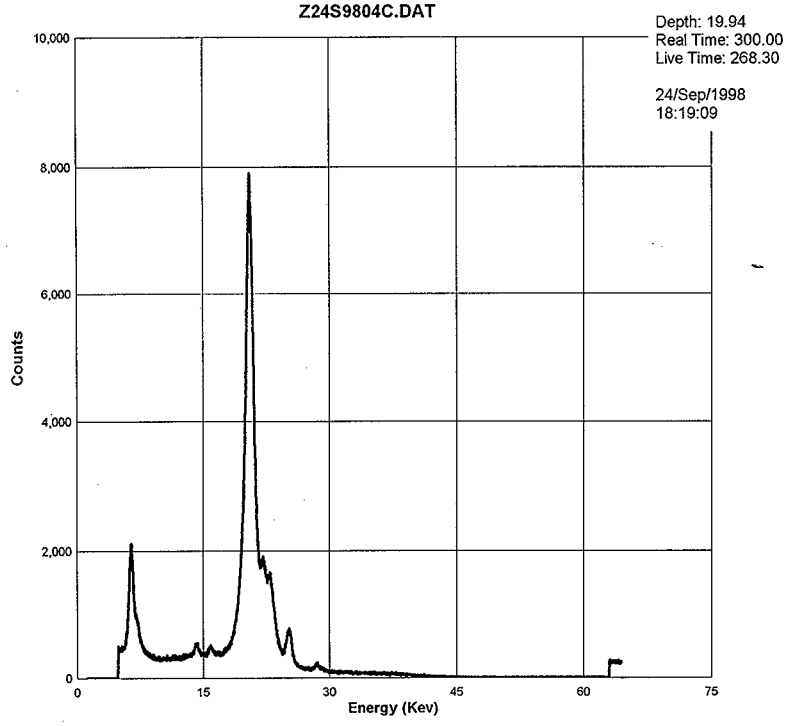
Z24S9804X--048--179A.g



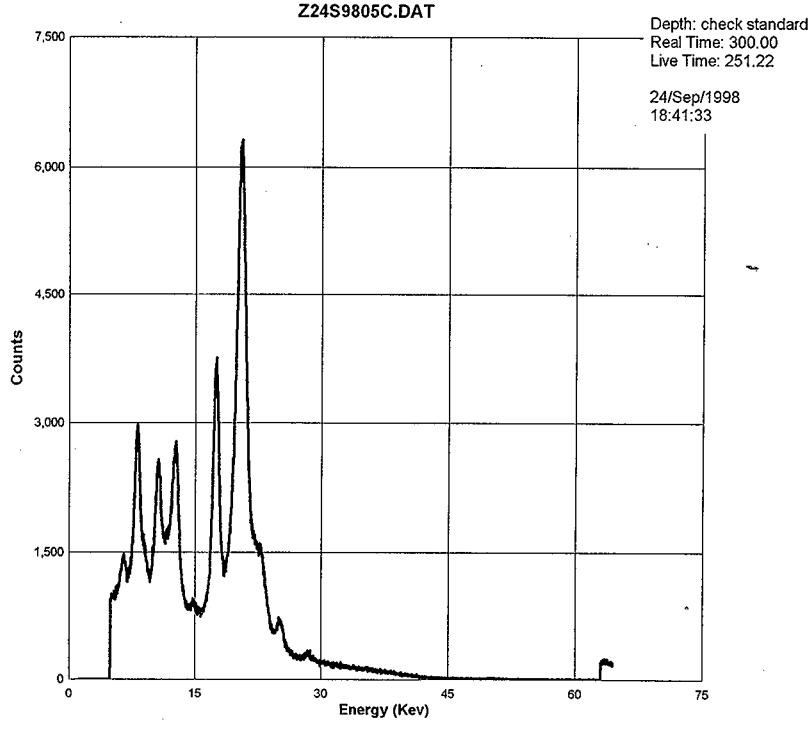
Z24S9804X--047--198A.g



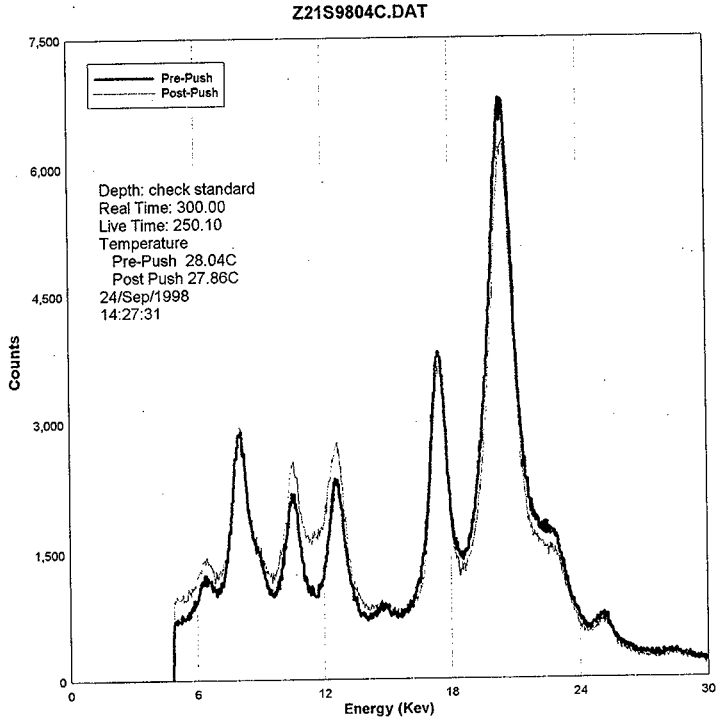
Z24S9804X--045--206A.grf



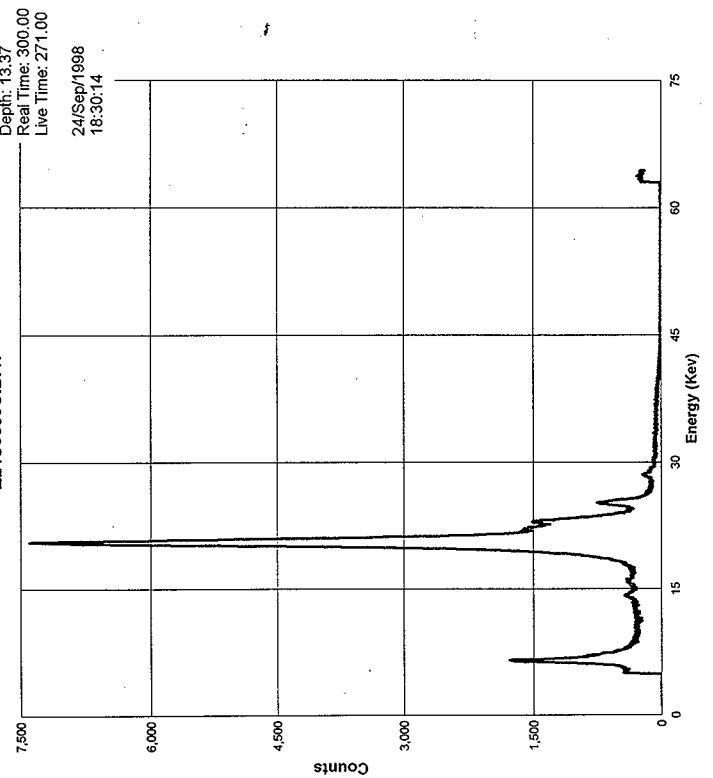
Z24S9804X--043--224A.grf



Z24S9805X--090-199C.grf



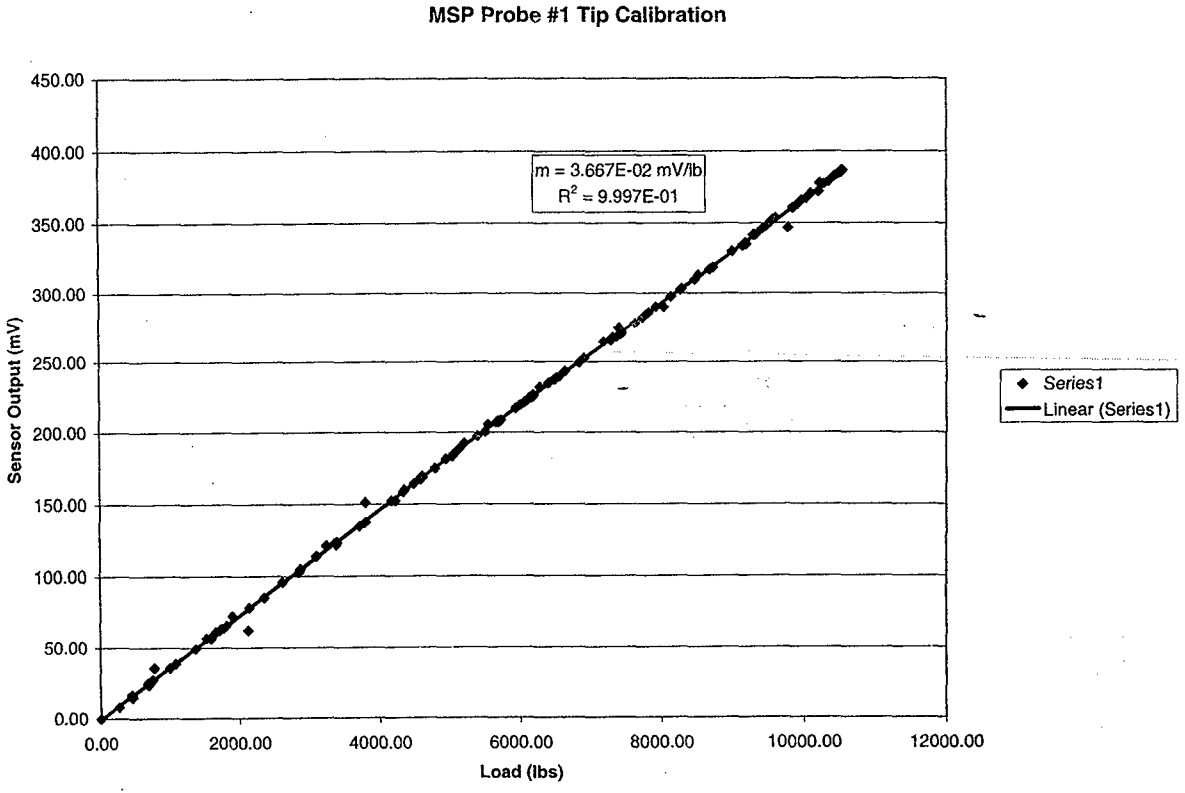
Z21S9804X--064--45A.grf



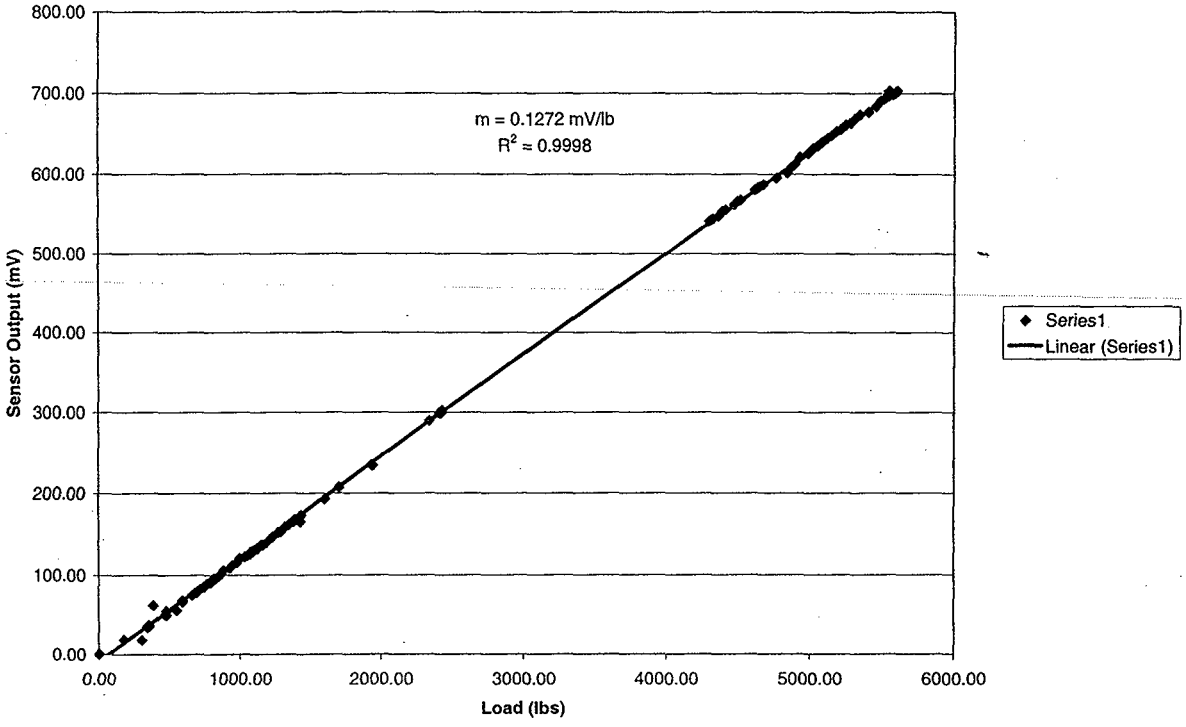
Z24S9805X--070-9A.gr

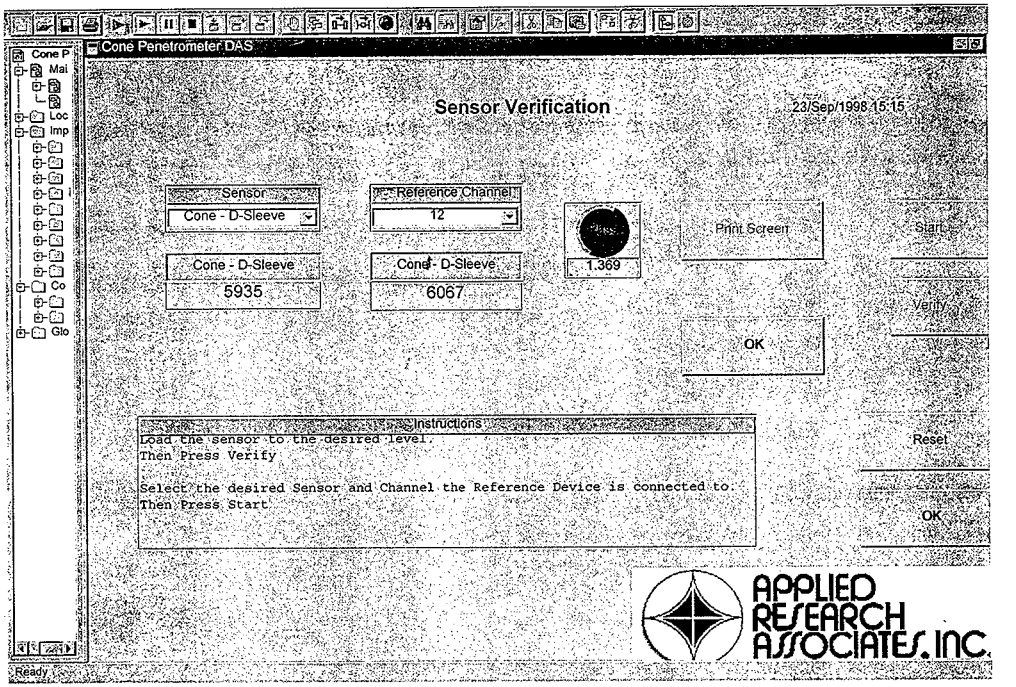
Appendix D

Calibration Date 8/18/
ref Load cell #76197



MSP Probe #1 Sleeve Calibration



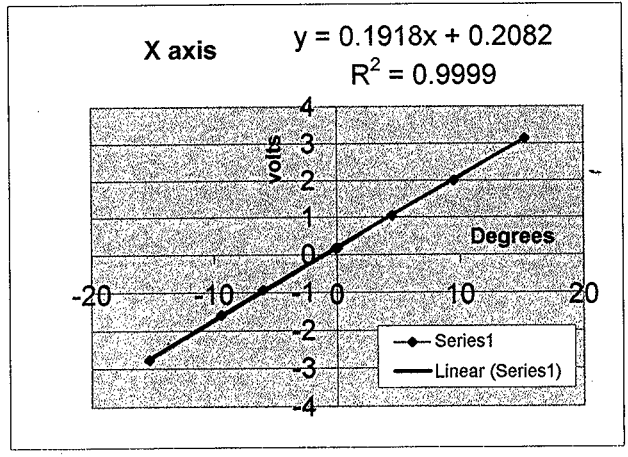

Cone Penetrometer DAS
Sensor Verification
23/Sep/1998 15:15
Sensor
Cone - D-Sleeve
Reference Channel
12
Cone - D-Sleeve
5935
Cone - D-Sleeve
6067
1.369
Print Screen
Start
Verify
OK
Instructions
Load the sensor to the desired level.
Then Press Verify
Select the desired Sensor and Channel the Reference Device is connected to.
Then Press Start
Reset
OK
APPLIED RESEARCH ASSOCIATES, INC.
Ready

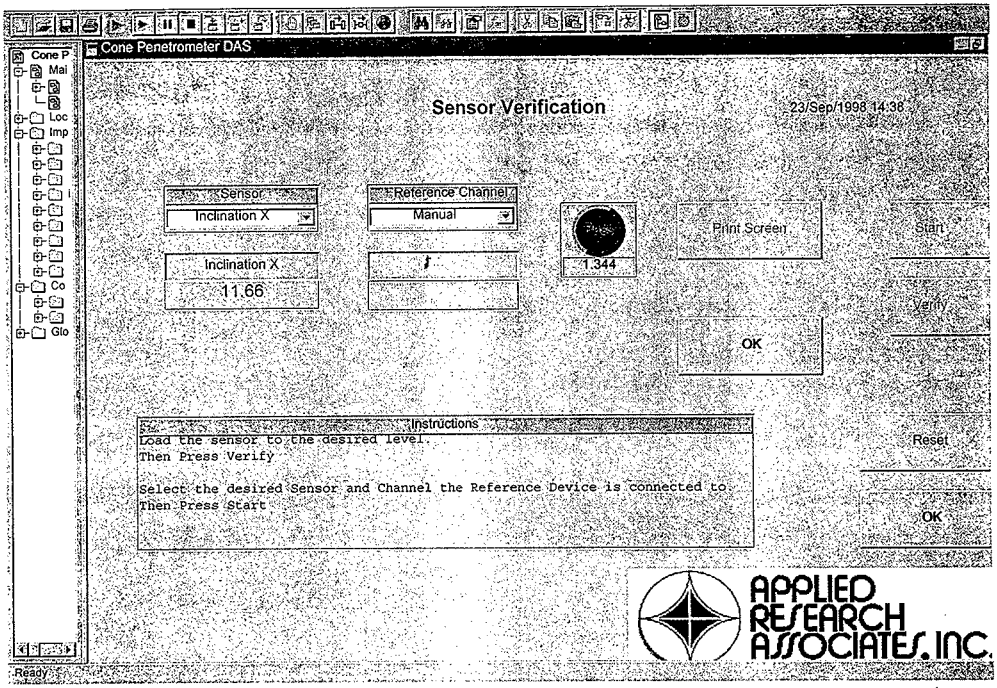
9/10/98

MSP Probe #1

X Axis

Exterior Angle Degree	Sensor Output Volts	Interior Angle Degree
89.9	0.1965	-0.1
84	-0.917	-6
80.6	-1.574	-9.4
74.7	-2.749	-15.3
89.9	0.2029	0.1
85.5	1.07	4.5
80.5	2.018	9.5
74.7	3.153	15.3
90	0.2047	0



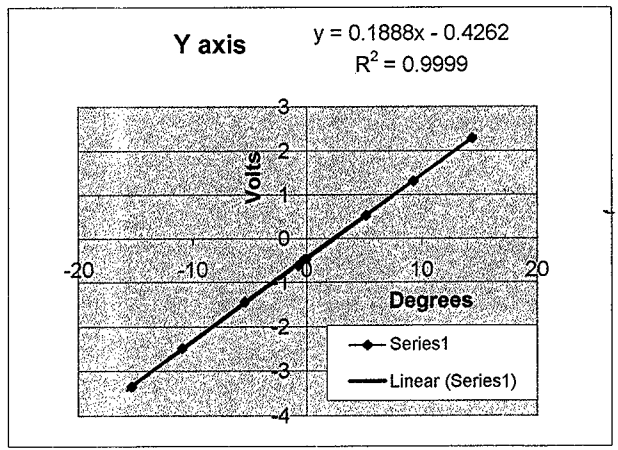

Cone Penetrometer DAS
Sensor Verification
23/Sep/1998 14:38
Sensor
Inclination X
Reference Channel
Manual
Inclination X
11.66
1.344
Print Screen
Start
Verify
OK
Instructions
Load the sensor to the desired level.
Then Press Verify
Select the desired Sensor and Channel the Reference Device is connected to.
Then Press Start
Reset
OK
APPLIED RESEARCH ASSOCIATES, INC.
Ready

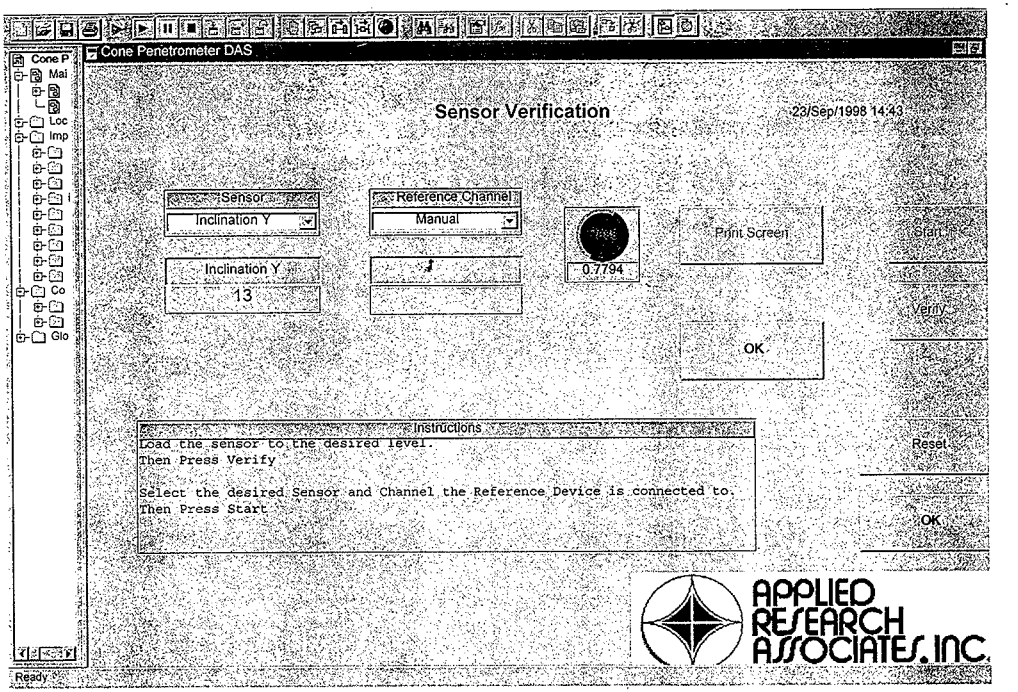
calibration in Hanford 9/10/98

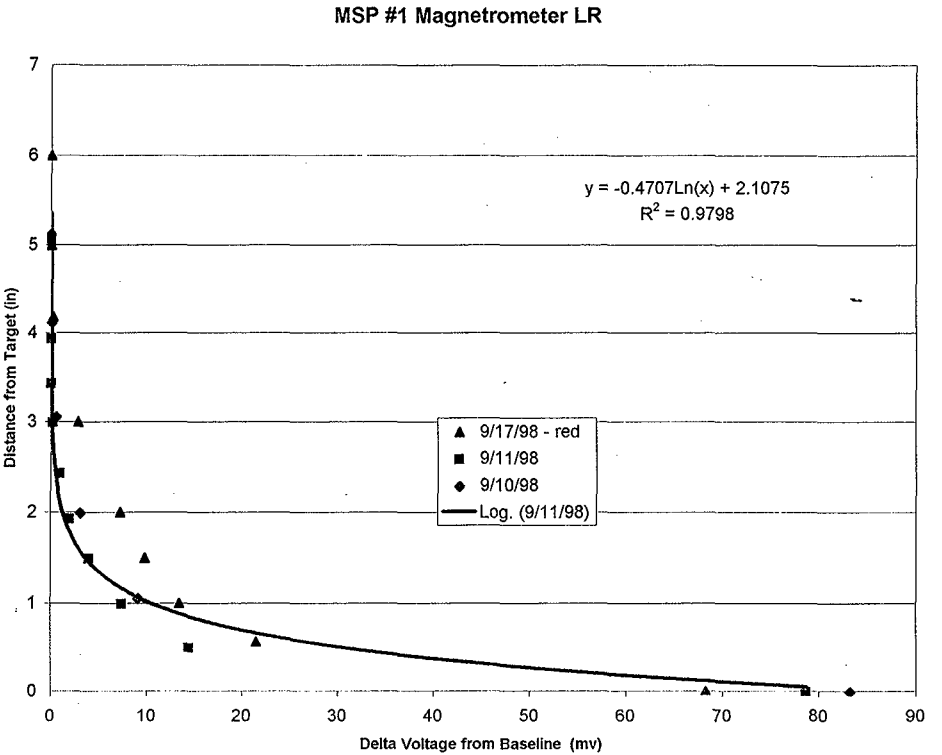
MSP probe #1

Y axis

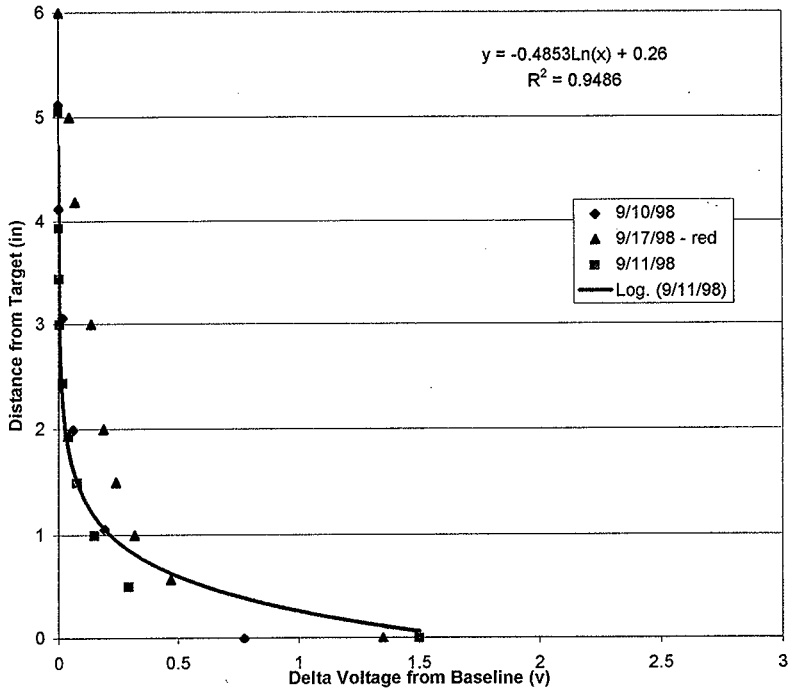
Exterior Angle Degree	Sensor Output Volts	Interior Angle Degree
89.8	-0.4518	-0.2
84.6	-1.422	-5.4
79.1	-2.466	-10.9
74.7	-3.324	-15.3
90	-0.4431	0
84.8	0.5511	5.2
80.7	1.332	9.3
75.6	2.306	14.4
89.3	-0.5974	-0.7

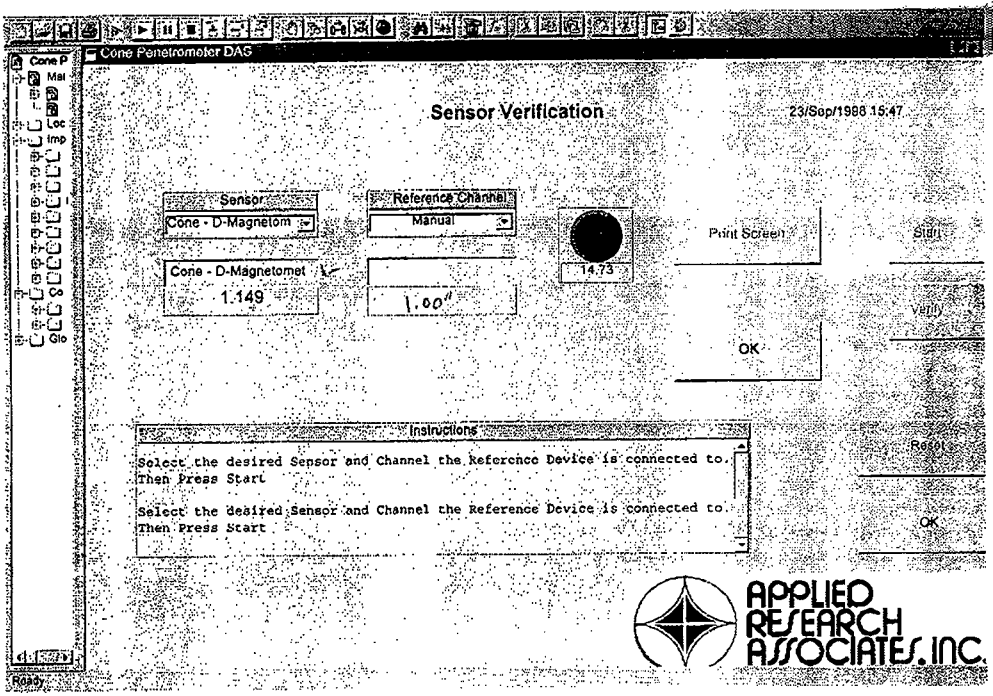



Cone Penetrometer DAS
Sensor Verification
23/Sep/1998 14:43
Sensor
Inclination Y
Reference Channel
Manual
Inclination Y
13
0.7794
Print Screen
Start
Verify
OK
Reset
OK
Instructions
Load the sensor to the desired level.
Then Press Verify
Select the desired Sensor and Channel the Reference Device is connected to.
Then Press Start
APPLIED RESEARCH ASSOCIATES, INC.
Ready

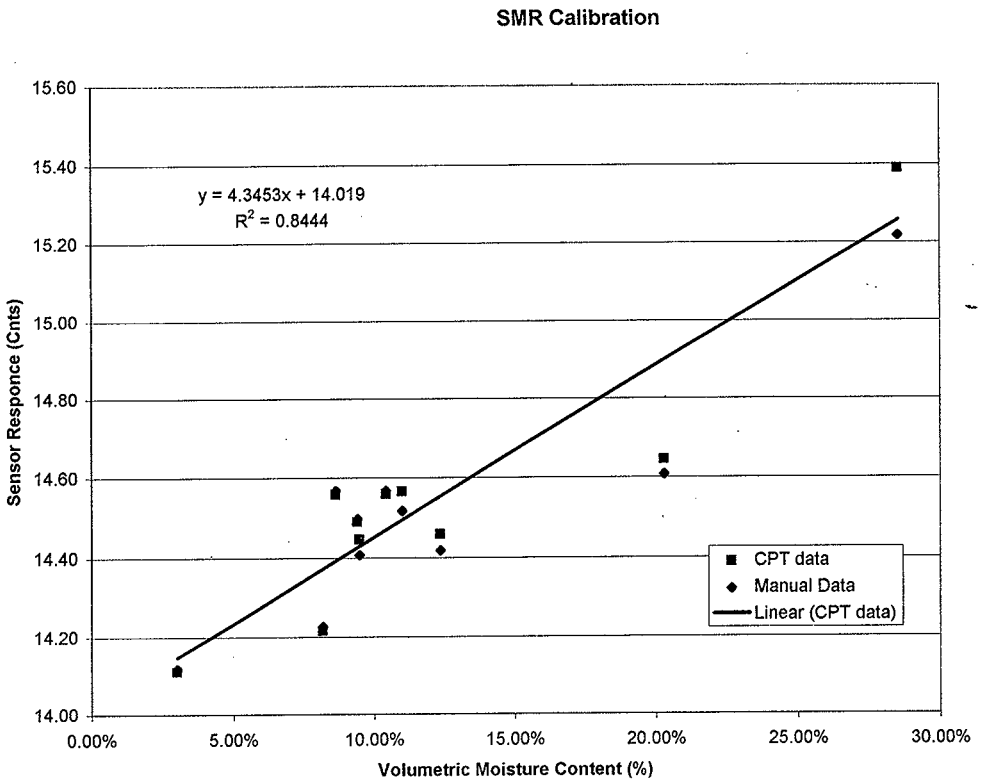

MSP #1 Magnetrometer LR
y = -0.4707Ln(x) + 2.1075
R2 = 0.9798
9/17/98 - red
9/11/98
9/10/98
Log. (9/11/98)
Distance from Target (in)
Delta Voltage from Baseline (mv)
0
1
2
3
4
5
6
7
0
10
20
30
40
50
60
70
80
90

MSP #1 magnetrometer HR

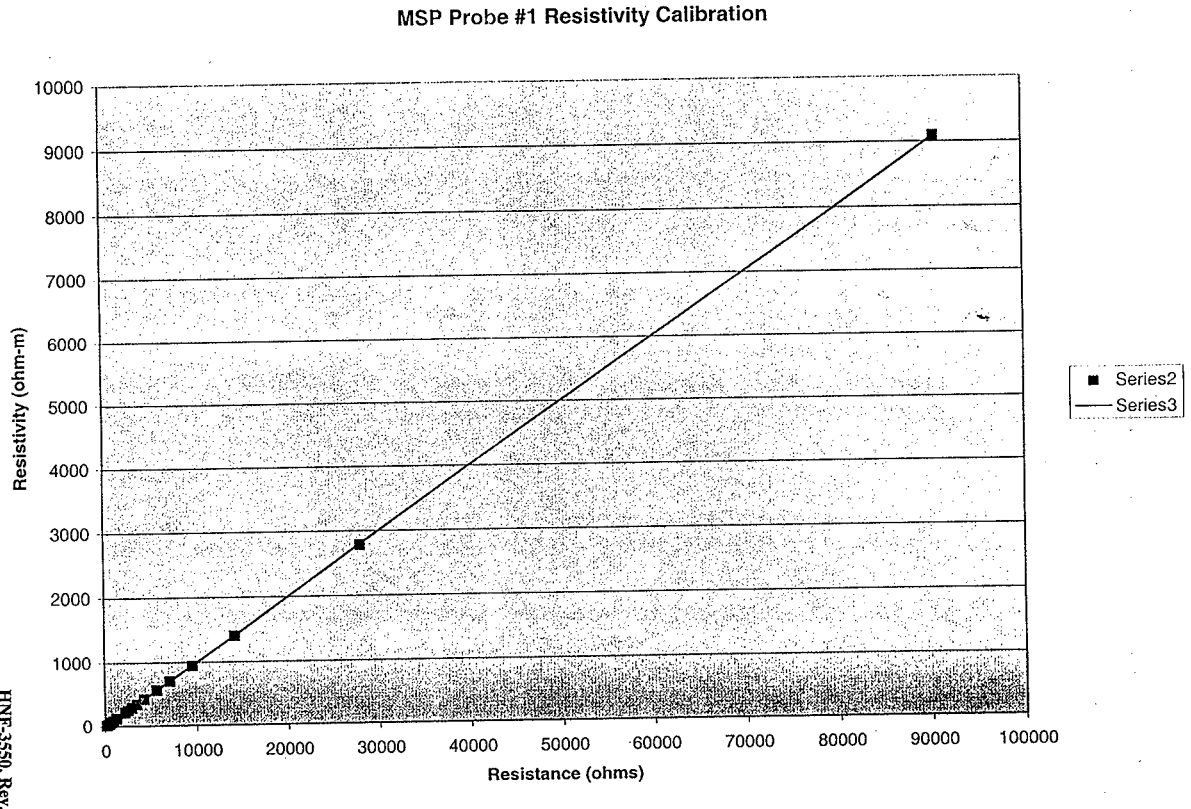




BEST AVAILABLE COPY

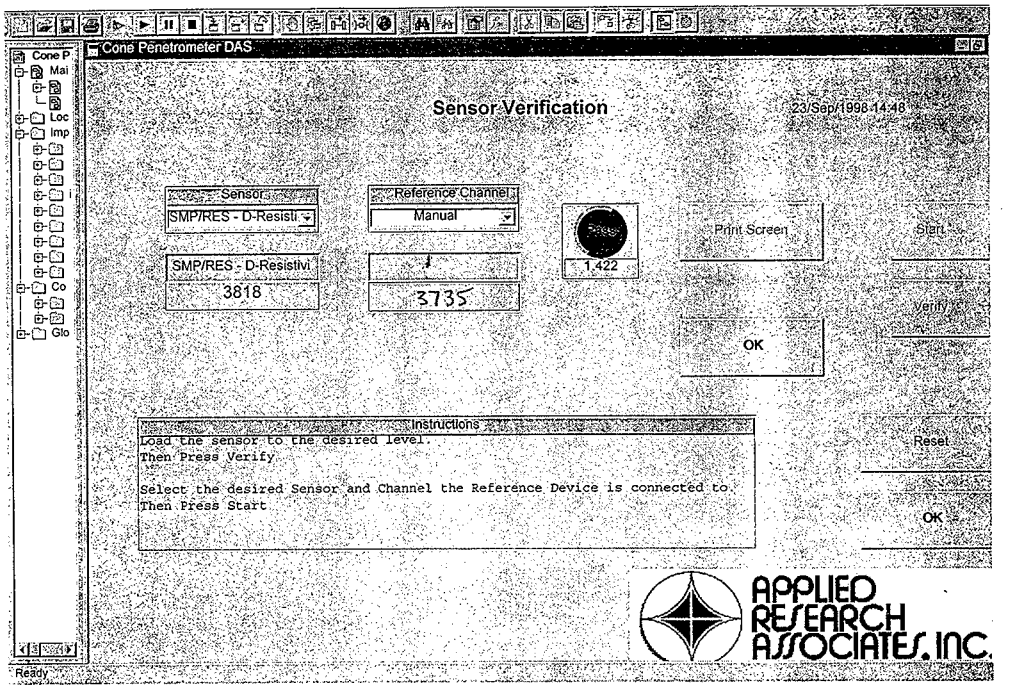

SMR Calibration
y = 4.3453x + 14.019
R2 = 0.8444
Sensor Responce (Cnts)
15.60
15.40
15.20
15.00
14.80
14.60
14.40
14.20
14.00
0.00%
5.00%
10.00%
15.00%
20.00%
25.00%
30.00%
Volumetric Moisture Content (%)
CPT data
Manual Data
Linear (CPT data)

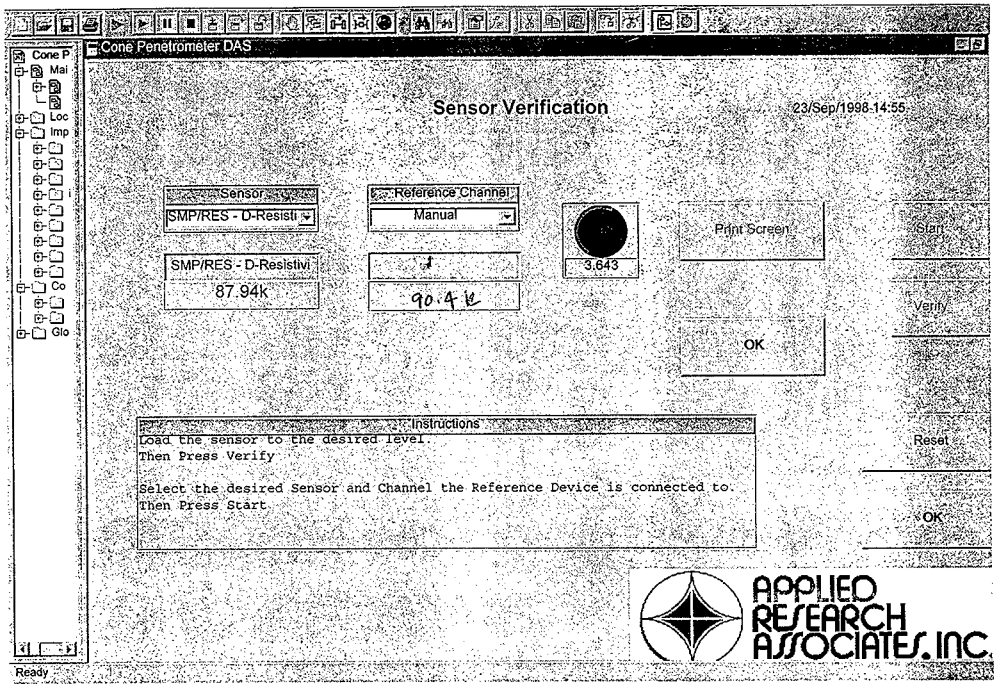
Calibration Date: 8/14/9

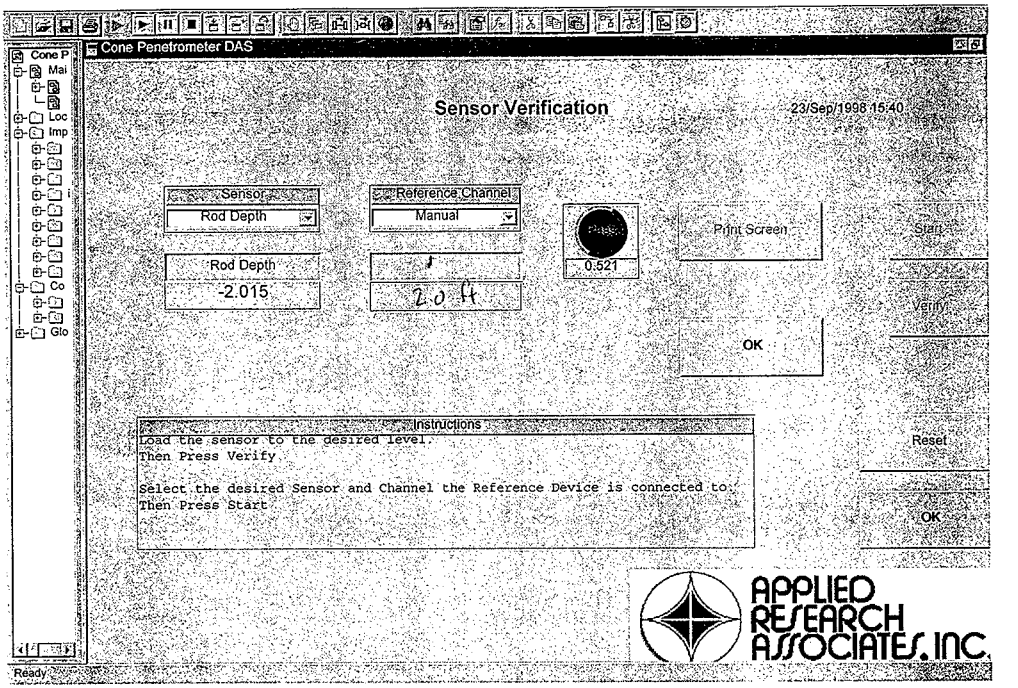


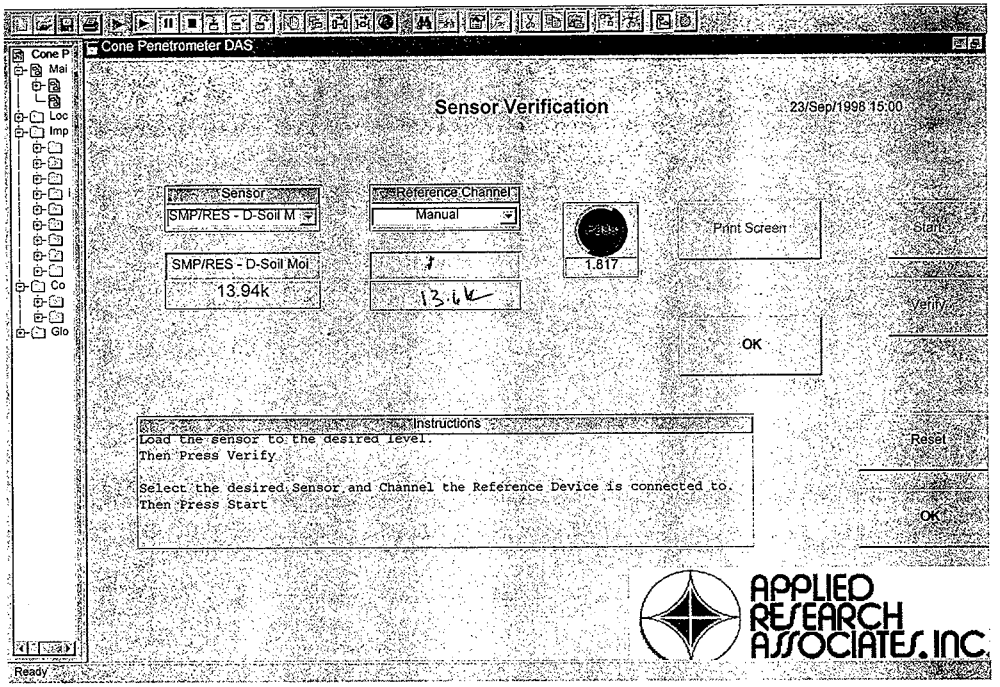
Salt Added (g)	Soil Moisture Air	Resistivity H20	Resistivity Air	Resistivity H20	Conductivity (uS/cm)	Temperature	Adjusted Resistivity (V)		Measured Resistivity (ohm-m)	K
0	13390	15980	0.08853	0.05186	1.1		0.054	90602.39412	9090.909	0.100339
0.32	13390	15990	0.08924	0.1603	3.6	0.9209	0.167	27958.57866	2777.778	0.099353
0.34	13390	16010	0.08983	0.2974	7.1	0.9218	0.310	14147.81493	1408.451	0.099553
0.34	13420	16010	0.08723	0.416	10.6	0.9214	0.433	9544.134998	943.3962	0.098846
0.36	13420	16000	0.08759	0.5295	14.3	0.9216	0.551	7069.613143	699.3007	0.098916
0.36	13420	16000	0.08539	0.6277	17.9	0.9213	0.654	5650.725122	558.6592	0.098865
0.59	13410	15990	0.08583	0.7679	24	0.9219	0.800	4253.887432	416.6667	0.09795
0.51	13420	15990	0.0872	0.878	29.3	0.9224	0.914	3469.658496	341.2969	0.098366
0.56	13420	16010	0.0861	0.9747	35	0.9222	1.015	2927.013603	285.7143	0.097613
0.57	13420	16010	0.08677	1.064	40.8	0.9223	1.108	2513.49639	245.098	0.097513
0.6	13420	16010	0.08707	1.142	46.9	0.9241	1.189	2205.219054	213.2196	0.096689
3.81	13410	16010	0.08773	1.481	85.6	0.9254	1.542	1242.646968	116.8224	0.094011
3.84	13410	16000	0.088	1.667	124.1	0.9267	1.736	880.8399275	80.58018	0.091481
3.87	13420	16000	0.08842	1.79	162.8	0.9278	1.864	682.8827705	61.42506	0.08995
7.97	13410	15980	0.08834	1.935	243	0.9272	2.015	481.8398755	41.15226	0.085407
8.02	13360	15980	0.08823	2.013	321	0.9263	2.096	385.6732038	31.15265	0.080775
8.15	13360	15950	0.08841	2.072	400	0.9269	2.157	317.7413896	25	0.07868
40.9	13420	15910	0.08988	2.208	788	0.9271	2.299	174.9819561	12.69036	0.072524
39.19	13420	15910	0.09031	2.212	1151	0.9287	2.303	171.0488965	8.688097	0.050793
	13390		0.08777							

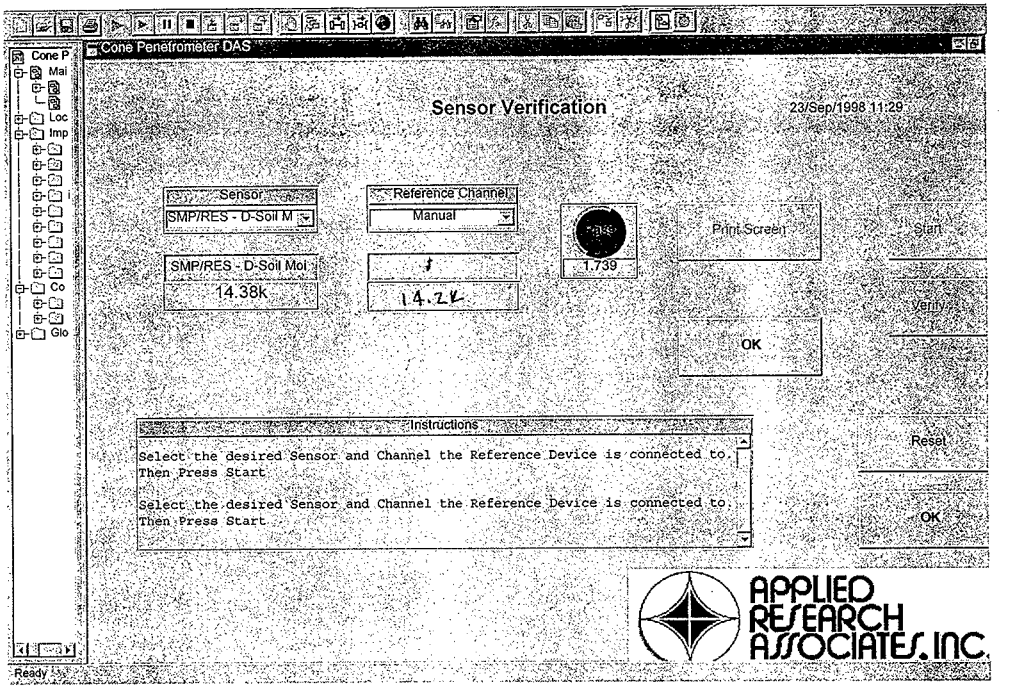
0.581	2.26	212.3894	1.04091	
10.586	2.3	173.913		1.041155
100077	0.047	104383	1.041399	
1000000	0.078	62102.56		

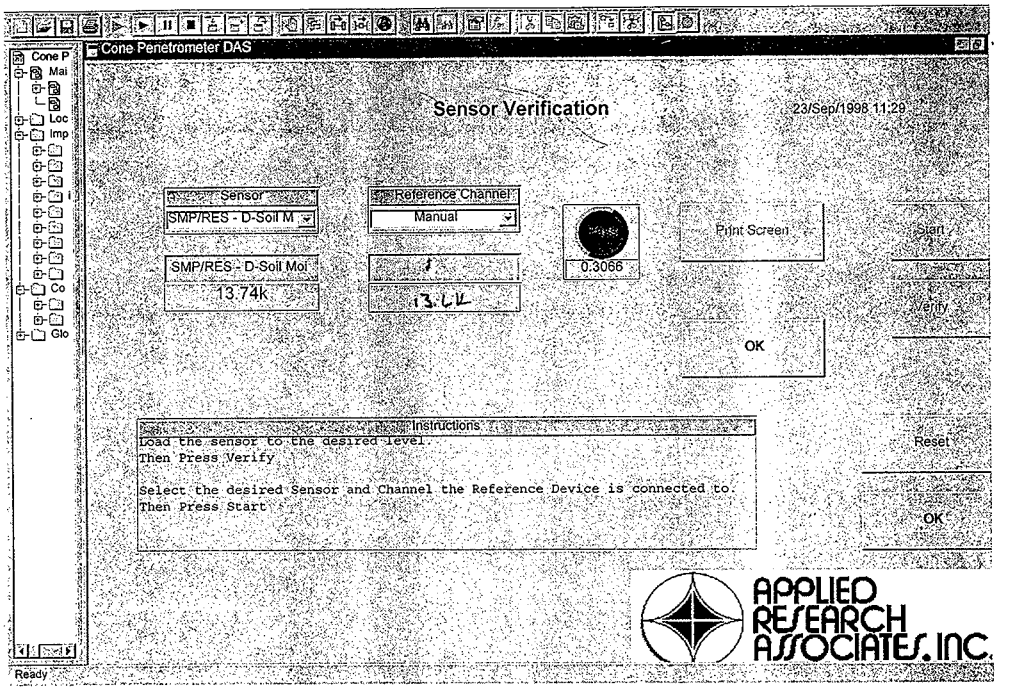

Cone Penetrometer DAS
Sensor Verification
23/Sep/1998 14:48
Sensor
SMP/RES - D-Resisti
Reference Channel
Manual
SMP/RES - D-Resistivi
3818
3735
1.422
Print Screen
Start
Verify
OK
Instructions
Load the sensor to the desired level.
Then Press Verify
Select the desired Sensor and Channel the Reference Device is connected to.
Then Press Start
Reset
OK
APPLIED RESEARCH ASSOCIATES, INC.
Ready

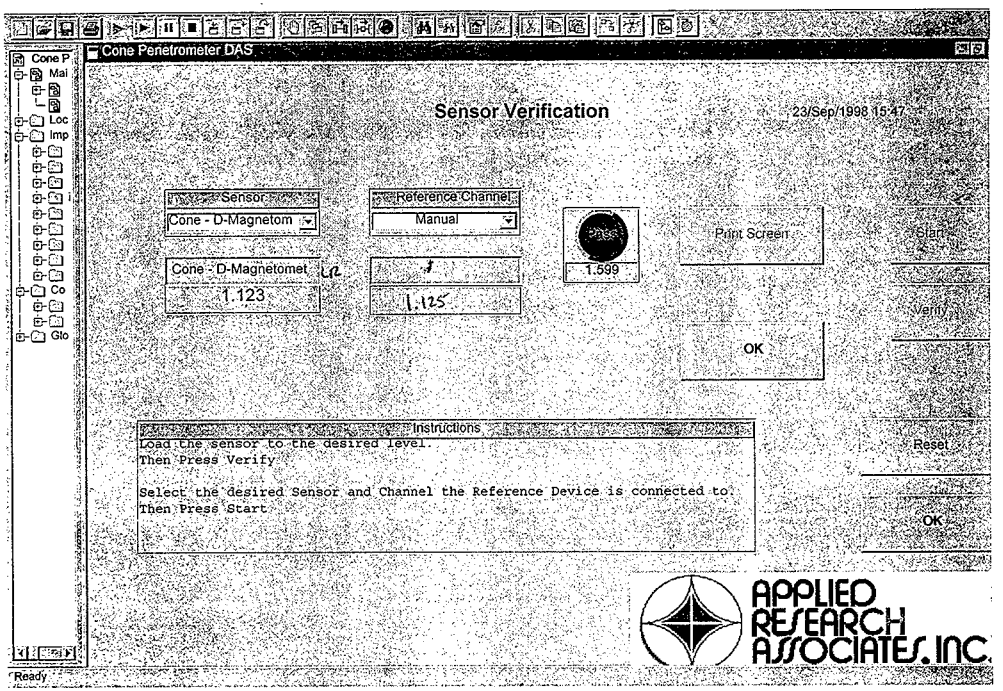

Cone Penetrometer DAS
Sensor Verification
23/Sep/1998 14:55
Sensor
SMP/RES - D-Resisti
Reference Channel
Manual
3.643
Print Screen
Start
SMP/RES - D-Resistivi
87.94k
Verify
OK
Instructions
Load the sensor to the desired level
Then Press Verify
Select the desired Sensor and Channel the Reference Device is connected to.
Then Press Start
Reset
OK
APPLIED RESEARCH ASSOCIATES, INC.
Ready

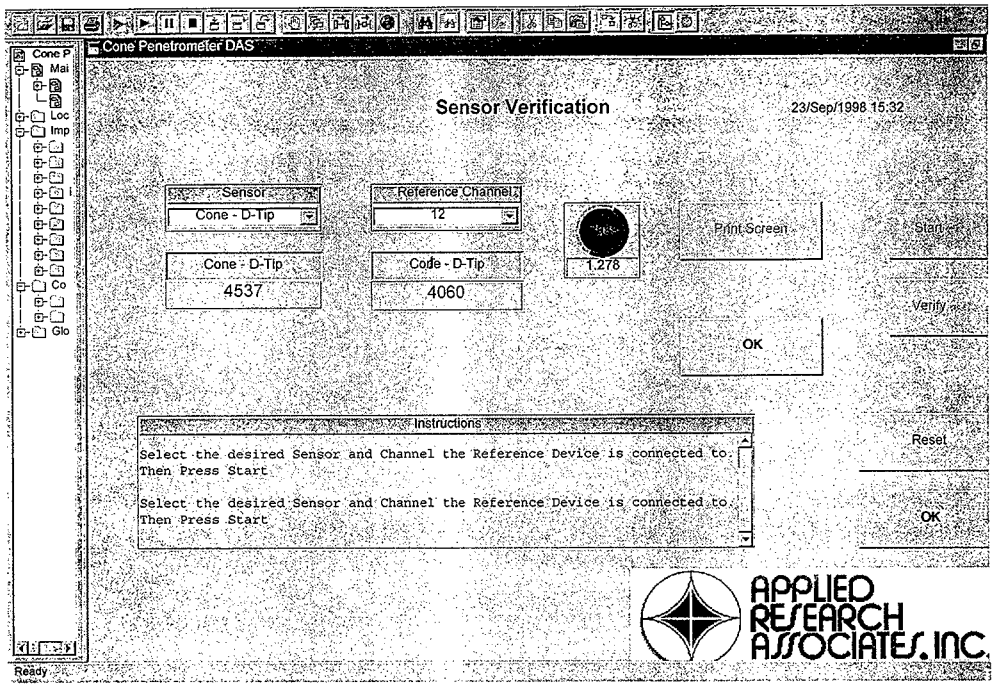

Cone Penetrometer DAS
Sensor Verification
23/Sep/1998 15:40
Sensor
Rod Depth
Reference Channel
Manual
Rod Depth
-2.015
2.0 ft
0.521
Print Screen
Start
Verify
OK
Reset
OK
Instructions
Load the sensor to the desired level.
Then Press Verify
Select the desired Sensor and Channel the Reference Device is connected to.
Then Press Start
APPLIED RESEARCH ASSOCIATES, INC.
Ready


Cone Penetrometer DAS
Sensor Verification
23/Sep/1998 15:00
Sensor
SMP/RES - D-Soil M
Reference Channel
Manual
SMP/RES - D-Soil Moi
13.94k
1.817
Print Screen
Start
Verify
OK
Reset
OK
Instructions
Load the sensor to the desired level.
Then Press Verify
Select the desired Sensor and Channel the Reference Device is connected to.
Then Press Start
APPLIED RESEARCH ASSOCIATES, INC.
Ready


Cone Penetrometer DAS
Sensor Verification
23/Sep/1998 11:29
Sensor
SMP/RES - D-Soil M
Reference Channel
Manual
SMP/RES - D-Soil Mol
14.38k
1
14.2k
1.739
Print Screen
Start
Verify
OK
Reset
OK
Instructions
Select the desired Sensor and Channel the Reference Device is connected to.
Then Press Start
Select the desired Sensor and Channel the Reference Device is connected to.
Then Press Start
APPLIED RESEARCH ASSOCIATES, INC.
Ready


Cone Penetrometer DAS
Sensor Verification
23/Sep/1998 11:20
Sensor
SMP/RES - D-Soil M
Reference Channel
Manual
0.3066
Print Screen
Start
SMP/RES - D-Soil Moi
13.74k
Verify
OK
Instructions
Load the sensor to the desired level.
Then Press Verify
Select the desired Sensor and Channel the Reference Device is connected to.
Then Press Start
Reset
OK
APPLIED RESEARCH ASSOCIATES, INC.
Ready


Cone Penetrometer DAS
Sensor Verification
23/Sep/1998 15:47
Sensor
Cone - D-Magnetom
Reference Channel
Manual
Cone - D-Magnetomet
1.123
1
1.125
1.599
Print Screen
Start
Verify
OK
Reset
OK
Instructions
Load the sensor to the desired level.
Then Press Verify
Select the desired Sensor and Channel the Reference Device is connected to
Then Press Start
APPLIED RESEARCH ASSOCIATES, INC.
Ready


Cone Penetrometer DAS
Sensor Verification
23/Sep/1998 15:32
Sensor
Cone - D-Tip
Reference Channel
12
1.278
Print Screen
Start
Cone - D-Tip
4537
Code - D-Tip
4060
Verify
OK
Instructions
Select the desired Sensor and Channel the Reference Device is connected to.
Then Press Start
Select the desired Sensor and Channel the Reference Device is connected to.
Then Press Start
Reset
OK
APPLIED RESEARCH ASSOCIATES, INC.
Ready

Appendix E

HANFORD TANK INITIATIVE CONE PENETROMETER VADOSE ZONE CHARACTERIZATION PROJECT

ARA Hanford CPT Development Test Plan

For

Multi-Sensor Probe, Tip and Soil Moisture Modules

Contract Number MJG-SLB-A52807

Work Element #3

Revision 0.0

HTI CONE PENETROMETER PROBE ENGINEERING

1.0 INTRODUCTION

1.1 Purpose

This procedure shall be used for the final development testing of the Multi-Sensor Probe (MSP) and its associated Data Acquisition system (MSP-DAS) for the final phase of testing to be performed at the Hanford Site. This MSP probe includes a variety of sensors including: 1) a tip module containing tip stress, sleeve stress and inclination sensor as well as a magnetometer for detection of ferrous objects, 2) a soil moisture and resistivity module, 3) a gamma spectroscopy (GS) module for radiation characterization, and 4) an X-Ray Fluorescence (XRF) module for detection of metal contaminants. The goal of this test is to show integration of the probe, the CPP-DAS, the MSP-DAS and CP platform systems.

The test procedures will demonstrate the overall system function as well as system integration, including software integration with the Cone Penetrometer Platform (CPP) data acquisition system (CPP-DAS). This document details the procedures used to conduct these test and confirm that the specifications detailed in HNF-SD-HTI-SDS-001. Rev. 2 entitled "Specification for Soil Multisensor and Soil Sampling Cone Penetrometer Probes" are satisfied.

1.2 Scope

Completion of the testing specified in this document will verify that the mechanical, electrical and software components of the MSP and MSP-DAS are operating as designed. The scope of the test plan is as follows:

- Basic equipment functions and mechanical interfaces will be verified.
- Performance of electrical components and sensor responses will be verified.
- The software and software interfaces between the MSP-DAS and CPP-DAS will be demonstrated.

2.0 APPLICABLE/REQUIRED DOCUMENTS

- ARA MSP-DAS hardware wiring Plan
- ARA modification log on the MSP probe
- ARA Design Documentation on the Soil Moisture Probe
- ARA MSP-DAS software design plan
- Specification HNF-SD-HTI-SDS-001. Rev. 2
- Statement of work

3.0 TEST CONTROLS

3.1 Responsibilities

3.1.1 Project Engineer

Deborah Iwatate

William Callaway

Gary Troyer

- Make redline changes to working TP as required.
- Overall responsibilities for maintaining and controlling testing.
- Provide liaison with facility used for testing.
- Provide liaison with Quality Assurance (QA) for testing activities as required.
- Overall testing responsibilities and assignment responsibilities.
- Monitor testing for compliance with the test procedures and co-sign the appropriate steps. (Note: On certain steps, the project engineer may run these steps to gain a better understanding of the equipment.)
- Can authorize the test performer to perform Project Engineer responsibilities on a limited basis.

3.1.2 Applied Research Associates, Inc. (ARA) Test Performers (or associated subcontractors)

Wesley Bratton

Willie Dickerson

Bob Jones

- Perform test in accordance with approved test procedure.
- Maintain a file of documented information pertinent to the tests.
- Assure safe conduct of testing.
- Prepare test report.

3.2 Test Data

3.2.1 All test data, pertinent observations, and off-normal events shall be recorded on the test procedure, Section 6.0 of this TP. If additional space is required, the data shall be recorded on an observation/results data sheet (provided in Appendix A) or equivalent.

3.2.2 Data recorded on the observation/results data sheets shall be documented in the test report (TR).

3.2.3 The data recorded during the test shall be released in the TR as raw or reduced data.

3.2.4 Calibration data shall be released in the TR.

3.3 Test Configuration

3.3.1 The drawings and engineering documents that establish the process equipment test configuration are listed in Section 2.0.

3.3.2 Additional documents required to perform, document, or validate a test (sketches, calibration sheets, etc.) will be referenced in the TR.

3.4 Procedure Control

3.4.1 A controlled test procedure package shall be used for testing and shall include the following:

- A single copy of this test procedure.
- Other information directly applicable to testing that is required.

3.5 Retest and Redline Procedure Control

3.5.1 If retest is required, additional copies of applicable procedure sections or observation/results data sheets of this test procedure may be used or new procedures may be used.

3.5.2 Changes to the test procedure are permitted. The project engineer shall red ink changes with the concurrence of the test performer. Approvals will be documented by the Hanford project engineer's and test performer's initials on the redlined item and noted in the exceptions sheet located in Appendix B, giving the reasons for the change.

3.6 Open Items

3.6.1 Items and actions identified during the conduct of testing that require future resolution/completion shall be noted on comment sheets. Identified open items shall subsequently be addressed in the Test Report (TR).

4.0 TEST FACILITY

The final development testing will be conducted at the Hanford Facility in Richland using the CPP system. This testing will document proper operation in Hanford soils as required by the specification.

5.0 SAFETY

- Only the project engineers and test performer personnel shall operate the cone penetrometer during performance of this TP.
- Test personnel shall be briefed prior to test performance on the hazards unique to the cone penetrometer equipment.
- Applied Research Associates, Inc. (ARA) is responsible for safety during the developmental testing, and identifying the appropriate personnel protective equipment required for testing.

Concurrence: _____ _____
ARA Representative Date

6.0 TEST PROCEDURES

6.1 Prerequisites

The goal of this final development test program is to confirm total system integration of the platform and it CPP-DAS with the MSP-DAS system and the associated hardware and probes. As part of this testing, each sensor will undergo a validation test to confirm operation and calibration of the sensor prior to the actual push deployment. After the validations, the probe will be pushed a depth in the Hanford soils using the same procedures that will be utilized during the Hot Deployment.

Space is provided in each test parameter section to record test observations. This information may be augmented with additional sheets, copies of pages of laboratory notebooks, printouts of representative spectra, etc. This format is not intended to replace requirements for preparation of a qualification test plan and a qualification test summary report.

Successful completion of a given test is documented by the project engineer's signature on the observation/results data sheet.

6.2 Test Sequencing

This testing will conclude the development testing of the MSP probe and the associated hardware and software. The final testing program consists of two steps. The first step is the validation of each sensor using the validation section of the CPP-DAS software or the QA/QC section of the MSP-DAS software. Upon successful completion of this testing the probe will be pushed in the Hanford soils using the CPP platform to a depth of 20 feet.

6.3 Performance Verification Tests

6.3.1 Probe Inspection

PURPOSE: Verify that all required HTI-CPP probes have been transported to the Hanford Site.

TEST: Visual Inspection of the following four probe units.

1) MSP probe with umbilical cable and Data Acquisition System
2) Soil Sampling probe with both sample chambers and a magnetometer and inclinometer insert unit.
3) Stand-along grouting module
4) Grouting module for the SSP unit

EXPECTED: Evidence that all probes are present on site.

TEST RESULT (S):

Unit	Date Inspected	Initials
1) MSP probe and equipment	WSC	9/23/98
2) SSP unit and equipment	WSC	9/25/98
3) Stand Alone grouting	WSC	9/25/98
4) SSP Grouting	WSC	9/25/98

PERFORMED BY / WITNESSED BY

_____
Date

WLB/ANA
Initials / Org

6.3.2 MSP Equipment Integration

PURPOSE: Confirm integration of MSP probe with CPP platform and DAS.

EQUIPMENT CONDITION: The probe and associated electronics and software should be installed and fully integrated with the CPP platform.

TEST: Confirm that Test name, test depth from CPP-DAS and CPP-DAS time are being transferred to the MSP DAS system.

Visually observe that the MSP probe is on the rig and is pushed by the CPP.

TEST RESULT (S):

The test name, depth and time are observed on the MSP-DAS computer

WSC (initals).

Observed that the MSP probe and umbilical was pushed using the CPP system

WSC (initials)

PERFORMED BY / WITNESSED BY

09/25/98
Date

WLB/ARA
Initials / Org

6.3.3 Sensor Validation

PURPOSE: Confirm operation and validity of calibration of all sensors in the MSP probe.

EQUIPMENT CONDITION: The probe and associated electronics and software should be fully integrated with the CPP platform.

TEST: Use the verification section of the software to check and validate the following sensors in the Tip Module and the SMR module: Tip stress, sleeve stress, inclination, magnetometer, resistivity and soil moisture. Print hardcopies of the validation screens.

Attach the QC samples for the XRF and gamma sensors on the appropriate section of the probe and using the MSP-DAS software make the QA/QC measurements.

EXPECTED: For the tip module and SMR units, each sensor should validate. For the XRF and gamma modules, the spectra files should indicate peaks at the appropriate energy levels.

TEST RESULT (S):

Notes pages in the CPP logbook with validation printouts.

Sensor	Pages in book	Date performed	Initials
Tip stress	_____	9/23	WLB
Sleeve Stress	_____	9/23	WLB
Inclinometer	_____	9/23	WLB
Magnetometer	_____	9/23	WLB
Resistivity	_____	9/23	WLB
Soil Moisture	_____	9/23	WLB
Gamma	_____	9/24	WLB
XRF	_____	9/24	WLB

PERFORMED BY / WITNESSED BY

09/23/98
Date

WLB/ARA WSC/HTI _____
Initials / Org

6.3.4 Penetration Test

PURPOSE: Demonstrate successful integration of systems and operation in Hanford soils.

EQUIPMENT CONDITIONS: The probe and associated electronics and software should be fully integrated with the CPP platform. The umbilical must be strung through at least 10 rods. The remaining cable should be stretched out and not coiled.

TEST: Conduct a penetration to a tip depth of twenty-six feet below the ground surface or push force values of 30tons. Penetration should be conducted using standard operating procedures. Prepare plots of CPT and spectra data.

EXPECTED: Data from all sensors showing soil conditions at the location as well as no contamination present.

TEST RESULT (S):
Test location: ILAW - Location #2
Test Filename and IDs: Z2459804C.dat / Z2459804C-XXX + /Z2459804X-XXX
Penetration Depth: 25.5 ft

PERFORMED BY / WITNESSED BY

09/25/98
Date

WLB/ARA	WSC/HTI*		
Initials / Org			

* PROCESSED DATA TO BE DELIVERED BY 9/28/98

DISTRIBUTION SHEET

To	From	Page 1 of 1
Distribution	Numatec Hanford Co., Project Definition	Date 10/23/98
Project Title/Work Order		EDT No. 625688
Completion of the HTI Characterization Milestone T04-98-523, HNF-3550, Rev. 0		ECN No. N/A

Name	MSIN	Text With All Attach.	Text Only	Attach./ Appendix Only	EDT/ECN Only
GL Troyer	T6-50	X			
WS Callaway	S3-90	X			
DF Iwatate (2)	R2-89	X			
R Root	R2-53			X (cvr)	
AF Noonan	R2-89	X			
JM Zimmer (2)	B1-42	X			
GS Leshikar	S0-08			X (cvr)	
Central Files (1)	~~B1-07 H7-09~~ B1-07	X			
HTI Project Files (1)	R1-29	X			
DOE/RL reading room	H2-53	X			

(MS523rpt.DIS)