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ENGINEERING DATA TRANSMITTAL

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2. To: (Receiving Organization) Distribution	3. From: (Originating Organization) Engineering Testing Laboratory, 8C921	4. Related EDT No.:
5. Proj./Prog./Dept./Div.: Magnetometer Calibration and Test Procedure	6. Design Authority/ Design Agent/Cog. Engr.: Don M. Squier	7. Purchase Order No.:
8. Originator Remarks: This test procedure is submitted for review and approval		9. Equip./Component No.:
		10. System/Bldg./Facility:
11. Receiver Remarks: 11A. Design Baseline Document? [] Yes [X] No		12. Major Assm. Dwg. No.:
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		14. Required Response Date: ASAP

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-SD-WM-TP-531		0	Magnetometer Calibration and Test Procedure	Q	1,4	1,4	

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
1		Project Engineer G. A. Barnes	[signature]	5-28-97	B4-51						
1	1	Cog.Eng. D. M. Squier	[signature]	5-27-97	L6-13						
1		Cog. Mgr. M. J. Schliebe	[signature]	5/28/97	L6-13						
1		QA J. F. Bores	(approved by fax)	5/28/97	S1-57						
		Safety									
		Env.									

18.	19.	20.	21.
D. M. Squier [signature] 5-27-97 Signature of EDT Originator / Date	G. A. Barnes [signature] 5-28-97 Authorized Representative for Receiving Organization / Date	M. J. Schliebe [signature] 5/28/97 Design Authority/ Cognizant Manager / Date	DOE APPROVAL (if required) Ctrl. No. [] Approved [] Approved w/comments [] Disapproved w/comments

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1		Project Engineer G. A. Barnes			B4-51						
1	1	Cog.Eng. D. M. Squier	[signature]	5-27-97	L6-13						
1		Cog. Mgr. M. J. Schliebe			L6-13						
1	1	QA J. F. Bores	J. F. Bores	5/28/97	S1-57						
		Safety									
		Env.									

18.	19.	20.	21. DOE APPROVAL (if required) Ctrl. No.
D. M. Squier [signature] 5-27-97 Signature of EDT Originator Date	G. A. Barnes Authorized Representative Date for Receiving Organization	M. J. Schliebe Design Authority/ Cognizant Manager Date	[] Approved [] Approved w/comments [] Disapproved w/comments

Magnetometer Calibration and Test Procedure

D. M. Squier
Numatec Hanford, Richland, WA 99352
U.S. Department of Energy Contract DE-AC06-96RL13200

EDT/ECN: 601046 UC: 506
Org Code: 8C921 Charge Code: D26K3
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Key Words: Magnetometer, 241-AX-104, Tank Heel

Abstract: Nuclear waste has been pumped from storage tank 241-AX-104 leaving and unknown volume of dried tank heel. A magnetometer transducer will be lowered through several tank risers to rest on the heel's surface for measurements of the distance to the tank bottom. These measurements will permit an estimate of the heel volume. Magnetometer calibration and testing are described by this Supporting Document.

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May 23, 1997

Don M. Squier

Engineering Testing Laboratory
Numatec Hanford Company
Richland, Washington

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1.0 Purpose/Scope

Nuclear waste has been sluiced and pumped from storage tank 241-AX-104, leaving a contaminated heel volume. These operations did not include measurements of the removed waste volume leaving an unknown heel volume in the tank.

A magnetometer transducer will be lowered through tank riser ports to rest on the heel's surface. The heel thickness will control the distance between the transducer and the tank's bottom The instrument's output varies with the distance from a magnetic mass, such as the tank's steel bottom, thereby enabling a measurement of the heel depth. Measurements at several tank locations will permit an estimate of the tank's heel volume.

The magnetometer's output is influenced by adjacent magnetic materials, such as the tank walls, air lift circulators or other equipment installed in the tank. An adjacent vertical steel surface produces a voltage offset in the instrument's output. Measurements near a tank wall or other tank components may be corrected by noting the offset before the instrument's output is influenced by the tank bottom. An unlevel or uneven heel surface could orient the magnetometer transducer so that it is not vertically level. The magnetometer readings are influenced by these skewed transducer orientations. The magnitude of these errors and offsets must be characterized to bound the heel volume estimate range.

The data collected by this activity will be statistically analyzed by SESC to state the confidence level of the heel volume estimates. A test report will document the results of the measurements.

2.0 Test Conditions and Equipment Required

The magnetometer system consists of the following basic components:

- Magnetometer transducer with internal thermistor
- 100 feet of electrical cable containing power and signal leads
- Power and signal conditioning module with a front panel digital indication. A selector switch allows display of the transducer temperature, excitation voltage or magnetometer voltage (distance). The temperature and distance are also available as analog outputs on a rear panel connector.

Several measurement configurations will characterize the magnetometer's voltage output as it is vertically displaced over an eight inch range from a carbon steel 3/8 inch plate target.

- The target shall have a square configuration with nominal three foot dimensions (Ref. Applied Research Associates, Inc, ARA Report No. 5968-3, "Development of Bottom Detecting Unit for Hanford Tank Farm CPT Work", Sept. 15, 1995).
- The magnetometer will be centered over the target plate.
- The target will be leveled and located so that it is isolated from magnetic materials.

The transducer will be suspended by an arm mounted on a vernier gage slide. The long arm is constructed of aluminum to prevent the vernier gage's steel components from affecting the magnetometer measurements. This arrangement will assure a vertical orientation of the transducer. The base mounted vernier gage will be leveled so that the transducer displacements are only in the vertical direction.

The magnetometer is expected to measure distances within a 1/16 inch. Typically it is desirable to use a calibration standard that is at least four times more accurate that the instrument being calibrated. The vernier gage will permit transducer positioning within 0.001 inches. The vernier gage accuracy is fixed at the time of manufacture and will be a suitable standard in the uncalibrated condition for this application.

The basic measurement sequence is to lower the transducer onto the target face and then record the vernier reading. This vernier reading is the zero displacement value. Displacement from the target is obtained by subtracting the zero displacement value from the subsequent vernier readings. The eight is added to the zero displacement value to determine the eight inch displacement vernier reading. The vernier slide is then moved to the eight inch displacement position and the vernier reading and the voltage output are recorded. The vernier slide is repeatedly moved down one inch and the resulting magnetometer voltages and vernier readings are recorded. The transducer is eased onto the target when returning to the zero position before recording the vernier reading and voltage output. The project engineer will determine if a significant change in the zero position reading will invalidate the run. At least ten displacement runs will be made in each measurement configuration. The project engineer shall dictate if additional runs are necessary.

Wherever possible calibrated equipment will be used. The identity of all measuring equipment will be recorded by type, manufacturer, model, range and serial number (if applicable). Calibration code, calibration date, and expiration date will be recorded for any measuring equipment identified with this information.

2.1 Ideal Measurement Condition

The magnetometer will be centered over the plate target and the voltage output recorded at intervals over the eight inch displacement range. This condition will simulate the ideal condition where errors are not introduced by intervening materials, elevated temperatures, adjacent magnetic materials or skewed transducer orientations. These measurements are somewhat similar to in tank deployment locations that are removed from adjacent magnetic surfaces other than the tank bottom. There are no acceptance criteria for these measurements, the data is used to develop a magnetometer calibration curve.

2.2 Proximity to Simulated Tank Wall and Knuckle Condition

The vertical steel surface offset will be characterized using a simulation of a tank wall and tank bottom junction. The actual tank junction is formed by a four to eight inch radius between the bottom plate and the wall plate (Ref. drawing H-2-44562). This radius is termed the tank bottom knuckle. The tank's internal wall stiffening ribs will prevent the instrument from getting any closer than five inches from the wall. This distance from the wall places the instrument's centerline near the portion of the knuckle that is approaching horizontal. The tank wall and bottom knuckle will be simulated by a test fixture fabricated from 3/8" carbon steel plate as shown in the Figure 1 cross section.

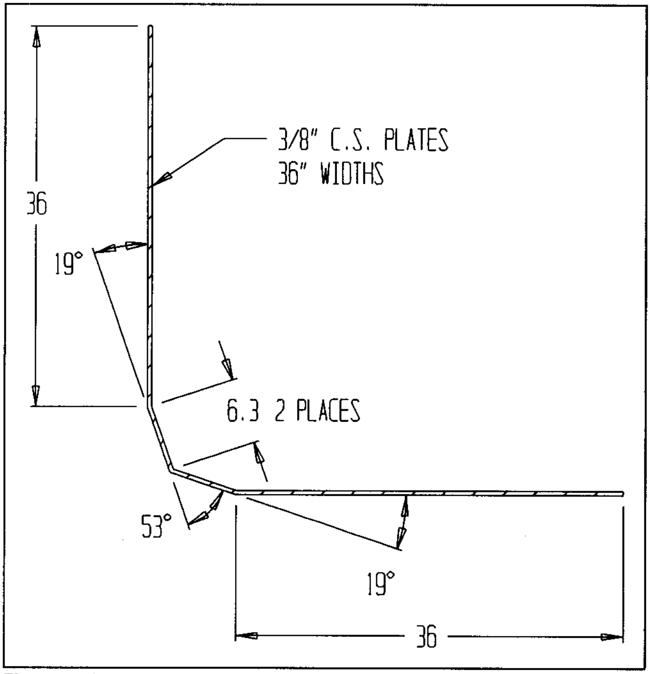

Figure 1 Simulated Tank Wall and Bottom Knuckle Test Fixture

The simulated tank wall and bottom knuckle test fixture geometry follows the curve of an eight inch radius within a nominal $^+/-$ 0.4 inches. The test fixture's flat plate fabrication does not attempt to mimic the cylindrical large radius curvature of the tank walls. The angled plate sections are tack welded at intervals. The simulated wall will be vertically leveled so that it is perpendicular to the simulated tank bottom before measurements are made.

The measurements will be made with magnetometer transducer centerline located 6, 12 and 18 inches from the simulated tank wall. Ten runs will be made at each location. These measurements will use also use the target plate (simulated tank bottom) as the zero displacement reference position. The project engineer will make a judgement, based on the collected data, if runs are necessary at additional locations from the simulated wall. There are no acceptance criteria for these measurements, the data is used to develop a magnetometer calibration curve.

2.3 Skewed Transducer Condition

A protractor level will be used to skew the magnetometer transducer 5° from the true vertical position. The transducer's diameter will be measured and recorded so that the mean distance to the target plate can be calculated. The zero displacement position is defined as the elevation that allows a point on the transducer's face edge to just contact the target plate. There are no acceptance criteria for these measurements, the data is used to develop a magnetometer calibration curve.

2.4 Heel Simulant Covering the Target Surface

A one inch high wooden frame will surround the leveled target's edges to contain a one inch layer of ferric oxide (Ref. Letter from: J. E. Horton, to: J. S. Buckingham, "Achievement Report (Draft)", July 10, 1974). This will simulate the major component of the dry heel remaining on the tank bottom. The zero displacement position will be measured and recorded before the ferric oxide is leveled onto the target surface. The non-magnetic ferric oxide is not expected to change the instrument's output from the values previously obtained under the ideal measurement condition. The transducer is then lowered onto or near the ferric oxide surface so that displacement from the target is identical to a displacement position recorded during the ideal measurement conditions. The magnetometer voltage output and vernier reading are recorded. If the voltage reading varies by more than 5% of the voltage value recorded under the ideal measurement conditions, the project engineer shall record and disposition a test exception. The judgement of the project engineer shall dictate if additional measurements are necessary to better characterize this measurement condition.

2.5 Elevated Temperature Measurements

The target and transducer will be placed in an environmental chamber to verify proper operation of the instrument's temperature compensation features and the signal conditioner's temperature indication. The transducer will rest on a non-magnetic spacer, one to two inches above the target's surface. The spacer material and height dimension will be recorded to account for elevation changes due to thermal expansion.

A K-type thermocouple will be attached to the magnetometer transducer body. The thermocouple output and magnetometer's distance and temperature outputs will be connected to a data acquisition system.

The environmental chamber's controller will be programmed to provide 10° F temperature increments from 70° F to 150° F. The temperature will be held a each increment for an hour to achieve temperature equilibrium. Experience with the test system may dictate changes in the hot soak times required to achieve temperature equilibrium. The data acquisition system will record data at five minute intervals through out the temperature cycle.

The data acquisition system's display will plot the last one hundred points collected. This feature makes it possible to determine when temperature equilibrium is achieved as indicated by a constant temperature over time. The function of the signal conditioner's temperature digital indication will be checked by recording the signal conditioner's digital temperature indication and the transducer body thermocouple temperature when temperature equilibrium is achieved. The signal conditioner's digital temperature indication will only be checked at a few points as the test system will be operating overnight when the building is not staffed.

The data recorded by the data acquisition system will be imported into a spread sheet to generate a hard copy attachment to the test control copy of this procedure. If the signal conditioner's digital temperature indication varies 5% from the thermocouple value under equilibrium conditions, the project engineer shall record and disposition a test exception.

2.6 Radiation Exposure

The magnetometer transducer will be lowered into an access tube at PNNL's Gamma Facility to verify that the distance indication reads correctly while exposed to gamma radiation at maximum of 500 rad/hour. A steel disk and spacer disk will be attached to the transducer's end. The non-magnetic spacer disk will hold the steel disk a constant distance from the transducer's end so that the instrument's distance indication is not saturated at the full voltage output. This arrangement will make it possible to observe an increase or decrease in the distance indication.

The magnetometer output will be affected by stainless steel access tube surrounding the transducer. The initial distance (volts) indication produced by the steel disk and spacer disk will be recorded when the transducer is fully enveloped by the access tube, but experiencing the reduced levels of gamma radiation present at the access port opening. The transducer will be lowered into the access tube in increments. The elevation in the access tube will be recorded at each increment so the radiation exposure can be estimated from the facility's calibration records. The magnetometer system's indication of temperature and distance will be recorded at each elevation increment.

The project engineer will record and disposition a test exception if any distance indication in the access tube differs 5% from the initial (access tube opening) distance indication. This shall also apply if the temperature indicated by the magnetometer system differs from the thermocouple temperature indication by 5%.

3.0 Procedure

The measurements and the test equipment are recorded on the data sheets provided in Appendix A. Every sheet will require the signature of the person making the entries and the entry date. The Measuring and Test Equipment (M&TE) list identifies the equipment by item numbers. Applicable item numbers are entered into a space provided on each data sheet for the measurement activity. Some measurement activities may require multiple data sheets, these sheets have a space to enter the page number and page count.

Procedure changes are permitted by "red line" markings on the procedure. The project engineer shall indicate concurrence by dating and initialing the red line item(s).

These measurement activities may reveal a requirement for additional measurements. Any addtional measurements shall be documented by a description, procedure and data records.

A single copy of this procedure shall be used for the measurement activities and stamped or marked "record copy" on every page and attachment. Attachments would include, but are not limited to; data sheets, test exceptions and additional test descriptions and test procedures.

3.0.1 Fill out the M&TE list to identify the equipment used for all measurements. Mark N/A in columns that do not apply.

3.0.2 Sign and date the M&TE list.

3.1 Ideal Measurement Condition Calibration Procedure

3.1.1 Verify the correct M&TE items are entered on the data sheet.

3.1.2 Sign and date the data sheet.

3.1.3 Level the target.

3.1.4 Position the magnetometer over the target's center.

3.1.5 Vertically level the vernier gage.

3.1.6 Verify that the transducer is vertically level.

3.1.7 Enter the sequential run number at the top of the data column.

3.1.8 Lower the magnetometer to the target's surface and record the vernier reading at this zero position.

3.1.9 Add 8 to the zero position and move the vernier slide to read this value.

3.1.10 Record the vernier reading and voltage reading.

3.1.11 Move the vernier slide down a nominal one inch.

3.1.12 Repeat steps 3.1.10 and 3.1.11 until the magnetometer is a nominal 1/2" above the target.

3.1.13 Lower the vernier slide until the magnetometer just touches the target surface.

3.1.14 Record the vernier reading and voltage reading.

3.1.15 The project engineer shall examine the initial vernier reading at the zero position and the finial vernier reading to judge if a significant change in position has occurred during the run. If a run is judged invalid, the project engineer shall line out the data columns, mark them as void then initial and date the columns.

3.1.16 Repeat steps 3.1.7 through 3.1.15 ten times or as directed by the project engineer

3.2 Proximity to Simulated Tank Wall and Knuckle Calibration Procedure

3.2.1 Verify the correct M&TE items are entered on the data sheet.

3.2.2 Sign and date the data sheet.

3.2.3 Level the target.

3.2.4 Vertically level the simulated tank wall.

3.2.5 Vertically level the vernier gage.

3.2.6 Verify the magnetometer transducer is vertically level.

3.2.7 Lower the magnetometer to the target's surface and record the vernier reading at the zero position.

3.2.8 Position the transducer centerline six inches from the simulated tank wall while maintaining a position centered on the wall's width.

3.2.9 Add 8 to the zero position and move the vernier slide to read this value.

3.2.10 Enter the distance from the simulated tank wall to the transducer centerline at the top of the data column.

3.2.11 Enter the sequential run number at the top of the data column..

3.2.12 Record the vernier reading and the magnetometer voltage reading.

3.2.13 Move the vernier slide down a nominal one inch.

3.2.14 Repeat steps 3.2.12 and 3.2.13 until the magnetometer just comes into contact with the simulated knuckle or the target plate.

3.2.15 Repeat steps 3.2.9 through 3.2.14 ten times.

3.2.16 Position the transducer centerline 12 inches from the simulated wall while maintaining a position centered on the wall's width.

3.2.17 Vertically level the vernier gage.

3.2.18 Verify the magnetometer transducer is vertically level.

3.2.19 Lower the magnetometer to the target's surface and record the vernier reading at the zero position.

3.2.20 Repeat steps 3.2.9 through 3.2.15.

3.2.21 Position the transducer centerline 18 inches from the simulated wall while maintaining a position centered on the wall's width.

3.2.22 Vertically level the vernier gage.

3.2.23 Verify the magnetometer transducer is vertically level.

3.2.24 Lower the magnetometer to the target's surface and record the vernier reading at the zero position.

3.2.25 Repeat steps 3.2.9 through 3.2.15

3.2.26 Repeat steps 3.2.22 through 3.2.25 at distances from the simulated wall as specified by the project engineer if so directed.

3.3 Skewed Transducer Calibration Procedure

3.3.1 Verify the correct M&TE items are entered on the data sheet.

3.3.2 Sign and date the data sheet

3.3.3 Measure and record the magnetometer's diameter

3.3.4 Position the magnetometer over the target plate's center

3.3.5 Level the vernier gage

3.3.6 Adjust the magnetometer transducer mount so that it is skewed 5° off the true vertical position

3.3.7 Record the sequential run number at the top of the data column.

3.3.8 Lower the magnetometer so that an edge just touches the skewed target plate.

3.3.9 Record the vernier reading at the zero position.

3.3.10 Add 8 to the zero position and move the vernier slide to read this valve.

3.3.11 Record the vernier reading and the magnetometer voltage reading.

3.3.12 Move the vernier slide down a nominal 1/2".

3.3.13 Repeat steps 3.3.11 and 3.3.12 until the magnetometer edge just touches the skewed target plate.

3.3.14 The project engineer shall examine the initial vernier reading at the zero position and the finial vernier reading to judge if a significant change in position has occurred during the run. If a run is judged invalid, the project engineer shall line out the data columns, mark them as void then initial and date the columns.

3.3.15 Repeat steps 3.3.7 through 3.3.14 ten times or as directed by the project engineer.

3.4 Heel Simulant Covering the Target Surface Test Procedure

3.4.1 Verify the correct M&TE items are entered on the data sheet.

3.4.2 Sign and date the data sheet.

3.4.3 Install containment boundary on target

3.4.4 Level target plate.

3.4.5 Position the magnetometer transducer over the target's center.

3.4.6 Level the vernier gage.

3.4.7 Verify that the transducer is vertically leveled.

3.4.8 Lower the vernier slide until the magnetometer just touches the target surface.

3.4.9 Record the vernier reading at this zero position.

3.4.10 Elevate the vernier slide so room is available to work on the target surface.

3.4.11 Level the ferric oxide heel simulant onto the target surface to provide a nominal one inch depth.

3.4.12 Measure and record the heel simulant depth.

3.4.13 Lower the vernier slide so the magnetometer is just above the simulant surface, duplicating a displacement from the target recorded under the ideal measurement conditions.

3.4.14 Record the vernier reading and the magnetometer voltage.

3.4.15 Repeat steps 3.4.10 through 3.4.14 as directed by the project engineer.

3.5 Elevated Temperature Measurement Test Procedure

3.5.1 Verify the correct M&TE items are entered on the data sheet.

3.5.2 Sign and date the data sheet.

3.5.3 Measure and record the height of the magnetometer spacer.

3.5.4 Record the magnetometer spacer material.

3.5.5 Place the target plate in the environmental chamber

3.5.6 Rest the magnetometer transducer on the spacer in the center of the target plate.

3.5.7 Start the environment chamber to provide a temperature of 70° F.

3.5.8 Start the data acquisition system to display (not record) the temperature trends.

3.5.9 Monitor the system to determine when temperature equilibrium is achieved in the magnetometer body. This is indicated by a constant temperature output from the thermocouple attached to the magnetometer transducer.

3.5.10 When temperature equilibrium is reached, record the magnetometer body temperature and the temperature indication on the magnetometer signal conditioner.

3.5.11 Start data acquisition system recording.

3.5.12 Program the environmental chamber's temperature controller to provide 10° F temperature increments from 70° to 150° F with one hour soak times at each increment.

3.5.13 Repeat steps 3.5.9 and 3.5.10 as possible through out the run.

3.6 Radiation Exposure Test Procedure

3.6.1 Verify the correct M&TE items are entered on the data sheet.

3.6.2 Attach a copy of the access tube calibration report to this ATP

3.6.3 Sign and date the data sheet.

3.6.4 Lower the magnetometer transducer into the access tube opening and record the initial distance reading produced by the steel disk and spacer block.

3.6.5 Lower the magnetometer into the access tube to the elevation specified by the project engineer.

3.6.6 Record the elevation

3.6.7 Record the thermocouple temperature indication

3.6.8 Record the magnetometer temperature indication

3.6.9 Record the magnetometer distance indication.

3.6.10 Repeat steps 3.6.5 through 3.6.9 as required to obtain the 500 rad/hour exposure rate.

Appendix A

Measuring and Test Equipment List - Magnetometer Calibration and Test Procedure								
Prepared by:				**Date:**				
Item No.	**Instrument Type**	**Manufacturer**	**Model**	**Range**	**Serial No.**	**Calibration Code**	**Calibration Date**	**Calibration Expires**
1	Magnetometer							
2	Voltmeter							
3	Vernier Gage							
4	Protractor Level							
5								
6								
7								
8								
9								
10								
11								
12								

Appendix A

Ideal Measurement Condition Data - Magnetometer Calibration								**Page__ of __**	
M&TE Item numbers used for these measurements:									
Measurements Performed By:							Date:		
Run #		Run #		Run #		Run #		Run #	
Vernier at zero position		Vernier at zero position		Vernier at zero position		Vernier at zero position		Vernier at zero position	
Vernier Reading Inches	Magneto-meter Voltage	Vernier Reading Inches	Magneto-meter Voltage	Vernier Reading Inches	Magneto-meter Voltage	Vernier Reading Inches	Magneto-meter Voltage	Vernier Reading Inches	Magneto-meter Voltage

Appendix A

Proximity to Simulated Tank Wall and Knuckle Data **Magnetometer Calibration**	**Page__ of __**
M&TE Item numbers used for these measurements:	
Measurements Performed By:	Date:
Upper Bound - Position from Wall (inches):	

Run #		Run #		Run #		Run #		Run #	
Distance from Wall inches		Distance from Wall inches		Distance from Wall inches		Distance from Wall inches		Distance from Wall inches	
Vernier at zero position		Vernier at zero position		Vernier at zero position		Vernier at zero position		Vernier at zero position	
Vernier Reading Inches	Magneto-meter Voltage	Vernier Reading Inches	Magneto-meter Voltage	Vernier Reading Inches	Magneto-meter Voltage	Vernier Reading Inches	Magneto-meter Voltage	Vernier Reading Inches	Magnet o-meter Voltage

Appendix A

Skewed Transducer Data **Magnetometer Calibration**								**Page__ of __**	
M&TE Item numbers used for these measurements:									
Measurements Performed By:								Date:	
Transducer Diameter (inches):									
Run #		Run #		Run #		Run #		Run #	
Vernier at zero position		Vernier at zero position		Vernier at zero position		Vernier at zero position		Vernier at zero position	
Vernier Reading Inches	Magneto-meter Voltage	Vernier Reading Inches	Magneto-meter Voltage	Vernier Reading Inches	Magneto-meter Voltage	Vernier Reading Inches	Magneto-meter Voltage	Vernier Reading Inches	Magnet o-meter Voltage

Appendix A

Heel Simulant Covering the Target Surface Data Magnetometer Test		
M&TE Item numbers used for these measurements:		
Measurements Performed By:		Date:
Vernier Reading at Zero Position (inches)		
Simulant Depth (inches)	Vernier Reading (inches)	Magnetometer Output (Volts)

Appendix A

Elevated Temperature Data Magnetometer Test	
M&TE Item numbers used for these measurements:	
Measurements Performed By:	Date:
Magnetometer Spacer Height (inches)	
Magnetometer Spacer Material	
Magnetometer Body Temperature C°	Signal Conditioner Temperature Indication C°

Appendix A

Radiation Exposure Magnetometer Test		
M&TE Item number used for these measurements:		
Measurements Performed By:		Date:
Initial magnetometer distance indication (volts)		
Access Tube Elevation (feet)	Magnetometer Temperature Indication °C	Magnetometer Distance Indication (volts)

DISTRIBUTION SHEET

To	From	Page 1 of 1
Distribution	Don Squier, Engineering Testing Laboratory	Date May 23, 1997
Project Title/Work Order		EDT No. 601046
HNF-SD-WM-TP-531, Rev. 0 Magnetometer Calibration and Test Procedure		ECN No.

Name	MSIN	Text With All Attach.	Text Only	Attach./ Appendix Only	EDT/ECN Only
G. A. Barnes	B4-51	X			
M. J. Schliebe	L6-13	X			
F. R. Reich	B4-51	X			
J. F. Bores	S1-57	X			
D. M. Squier	L6-13	X			
M. R. Telander	P8-15	X			
Central Files	A3-88	X			