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Director
Office of Nuclear Material Safety and Safeguards
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Louisiana Energy Services, LLC
NRC Docket No. 70-3103

Subject: URENCO USA Semiannual Radiological Effluent Release Report (SRERR)

Pursuant to 10 CFR 70.59 Effluent monitoring reporting requirements, URENCO USA respectfully submits the Semiannual Effluent Release Report for the monitoring period of January 1, 2010 to June 30, 2010. This report specifically addresses release of licensed, principal radionuclide's in liquid or gaseous form to uncontrolled areas.

If there are any questions with regard to this submission, please contact URENCO USA Vice President of Compliance Perry Robinson at (575)-394-6598.

Sincerely,

Stephen R. Cowne for
David E. Sexton
Chief Nuclear Officer and Vice President of Operations

Enclosure: Report (SRERR) January 1, 2010 through June 30, 2010

IE17

CC:

Tyrone D. Naquin, Program Manager
Two White Flint North
Mail Stop EBB2-C40M
11545 Rockville Pike
Rockville, MD 20852-2738

Jay L. Henson
Chief, Fuel Facility Branch 2
US NRC, Region II
245 Peachtree Center Ave, NE
Suite 1200
Atlanta, GA 30303-125

Enclosure

Semiannual Radiological Effluent Release Report

URENCO USA

Facility Operating License SNM-2010

Semi-Annual Radioactive Effluent Release Report

January 1, 2010 through June 30, 2010

August 25, 2010

Contents

Introduction

A Semi-Annual Report is required under 10 CFR 70.59 and 10 CFR 40.65 to report the quantity of principal radionuclides released to unrestricted areas from licensed nuclear facilities. In February 2009, URENCO USA began testing centrifuges using small quantities of Uranium Hexafluoride at the URENCO USA site, located approximately four miles east of Eunice, NM. In June 2010, URENCO USA received feed material onsite for uranium enrichment activity, officially initiating the first cascade online.

During the period that began on January 1, 2010 and ended June 30, 2010, Uranium Hexafluoride was located within the Centrifuge Assembly Building (CAB) and the Separations Building Module (SMB-1001). Potential releases of radioactive effluents would have originated from gaseous (exhaust system) or liquid (domestic wastewater / sewage) effluents from the CAB and SBM-1001. A review of the data for gaseous and liquid effluents shows that there were no releases to the public that would have exceeded the requirements set forth in 10 CFR 20.1301.

Release Point Information

Gaseous Release Locations

Centrifuge Test and Post Mortem Facilities (CTPMF) Exhaust Filtration System

Potentially hazardous contaminants from the CTPMF are release through the Exhaust Filtration System (EFS). The system also ensures the CTPMF is maintained at a negative pressure with respect to adjacent areas. The EFS is located in the Centrifuge Assembly Building (CAB) and monitored from the Control Room (Appendix A, Plot Plan).

The total airflow to be handled by the EFS is adequate to maintain negative pressure in the CTPMF. The EFS consists of a duct network that serves the CTMPF and operates at negative pressure. The ductwork is connected to a filter station that can handle 100% of the effluent. Work applications that require the EFS to be operational can be manually shut down if the system shuts down.

For the EFS, the minimum required filter configuration is one pre-filter, one potassium carbonate impregnated activated carbon filter, and one High-Efficiency Particulate Air (HEPA) filter. Additional filters may be used to provide adequate airflow. The pre-filter removes dust and debris, the potassium carbonate impregnated activated carbon filter removes Hydrogen Fluoride (HF), and the HEPA filter removes remaining uranic particles from the air stream. After filtration, the clean gases pass through a fan which maintains the negative pressure upstream of the filter station. The clean gases are then discharged through the monitored (alpha and HF) stack on the CAB.

The ABPM201S (alpha particulate monitor) is located adjacent to the filter train in the CTPMF EFS exhaust stack and receives a stream of air from the downstream side of the filters. The filter assembly is equipped with an isokinetic nozzle and properly located within the exhaust stack to ensure laminar flow. This ensures that particulate matter being collected on the filter is representative of particulate matter being released to the environment. The sample volume is pulled through a 47mm Millipore fiberglass filter to collect particulate matter. The filters are changed out on a weekly basis and sent to an off-site analytical laboratory for alpha, beta, and isotopic uranium analysis.

Reporting period: January 1, 2010 - June 30, 2010

Stack Location: Centrifuge Assembly Building, Centrifuge Test and Post Mortem Facilities Exhaust Filtration System

Table 2 of Appendix B to 10 CFR Part 20, Effluent Concentrations, Air, Class D, ^{234}U, ^{235}U, ^{238}U, (µCi/ml):

$^{234}U = 3E\text{-}12$,
$^{235}U = 3E\text{-}12$,
$^{238}U = 3E\text{-}12$

Table 1: CTPMF EFS Gaseous Effluent, Gross Alpha

Lab Sample ID	Sample Period	Total Time (min)	Gross Alpha Results (uCi/ml)	Gross Alpha Error Estimate (uCi/ml)	Gross Alpha MDA (uCi/ml)	Total CTPM Exhaust Filtration System Flow (m^3)	Quantity Released (Ci)
1300-562-1MA1 100106	12/30/09-1/6/10	10356	< 8.83E-16	2.86E-16	8.83E-16	* 1.17E+06	Result below LLD
1300-562-1MA1 100113	1/6/10-1/13/10	10220	< 7.62E-16	3.41E-16	7.62E-16	3.16E+06	Result below LLD
1300-562-1MA1 100120	1/13/10-1/20/10	9692	< 7.11E-16	2.74E-16	7.11E-16	2.62E+06	Result below LLD
1300-562-1MA1 100127	1/20/10-1/27/10	10153	< 6.71E-16	2.04E-16	6.71E-16	3.14E+06	Result below LLD
1300-562-1MA1 100203	1/27/10-2/3/10	10059	< 8.22E-16	3.56E-16	8.22E-16	3.08E+06	Result below LLD
1300-562-1MA1 100210	2/3/10-2/10/10	10096	< 8.18E-16	3.14E-16	8.18E-16	2.86E+06	Result below LLD
1300-562-1MA1 100217	2/10/10-2/17/10	10115	< 8.27E-16	2.70E-16	8.27E-16	3.11E+06	Result below LLD
1300-562-1MA1 100224	2/17/10-2/24/10	9995	< 1.06E-15	3.67E-16	1.06E-15	3.11E+06	Result below LLD
1300-562-1MA1 100303	2/24/10-3/3/10	10150	< 6.74E-16	2.05E-16	6.74E-16	3.14E+06	Result below LLD
1300-562-1MA1 100311	3/3/10-3/11/10	11443	< 9.95E-16	3.25E-16	9.95E-16	2.42E+06	Result below LLD
1300-562-1MA1 100318	3/11/10-3/18/10	10172	< 8.42E-16	2.92E-16	8.42E-16	3.14E+06	Result below LLD
1300-562-1MA1 100325	3/18/10-3/25/10	10020	< 8.81E-16	2.88E-16	8.81E-16	3.11E+06	Result below LLD
1300-562-1MA1 100331	3/25/10-3/31/10	8702	< 8.67E-16	3.12E-16	8.67E-16	2.69E+06	Result below LLD
1300-562-1MA1 100408	3/31/10-4/8/10	11440	< 5.34E-16	2.84E-16	5.34E-16	3.02E+06	Result below LLD
1300-562-1MA1 100414	4/8/10-4/14/10	8683	< 1.13E-15	3.67E-16	1.13E-15	2.69E+06	Result below LLD
1300-562-1MA1 100421	4/14/10-4/21/10	10063	< 9.52E-16	3.24E-16	9.52E-16	3.11E+06	Result below LLD
1300-562-1MA1 100428	4/21/2010-4/28/10	10062	< 5.30E-16	2.82E-16	5.30E-16	3.08E+06	Result below LLD
1300-562-1MA1 100505	4/28/10-5/5/10	10161	< 1.11E-15	4.26E-16	1.11E-15	3.11E+06	Result below LLD
1300-562-1MA1 100512	5/5/10-5/12/10	10010	< 1.00E-15	3.50E-16	1.00E-15	3.08E+06	Result below LLD
1300-562-1MA1 100519	5/12/10-5/19/10	10066	< 1.38E-15	5.21E-16	1.38E-15	3.00E+06	Result below LLD
1300-562-1MA1 100526	5/19/10-5/26/10	10035	< 1.52E-16	0.00E+00	1.52E-16	3.08E+06	Result below LLD
1300-562-1MA1 100602	5/26/10-6/2/10	10080	< 1.21E-15	4.12E-16	1.21E-15	3.08E+06	Result below LLD
1300-562-1MA1 100609	6/2/10-6/9/10	10068	< 6.67E-16	2.57E-16	6.67E-16	2.58E+06	Result below LLD
1300-562-1MA1 100616	6/9/10-6/16/10	10116	< 6.78E-16	2.44E-16	6.78E-16	3.08E+06	Result below LLD
1300-562-1MA1 100623	6/16/10-6/23/10	10128	< 1.35E-15	4.78E-16	1.35E-15	2.86E+06	Result below LLD
1300-562-1MA1 100630	6/23/10-6/30/10	10050	< 8.43E-16	3.08E-16	8.43E-16	3.05E+06	Result below LLD

*Total System Flow determined using maximum flow rate volume of 1.89 scfm
See Appendix B for Laboratory Data Sheets

Table 2: CTPMF EFS Gaseous Effluent, Gross Beta

Lab Sample ID	Sample Period	Total Time (min)	Gross Beta Results (uCi/ml)	Gross Beta Error Estimate (uCi/ml)	Gross Beta MDA (uCi/ml)	Total CTPM Exhaust Filtration System Flow (m^3)	Quantity Released (Ci)
1300-562-1MA1 100106	12/30/09-1/6/10	10356	< 1.92E-15	9.03E-16	1.92E-15	* 1.17E+06	Result below LLD
1300-562-1MA1 100113	1/6/10-1/13/10	10220	< 1.56E-15	8.01E-16	1.56E-15	3.16E+06	Result below LLD
1300-562-1MA1 100120	1/13/10-1/20/10	9692	< 1.77E-15	8.39E-16	1.77E-15	2.62E+06	Result below LLD
1300-562-1MA1 100127	1/20/10-1/27/10	10153	< 1.85E-15	8.67E-16	1.85E-15	3.14E+06	Result below LLD
1300-562-1MA1 100203	1/27/10-2/3/10	10059	< 2.06E-15	9.13E-16	2.06E-15	3.08E+06	Result below LLD
1300-562-1MA1 100210	2/3/10-2/10/10	10096	< 1.92E-15	8.68E-16	1.92E-15	2.86E+06	Result below LLD
1300-562-1MA1 100217	2/10/10-2/17/10	10115	< 2.11E-15	9.70E-16	2.11E-15	3.11E+06	Result below LLD
1300-562-1MA1 100224	2/17/10-2/24/10	9995	< 1.98E-15	9.19E-16	1.98E-15	3.11E+06	Result below LLD
1300-562-1MA1 100303	2/24/10-3/3/10	10150	< 1.69E-15	8.02E-16	1.69E-15	3.14E+06	Result below LLD
1300-562-1MA1 100311	3/3/10-3/11/10	11443	< 2.35E-15	1.15E-15	2.35E-15	2.42E+06	Result below LLD
1300-562-1MA1 100318	3/11/10-3/18/10	10172	< 2.54E-15	1.19E-15	2.54E-15	3.14E+06	Result below LLD
1300-562-1MA1 100325	3/18/10-3/25/10	10020	< 1.95E-15	9.98E-16	1.95E-15	3.11E+06	Result below LLD
1300-562-1MA1 100331	3/25/10-3/31/10	8702	< 2.45E-15	1.17E-15	2.45E-15	2.69E+06	Result below LLD
1300-562-1MA1 100408	3/31/10-4/8/10	11440	< 2.16E-15	9.30E-16	2.16E-15	3.02E+06	Result below LLD
1300-562-1MA1 100414	4/8/10-4/14/10	8683	< 2.47E-15	1.17E-15	2.47E-15	2.69E+06	Result below LLD
1300-562-1MA1 100421	4/14/10-4/21/10	10063	< 2.28E-15	1.02E-15	2.28E-15	3.11E+06	Result below LLD
1300-562-1MA1 100428	4/21/10-4/28/10	10062	< 2.14E-15	9.25E-16	2.14E-15	3.08E+06	Result below LLD
1300-562-1MA1 100505	4/28/10-5/5/10	10161	< 2.24E-15	1.04E-15	2.24E-15	3.11E+06	Result below LLD
1300-562-1MA1 100512	5/5/10-5/12/10	10010	< 2.11E-15	9.45E-16	2.11E-15	3.08E+06	Result below LLD
1300-562-1MA1 100519	5/12/10-5/19/10	10066	1.90E-14	2.00E-15	2.69E-15	3.00E+06	5.70E-08
1300-562-1MA1 100526	5/19/10-5/26/10	10035	< 2.30E-15	1.05E-15	2.30E-15	3.08E+06	Result below LLD
1300-562-1MA1 100602	5/26/10-6/2/10	10080	< 2.23E-15	9.97E-16	2.23E-15	3.08E+06	Result below LLD
1300-562-1MA1 100609	6/2/10-6/9/10	10068	< 1.90E-15	8.52E-16	1.90E-15	2.58E+06	Result below LLD
1300-562-1MA1 100616	6/9/10-6/16/10	10116	< 1.95E-15	9.14E-16	1.95E-15	3.08E+06	Result below LLD
1300-562-1MA1 100623	6/16/10-6/23/10	10128	< 2.37E-15	1.09E-15	2.37E-15	2.86E+06	Result below LLD
1300-562-1MA1 100630	6/23/10-6/30/10	10050	< 2.03E-15	9.33E-16	2.03E-15	3.05E+06	Result below LLD

*Total System Flow determined using maximum flow rate volume of 1.89 scfm

See Appendix B for Laboratory Data Sheets

Table 3: CTPMF EFS Gaseous Effluent, Radionuclides (Quarterly Filter Composite Results)

Radionuclide / Sample ID	Sample Period	Total Time (min)	Results (uCi/ml)	Error Estimate (uCi/ml)	MDA (uCi/ml)	Total CTPM Exhaust Filtration System Flow (m^3)	Quanity Released (Ci)	% of Table 2 of Appx B to 10 CFR Part 20 Values
U-234 / 1300-562-1MA1 COMP 1st QTR	12/30/2009-3/31/2010	1.312E+05	* 5.18E-14	4.32E-14	4.77E-14	36739970	1.90E-06	1.73%
U-234 / 1300-562-1MA1 COMP 2nd QTR	3/31/2010-6/30/2010	1.310E+05	* 1.62E-16	1.22E-16	1.13E-16	38813600	6.28E-09	0.01%
U-235 / 1300-562-1MA1 COMP 1st QTR	12/30/2009-3/31/2010	1.312E+05	< 2.66E-14	2.85E-14	2.66E-14	36739970	Result below LLD	Result below LLD
U-235 / 1300-562-1MA1 COMP 2nd QTR	3/31/2010-6/30/2010	1.310E+05	< 6.90E-17	7.41E-17	6.90E-17	38813600	Result below LLD	Result below LLD
U-238 / 1300-562-1MA1 COMP 1st QTR	12/30/2009-3/31/2010	1.312E+05	* 5.95E-14	4.60E-14	4.75E-14	36739970	2.19E-06	1.98%
U-238 / 1300-562-1MA1 COMP 2nd QTR	3/31/2010-6/30/2010	1.310E+05	* 4.34E-17	5.04E-17	3.83E-17	38813600	1.68E-09	0.001%

Isotopic uranium results for U-235 and U-236 were combined and designated U-235 in Table 3.
*Results below License Basis Environmental Report LLD value of 1.0E-14 µCi/mL.
See Appendix B for Laboratory Data Sheets

Separations Building Module (SBM-1001) Pumped Extract GEVS (Gaseous Effluent Vent System)

The Pumped Extract GEVS is designed to route contaminated gaseous streams from the SBM-1001 through filters for treatment before discharge to the atmosphere. Prefilters and high efficiency particulate air (HEPA) filters remove particulates and impregnated activated carbon filters are used for the removal of HF.

The GEVS stacks are continuously monitored from the Control Room to indicate radioactivity levels. The Pumped Extract GEVS is a Safe-By-Design system located in the UF_6 Handling Area of SBM-1001 that provides exhaust of potentially hazardous contaminants for the SBMs from all permanently connected vacuum pump and trap sets as well as temporary connections used by maintenance and sampling rigs.

There are two redundant continuous air monitoring devices in the GEVS (1MA1 and 1MA2). Similar to the CTPMF vent system, the alpha particulate monitors are located adjacent to the filter train in the Pump Extract GEVS exhaust stack and receive a stream of air from the downstream side of the filters. The filter assemblies are equipped with iso-kinetic nozzles and properly located within the exhaust stack to ensure laminar flow. This ensures that particulate matter being collected on the filter is representative of

particulate matter being released to the environment. The sample volume is pulled through a 47mm Millipore fiberglass filter to collect particulate matter. The filters are changed out on a weekly basis and sent to an off-site analytical laboratory for alpha, beta, and isotopic uranium analysis.

Table 4: SBM-1001 GEVS Gaseous Effluent, Gross Alpha

1MA1:

Field Sample ID	Sample Period	Total Time (min)	Gross Alpha Results (uCi/ml)	Gross Alpha Error Estimate (uCi/ml)	Gross Alpha MDA (uCi/ml)	Total Vent System Flow (m3)	Quantity Released (Ci)
1001-562-1MA1 100505	4/28/10-5/5/10	10156	< 5.27E-16	2.09E-16	5.27E-16	1.03E+05	Result below LLD
1001-562-1MA1 100512	5/5/10-5/12/10	9994	< 1.10E-15	3.67E-16	1.10E-15	1.01E+05	Result below LLD
1001-562-1MA1 100519	5/12/10-5/19/10	10115	< 8.98E-16	3.44E-16	8.98E-16	1.04E+05	Result below LLD
1001-562-1MA1 100526	5/19/10-5/26/10	10038	< 7.96E-16	2.43E-16	7.96E-16	9.77E+04	Result below LLD
1001-562-1MA1 100602	5/26/10-6/2/10	10185	< 7.82E-16	2.71E-16	7.82E-16	1.06E+05	Result below LLD
1001-562-1MA1 100609	6/2/10-6/9/10	10008	< 1.33E-15	4.38E-16	1.33E-15	1.04E+05	Result below LLD
1001-562-1MA1 100616	6/9/10-6/16/10	10088	< 8.78E-16	3.12E-16	8.78E-16	1.03E+05	Result below LLD
1001-562-1MA1 100623	6/16/10-6/23/10	10420	< 1.20E-15	4.35E-16	1.20E-15	1.09E+05	Result below LLD
1001-562-1MA1 100630	6/23/10-6/30/10	9896	< 1.11E-15	3.83E-16	1.11E-15	1.04E+05	Result below LLD

1MA2:

Field Sample ID	Sample Period	Total Time (min)	Gross Alpha Results (uCi/ml)	Gross Alpha Error Estimate (uCi/ml)	Gross Alpha MDA (uCi/ml)	Total Vent System Flow (m3)	Quantity Released (Ci)
1001-562-1MA2 100505	4/28/10-5/5/10	10157	< 1.05E-15	3.52E-16	1.05E-15	1.03E+05	Result below LLD
1001-562-1MA2 100512	5/5/10-5/12/10	9985	< 9.30E-16	3.16E-16	9.30E-16	1.01E+05	Result below LLD
1001-562-1MA2 100519	5/12/10-5/19/10	10125	< 9.76E-16	3.36E-16	9.76E-16	1.04E+05	Result below LLD
1001-562-1MA2 100526	5/19/10-5/26/10	10029	< 8.59E-16	3.20E-16	8.59E-16	9.77E+04	Result below LLD
1001-562-1MA2 100602	5/26/10-6/2/10	10195	< 9.40E-16	3.30E-16	9.40E-16	1.06E+05	Result below LLD
1001-562-1MA2 100609	6/2/10-6/9/10	9999	< 4.01E-16	2.13E-16	4.01E-16	1.04E+05	Result below LLD
1001-562-1MA2 100616	6/9/10-6/16/10	10097	< 1.09E-15	3.78E-16	1.09E-15	1.03E+05	Result below LLD
1001-562-1MA2 100623	6/16/10-6/23/10	10407	< 1.67E-15	5.87E-16	1.67E-15	1.09E+05	Result below LLD
1001-562-1MA2 100630	6/23/10-6/30/10	9904	< 1.17E-15	3.88E-16	1.17E-15	1.04E+05	Result below LLD

See Appendix B for Laboratory Data Sheets

Table 5: SBM-1001 GEVS Gaseous Effluent, Gross Beta

1MA1:

Field Sample ID	Sample Period	Total Time (min)	Gross Beta Results (uCi/ml)	Gross Beta Error Estimate (uCi/ml)	Gross Beta MDA (uCi/ml)	Total Vent System Flow (m3)	Quantity Released (Ci)
1001-562-1MA1 100505	4/28/10-5/5/10	10156	< 2.08E-15	9.56E-16	2.08E-15	1.03E+05	Result below LLD
1001-562-1MA1 100512	5/5/10-5/12/10	9994	< 2.22E-15	1.09E-15	2.22E-15	1.01E+05	Result below LLD
1001-562-1MA1 100519	5/12/10-5/19/10	10115	< 2.32E-15	1.04E-15	2.32E-15	1.04E+05	Result below LLD
1001-562-1MA1 100526	5/19/10-5/26/10	10038	< 2.14E-15	9.81E-16	2.14E-15	9.77E+04	Result below LLD
1001-562-1MA1 100602	5/26/10-6/2/10	10185	< 2.13E-15	1.07E-15	2.13E-15	1.06E+05	Result below LLD
1001-562-1MA1 100609	6/2/10-6/9/10	10008	< 2.07E-15	9.67E-16	2.07E-15	1.04E+05	Result below LLD
1001-562-1MA1 100616	6/9/10-6/16/10	10088	< 1.94E-15	8.62E-16	1.94E-15	1.03E+05	Result below LLD
1001-562-1MA1 100623	6/16/10-6/23/10	10420	* 2.60E-15	9.75E-16	1.80E-15	1.09E+05	2.83E-10
1001-562-1MA1 100630	6/23/10-6/30/10	9896	< 2.22E-15	1.01E-15	2.22E-15	1.04E+05	Result below LLD

1MA2:

Field Sample ID	Sample Period	Total Time (min)	Gross Beta Results (uCi/ml)	Gross Beta Error Estimate (uCi/ml)	Gross Beta MDA (uCi/ml)	Total Vent System Flow (m3)	Quantity Released (Ci)
1001-562-1MA2 100505	4/28/10-5/5/10	10157	< 2.43E-15	1.09E-15	2.43E-15	1.03E+05	Result below LLD
1001-562-1MA2 100512	5/5/10-5/12/10	9985	< 2.11E-15	1.01E-15	2.11E-15	1.01E+05	Result below LLD
1001-562-1MA2 100519	5/12/10-5/19/10	10125	< 1.88E-15	8.91E-16	1.88E-15	1.04E+05	Result below LLD
1001-562-1MA2 100526	5/19/10-5/26/10	10029	< 1.80E-15	8.10E-16	1.80E-15	9.77E+04	Result below LLD
1001-562-1MA2 100602	5/26/10-6/2/10	10195	* 4.44E-14	2.15E-15	1.84E-15	1.06E+05	4.70E-09
1001-562-1MA2 100609	6/2/10-6/9/10	9999	< 1.90E-15	9.23E-16	1.90E-15	1.04E+05	Result below LLD
1001-562-1MA2 100616	6/9/10-6/16/10	10097	< 1.81E-15	8.24E-16	1.81E-15	1.03E+05	Result below LLD
1001-562-1MA2 100623	6/16/10-6/23/10	10407	< 2.29E-15	1.00E-15	2.29E-15	1.09E+05	Result below LLD
1001-562-1MA2 100630	6/23/10-6/30/10	9904	< 1.67E-15	7.82E-16	1.67E-15	1.04E+05	Result below LLD

*Results below License Basis Environmental Report LLD value of 1.0E-14 µCi/mL.
See Appendix B for Laboratory Data Sheets

Table 6: SBM-1001 GEVS Gaseous Effluent, Radionuclides (Quarterly Filter Composite Results)

1MA1:

Radionuclide / Sample ID	Sample Period	Total Time (min)	Results (uCi/ml)	Error Estimate (uCi/ml)	MDA (uCi/ml)	Total Flow (m^3)	Quanity Released (Ci)	% of Table 2 of Appx B to 10 CFR Part 20 Values
U-234 / 1001-562-1MA1 COMP 2nd QTR	3/31/2010-6/30/2010	1.310E+05	< 2.30E-16	1.44E-16	2.30E-16	930720	Result below LLD	Result below LLD
U-235 / 1001-562-1MA1 COMP 2nd QTR	3/31/2010-6/30/2010	1.310E+05	< 1.65E-16	1.28E-17	1.65E-16	930720	Result below LLD	Result below LLD
U-238 / 1001-562-1MA1 COMP 2nd QTR	3/31/2010-6/30/2010	1.310E+05	< 1.33E-16	1.28E-17	1.33E-16	930720	Result below LLD	Result below LLD

1MA2:

Radionuclide / Sample ID	Sample Period	Total Time (min)	Results (uCi/ml)	Error Estimate (uCi/ml)	MDA (uCi/ml)	Total Flow (m^3)	Quanity Released (Ci)	% of Table 2 of Appx B to 10 CFR Part 20 Values
U-234 / 1001-562-1MA2 COMP 2nd QTR	3/31/2010-6/30/2010	1.310E+05	< 2.77E-16	2.07E-17	2.77E-16	930720	Result below LLD	Result below LLD
U-235 / 1001-562-1MA2 COMP 2nd QTR	3/31/2010-6/30/2010	1.310E+05	< 1.98E-16	1.55E-17	1.98E-16	930720	Result below LLD	Result below LLD
U-238 / 1001-562-1MA2 COMP 2nd QTR	3/31/2010-6/30/2010	1.310E+05	* 1.81E-16	2.12E-16	1.60E-16	930720	1.68E-10	0.006%

Isotopic uranium results for U-235 and U-236 were combined and designated U-235 in Table 6.

*Results below License Basis Environmental Report LLD value of 1.0E-14 µCi/mL.

See Appendix B for Laboratory Data Sheets

Sampling Data Gaps

There were no sampling data gaps for the reporting period beginning on January 1, 2010 and ending on June 30, 2010 for either the pumped extract GEVS in the SBM-1001 or the EFS in the CTPMF. The vent systems were not active during power outages and down times, therefore no effluent was released during those instances. For a list of down times and power outages, see Sampling program deviations and program adjustments.

Sampling program deviations and program adjustments

CTPMF EFS Deviations:

Date Range:	Reason for 7 day deviation:
3/6/10 to 3/8/10	Monitor was secured from 0850 on 3/6/10 until 1100 on 3/8/10 due to building outage. Filter was changed out one day over due, due to insufficient volume on Particulate and Iodine Sampler (PIS) filter.
3/31/2010	PIS changed out one day early to return sampling time to Wednesdays. Minimum volume on PIS filter was reached.
3/31/10 to 4/8/10	PIS changed out one day late due to insufficient volume on PIS filter. Monitor had flow alarm from 1305 on 3/31/10 until 1104 on 4/1/10 when it was cleared.
4/14/2010	PIS filter pulled a day early to return sampling day to Wednesdays, minimum volume on PIS filter was reached.
6/20/10 to 6/21/10	Power outage for the entire CAB due to bad weather. EFS power was also off. No release during this outage.

SBM-1001 Pumped Extract GEVS 1MA1 System Deviations:

Date Range:	Reason for 7 day deviation:
6/20/2010	Site had momentary loss of power, monitor restored. Filter was on for seven days.

SBM-1001 Pumped Extract GEVS 1MA2 System Deviations:

Date Range:	Reason for 7 day deviation:
6/20/2010	Site had momentary loss of power, monitor restored. Filter was on for seven days.
6/24/2010	Planned power outage took the B transformer off-line at 1030. The redundant alpha monitor was in service.

Significant Trends

CTPMF EFS Significant Trends:

This *Semiannual Radioactive Effluent Release Report* is the third submitted by URENCO USA. This report and the previous report display alpha, beta, and isotopic uranium concentrations in CTPMF effluent exhaust. Whenever duplicate data was available, the greatest value was used for the result or LLD.

Results for the sample collected on 5/19/10 from the CTPMF showed a value of 1.90E-14 µCi/mL for gross beta activity. Gross alpha activity for this same filter was below analytical LLD value of 1.38E-15 µCi/mL.

Isotopic uranium results for the first quarter of 2010 were between 1.73-1.98% of the Table 2 to Appendix B to 10 CFR 20. These data report several detections, as compared to previous results that were below minimum detectable activity.

All other gaseous effluent from the CTPMF EFS indicate gross alpha and gross beta radioactivity results and LLDs to be less than license basis LLD of 1.0E-14 µCi/mL. Future *Semiannual Radioactive Effluent Release Reports* will include a detailed analysis of any observed trends in radioactive uranic effluent activity if monitoring results exceed As Low As Reasonably Achievable (ALARA) standards.

SBM-1001 Pumped Extract GEVS Significant Trends:

This *Semiannual Radioactive Effluent Release Report* is the third submitted by URENCO USA, and the first to include alpha, beta, and isotopic uranium concentration results from the SBM-1001 Pumped Extract GEVS effluent exhaust. Whenever duplicate data was available, the greatest value was used for the result or LLD.

Sample collected on 6/23/10 from 1MA1 in the SBM-100 showed a gross beta result of 2.60E-15 μCi/mL. This result was the only filter taken from 1MA1 in the SBM-1001 that exceeded its LLD. The second redundant continuous air sampler on the Pump Extract GEVS system reported a value below its LLD of 2.29E-15 μCi/mL for the same sample period. Device 1MA2 in the SBM-1001 collected a sample from 5/26/10 through 6/2/10 that yielded a gross beta result of 4.44E-14 μCi/mL. This result was also in excess of the analytical LLD of 1.84E-15 μCi/mL. When analyzed, the redundant filter on device 1MA1 during the same monitoring period reported a value below the LLD of 2.13E-15 μCi/mL.

All other gaseous effluent results from the Pumped Extract GEVS demonstrate isotopic uranium, gross alpha, and gross beta radioactivity to be less than the license basis LLD of 1.0E-14 μCi/mL. Future *Semiannual Radioactive Effluent Release Reports* will include a detailed analysis of any observed trends in radioactive uranic effluent activity if monitoring results exceed ALARA standards.

Liquid Release Locations

Domestic waste (sewage) generated at the CAB and SBM-1001 is discharged off site, along with other domestic waste generated at the URENCO USA site, to the Eunice Waste Water Treatment Plant. Domestic waste is not expected to contain process water, as facility design does not discharge process liquid effluent to the domestic wastewater system. Domestic waste water is sampled quarterly at lift station 1, which is a central collection area for all domestic waste generated at the URENCO USA facility prior to off-site discharge (Appendix A, Plot Plan).

Liquid Release Data

Reporting period: January 1, 2010 - June 30, 2010
Release Location: Lift Station 1
Total Flow: 13,000 gpd

Table 3 of Appendix B to 10 CFR Part 20, Releases to Sewers, Monthly Average Concentration (μCi/ml):

^{234}U = 3E-6

^{235}U = 3E-6
^{238}U = 3E-6

Table 7: Domestic Wastewater Effluent, Radionuclides

Radionuclide	Sample Quarter 2009[1]	Total Time (days)	Result (uCi/ml)	Error Estimate (uCi/ml)	MDA (uCi/ml)	Lift Station 1 Total Flow (gal/day)	Quantity Released (Ci)	% of Table 3 of Appx B to 10 CFR Part 20 Values
U^{234}	1st	90	2.08E-09	8.17E-10	3.42E-10	13,000	9.22E-06	0.069%
U^{234}	2nd	91	1.75E-09	5.01E-10	6.94E-11	13,000	7.85E-06	0.058%
U^{235}	1st	90	< 3.59E-10	1.60E-10	3.59E-10	13,000	Below LLD	Below LLD
U^{235}	2nd	91	< 8.56E-11	6.47E-11	8.56E-11	13,000	Below LLD	Below LLD
U^{238}	1st	90	* 9.51E-10	5.19E-10	1.68E-10	13,000	4.21E-06	0.032%
U^{238}	2nd	91	* 8.08E-10	3.14E-10	6.91E-11	13,000	3.62E-06	0.027%

[1] Sample period for 1st Quarter 2010 was 1/01/2010 - 3/31/2010 and for 2nd Quarter 2010 was 4/01/2010 - 6/30/2010

*Results below License Basis Environmental Report LLD value of 3.0E-09 µCi/mL.

See Appendix B for Laboratory Data Sheets

Sampling program deviations and program adjustments

Sample collection and analysis was performed on a quarterly basis for the first half of 2010, in compliance with the URENCO USA Environmental Report. Domestic wastewater samples were collected in compliance with GL Environmental, Inc. SOP F007: Domestic Wastewater Sampling

Significant Trends

This *Semiannual Radioactive Effluent Release Report* is the third submitted by URENCO USA. Domestic wastewater effluent analytical results and the quantity of activity released are consistent with previous reports. Whenever duplicate data was available, the greatest value was used for the result or LLD.

Dose to Members of the Public

Isotopic uranium activity in gaseous effluent was less than 10% of values listed in Table 2 of Appendix B to 10 CFR Part 20, Effluent Concentrations, Liquid, Class D, for ^{234}U, ^{235}U, ^{238}U. This demonstrates compliance with 10 CFR 20.1301 dose limits to individual members of the public from gaseous effluents.

Domestic waste effluent activity ranged from 0.027% to 0.069% of the value listed in Table 3 of Appendix B to 10 CFR Part 20, Releases to Sewers, Monthly Average Concentration. This demonstrates compliance with 10 CFR 20.1301 dose limits to individual members of the public from releases to sewers.

Supplemental Information

Description of Sampling Equipment

Stack particulate sampling is achieved via a standard holder with 47mm Millipore (FSLW) fiberglass filters (part # 52123 or equivalent). The particulate sampling systems are fed with air from within the CTPMF and SBM-1001 by an isokinetic vent system and volumetrically measured using an air volume totalizer. Samples are taken using gloves and tweezers and kept in sterile 50mm Pall Petri Dishes.

Wastewater samples are collected from the main sewer line at an access location where the effluent has sufficient velocity to keep effluent solids in suspension. Grab samples of domestic wastewater were collected by submerging a clean container in the wastewater stream until full, and transferring contents into clean laboratory sample containers.

Description of sampling procedure

See Appendix C

Analytical procedure

Gross alpha and Gross Beta - LANL MLR-100 Modified

Isotopic Uranium - EML U-02 Modified

Calculation methods

A. Activity

Activity Calculation

$$\text{Activity (pCi/unit)} = \frac{C_s - C_b}{\text{Eff} * Y * V * D * A * T_s * 2.22}$$

Where:

C_s = total counts in peak region

C_b = total background in peak region

Eff = counting Efficiency

Y = yield

V = sample volume/weight

D = radioactive ingrowth or decay factors, as necessary

A = abundance

T_s = sample count time (in minutes)

2.22 = dpm to picoCurie conversion factor

B. Effluent Released

Effluent Released = Total Volume Effluent * Analyte activity

C. % of Table 2 or 3 of Appendix B to 10 CFR Part 20 Values

% MPC = (Analyte activity / MPC) x 100

Error estimates

$$CU = \frac{1.96\sqrt{\frac{cpm_s}{T_s} + \frac{cpm_b}{T_b}}}{Eff * V * D * A * 2.22}$$

Where:

CU	=	Counting uncertainty (sometimes referred to as "error")
1.96	=	Conversion to two-sigma (95.5%) uncertainty
cpm_s	=	counts per minute sample
cpm_b	=	counts per minute background
T_s	=	count time, minutes, sample
T_b	=	count time, minutes, background
Eff	=	Counting Efficiency
V	=	sample volume/weight
D	=	radioactive ingrowth or decay factors, as necessary
A	=	abundance
2.22	=	dpm to picoCurie conversion factor

Minimum Detectable Activity (MDA) Calculation

$$MDA = \frac{3 + 3.29\sqrt{R_b T_s \left(1 + \frac{T_s}{T_b}\right)}}{KT_s}$$

Where:

3.29	=	statistical factor for Type I and Type II error probabilities selected to be 0.05 each
3	=	a constant applied when the blank count approaches zero
R_b	=	background count rate in cpm
K	=	Efficiency, in-growth/decay, aliquot, abundance, dpm to pCi conversion factor
T_s	=	sample count time
T_b	=	background count time

Quality of Results

Probe sampling conditions are maintained so as to simulate conditions within the duct. The air volume totalizer is calibrated yearly per specification. The axis of the sampling probe head is parallel to the air flow lines in the ductwork, to ensure laminar flow.

The air sample filters consist of 47mm Millipore paper, rated for high recoverability. Pall 50mm Petri Dishes used for filter sample storage and shipment are sterile and free of trace particulates or other potential sources of contamination. Sample collection utilizes gloves and tweezers to avoid radiological contamination of sampling media during the sampling event. Additionally, media storage records are compiled for collected samples including sample location, total flow, date, time, sampler, and any irregularities associated with the sampling event. Collected samples are shipped under standard chain of custody procedures.

The analytical laboratory (Eberline Services) holds NELAP, DOECAP, USACE, and DOD certifications. URENCO USA holds a quality purchase agreement with the lab, and has audited Eberline Services per the URENCO USA Quality Assurance Program Description (QAPD). GL Environmental is currently an approved supplier for LES, and the GL Environmental Quality Assurance Program has been determined satisfactory per URENCO USA QAPD.

Calibration Procedures

See Appendix D

Unusual Releases

No unusual releases are reported from the National Enrichment Facility for the period beginning January 1, 2010 through June 30, 2010.

APPENDIX A - Plot Plan

Security-Related Information
Figure Withtheld Under 10 CFR 2.390

FACILITY LAYOUT (SITE PLAN)
WITH SITE BOUNDARY AND CONTROLLED
ACCESS AREA BOUNDARY

Figure 1.1-4 Facility Layout (Site Plan) with Site Boundary and Controlled Access Area Boundary

APPENDIX B - Lab Data Sheets

Eberline Analytical
Final Report of Analysis

Report To:
Debra Edwards
LES
275 Hwy 176
Eunice, NM 88231

Work Order Details:
SDG: 10-01106
Purchase Order: LES-GSA-3080
Analysis Category: ENVIRONMENTAL
Sample Matrix: AF

Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Report Units
10-01106-01	LCS	KNOWN	01/22/10 00:00	1/22/2010	2/12/2010	10-01106	Gross Alpha	LANL MLR-100 Modified	3.13E-04	1.35E-05			uCi/ml
10-01106-01	LCS	SPIKE	01/22/10 00:00	1/22/2010	2/12/2010	10-01106	Gross Alpha	LANL MLR-100 Modified	3.42E-04	8.33E-06	8.48E-06	3.09E-07	uCi/ml
10-01106-02	MBL	BLANK	01/22/10 00:00	1/22/2010	2/12/2010	10-01106	Gross Alpha	LANL MLR-100 Modified	-5.10E-17	3.31E-16	3.31E-16	8.65E-16	uCi/ml
10-01106-03	DUP	1300-562-1MA1 091209	12/09/09 14:13	1/22/2010	2/12/2010	10-01106	Gross Alpha	LANL MLR-100 Modified	-4.71E-17	1.60E-16	1.60E-16	5.21E-16	uCi/ml
10-01106-04	DO	1300-562-1MA1 091209	12/09/09 14:13	1/22/2010	2/12/2010	10-01106	Gross Alpha	LANL MLR-100 Modified	-4.59E-17	3.48E-16	3.48E-16	8.77E-16	uCi/ml
10-01106-05	TRG	1300-562-1MA1 091216	12/16/09 10:22	1/22/2010	2/12/2010	10-01106	Gross Alpha	LANL MLR-100 Modified	-4.46E-16	3.09E-16	3.09E-16	1.07E-15	uCi/ml
10-01106-06	TRG	1300-562-1MA1 091223	12/23/09 08:40	1/22/2010	2/12/2010	10-01106	Gross Alpha	LANL MLR-100 Modified	5.41E-17	3.82E-16	3.82E-16	9.18E-16	uCi/ml
10-01106-07	TRG	1300-562-1MA1 091230	12/30/09 08:46	1/22/2010	2/12/2010	10-01106	Gross Alpha	LANL MLR-100 Modified	-1.95E-16	3.30E-16	3.30E-16	9.30E-16	uCi/ml
10-01106-08	TRG	1300-562-1MA1 100106	01/06/10 13:27	1/22/2010	2/12/2010	10-01106	Gross Alpha	LANL MLR-100 Modified	-2.77E-16	2.86E-16	2.86E-16	8.83E-16	uCi/ml
10-01106-01	LCS	KNOWN	01/22/10 00:00	1/22/2010	2/12/2010	10-01106	Gross Beta	LANL MLR-100 Modified	2.38E-04	7.13E-06			uCi/ml
10-01106-01	LCS	SPIKE	01/22/10 00:00	1/22/2010	2/12/2010	10-01106	Gross Beta	LANL MLR-100 Modified	2.73E-04	6.28E-06	6.31E-06	8.86E-07	uCi/ml
10-01106-02	MBL	BLANK	01/22/10 00:00	1/22/2010	2/12/2010	10-01106	Gross Beta	LANL MLR-100 Modified	-1.55E-15	1.09E-15	1.09E-15	2.50E-15	uCi/ml
10-01106-03	DUP	1300-562-1MA1 091209	12/09/09 14:13	1/22/2010	2/12/2010	10-01106	Gross Beta	LANL MLR-100 Modified	-8.17E-16	8.90E-16	8.90E-16	2.01E-15	uCi/ml
10-01106-04	DO	1300-562-1MA1 091209	12/09/09 14:13	1/22/2010	2/12/2010	10-01106	Gross Beta	LANL MLR-100 Modified	2.15E-16	9.35E-16	9.35E-16	1.98E-15	uCi/ml
10-01106-05	TRG	1300-562-1MA1 091216	12/16/09 10:22	1/22/2010	2/12/2010	10-01106	Gross Beta	LANL MLR-100 Modified	-3.33E-17	1.15E-15	1.15E-15	2.47E-15	uCi/ml
10-01106-06	TRG	1300-562-1MA1 091223	12/23/09 08:40	1/22/2010	2/12/2010	10-01106	Gross Beta	LANL MLR-100 Modified	-3.18E-17	1.07E-15	1.07E-15	2.30E-15	uCi/ml
10-01106-07	TRG	1300-562-1MA1 091230	12/30/09 08:46	1/22/2010	2/12/2010	10-01106	Gross Beta	LANL MLR-100 Modified	0.00E+00	9.79E-16	9.79E-16	2.10E-15	uCi/ml
10-01106-08	TRG	1300-562-1MA1 100106	01/06/10 13:27	1/22/2010	2/12/2010	10-01106	Gross Beta	LANL MLR-100 Modified	1.67E-16	9.03E-16	9.03E-16	1.92E-15	uCi/ml

CU=Counting Uncertainty;CSU=Combined Standard Uncertainty (2-sigma);MDA=Minimal Detected Activity;LCS=Laboratory Control Sample; MBL=Blank; DUP=Duplicate; TRG=Normal Sample; DO=Duplicate Original

Eberline Analytical
Final Report of Analysis

Report To:
Debra Edwards
LES
275 Hwy 176
Eunice, NM 88231

Work Order Details:
SDG: 10-04125
Purchase Order: LES-GSA-3080
Analysis Category: ENVIRONMENTAL
Sample Matrix: AF

Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Report Units
10-04125-01	LCS	KNOWN	04/26/10 00:00	4/22/2010	5/3/2010	10-04125	Gross Alpha	LANL MLR-100 Modified	3.14E-04	1.35E-05			uCi/ml
10-04125-01	LCS	SPIKE	04/26/10 00:00	4/22/2010	5/3/2010	10-04125	Gross Alpha	LANL MLR-100 Modified	2.81E-04	7.42E-06	7.54E-06	4.44E-07	uCi/ml
10-04125-02	MBL	BLANK	04/26/10 00:00	4/22/2010	5/3/2010	10-04125	Gross Alpha	LANL MLR-100 Modified	-4.41E-16	4.61E-16	4.61E-16	1.27E-15	uCi/ml
10-04125-03	DUP	1300-562-1MA1 100113	01/13/10 15:55	3/18/2010	5/3/2010	10-04125	Gross Alpha	LANL MLR-100 Modified	-8.97E-17	2.15E-16	2.15E-16	6.46E-16	uCi/ml
10-04125-04	DO	1300-562-1MA1 100113	01/13/10 15:55	3/18/2010	5/4/2010	10-04125	Gross Alpha	LANL MLR-100 Modified	1.35E-16	3.41E-16	3.41E-16	7.62E-16	uCi/ml
10-04125-05	TRG	1300-562-1MA1 100120	01/20/10 09:27	3/18/2010	5/3/2010	10-04125	Gross Alpha	LANL MLR-100 Modified	0.00E+00	2.74E-16	2.74E-16	7.11E-16	uCi/ml
10-04125-06	TRG	1300-562-1MA1 100127	01/27/10 10:40	3/18/2010	5/3/2010	10-04125	Gross Alpha	LANL MLR-100 Modified	-1.40E-16	2.04E-16	2.04E-16	6.71E-16	uCi/ml
10-04125-07	TRG	1300-562-1MA1 100203	02/03/10 10:19	3/18/2010	5/3/2010	10-04125	Gross Alpha	LANL MLR-100 Modified	9.70E-17	3.56E-16	3.56E-16	8.22E-16	uCi/ml
10-04125-08	TRG	1300-562-1MA1 100210	02/10/10 10:35	3/18/2010	5/3/2010	10-04125	Gross Alpha	LANL MLR-100 Modified	-4.82E-17	3.14E-16	3.14E-16	8.18E-16	uCi/ml
10-04125-09	TRG	1300-562-1MA1 100217	02/17/10 11:10	3/18/2010	5/3/2010	10-04125	Gross Alpha	LANL MLR-100 Modified	-1.95E-16	2.70E-16	2.70E-16	8.27E-16	uCi/ml
10-04125-10	TRG	1300-562-1MA1 100224	02/24/10 09:45	3/18/2010	5/3/2010	10-04125	Gross Alpha	LANL MLR-100 Modified	-3.74E-16	3.67E-16	3.67E-16	1.06E-15	uCi/ml
10-04125-11	TRG	1300-562-1MA1 100303	03/03/10 10:55	4/22/2010	5/3/2010	10-04125	Gross Alpha	LANL MLR-100 Modified	-1.40E-16	2.05E-16	2.05E-16	6.74E-16	uCi/ml
10-04125-12	TRG	1300-562-1MA1 100311	03/11/10 09:38	4/22/2010	5/3/2010	10-04125	Gross Alpha	LANL MLR-100 Modified	-2.35E-16	3.25E-16	3.25E-16	9.95E-16	uCi/ml
10-04125-13	TRG	1300-562-1MA1 100318	03/18/10 11:10	4/22/2010	5/3/2010	10-04125	Gross Alpha	LANL MLR-100 Modified	-1.49E-16	2.92E-16	2.92E-16	8.42E-16	uCi/ml
10-04125-14	TRG	1300-562-1MA1 100325	03/25/10 10:10	4/22/2010	5/3/2010	10-04125	Gross Alpha	LANL MLR-100 Modified	-2.08E-16	2.88E-16	2.88E-16	8.81E-16	uCi/ml
10-04125-15	TRG	1300-562-1MA1 100331	03/31/10 11:12	4/22/2010	5/3/2010	10-04125	Gross Alpha	LANL MLR-100 Modified	-6.02E-17	3.12E-16	3.12E-16	8.67E-16	uCi/ml
10-04125-01	LCS	KNOWN	04/26/10 00:00	4/22/2010	5/3/2010	10-04125	Gross Beta	LANL MLR-100 Modified	2.37E-04	7.12E-06			uCi/ml
10-04125-01	LCS	SPIKE	04/26/10 00:00	4/22/2010	5/3/2010	10-04125	Gross Beta	LANL MLR-100 Modified	2.56E-04	5.96E-06	5.99E-06	8.94E-07	uCi/ml
10-04125-02	MBL	BLANK	04/26/10 00:00	4/22/2010	5/3/2010	10-04125	Gross Beta	LANL MLR-100 Modified	-4.84E-16	8.84E-16	8.84E-16	1.96E-15	uCi/ml
10-04125-03	DUP	1300-562-1MA1 100113	01/13/10 15:55	3/18/2010	5/3/2010	10-04125	Gross Beta	LANL MLR-100 Modified	-8.27E-16	9.43E-16	9.43E-16	2.11E-15	uCi/ml
10-04125-04	DO	1300-562-1MA1 100113	01/13/10 15:55	3/18/2010	5/4/2010	10-04125	Gross Beta	LANL MLR-100 Modified	1.21E-15	8.01E-16	8.01E-16	1.56E-15	uCi/ml
10-04125-05	TRG	1300-562-1MA1 100120	01/20/10 09:27	3/18/2010	5/3/2010	10-04125	Gross Beta	LANL MLR-100 Modified	3.01E-16	8.39E-16	8.39E-16	1.77E-15	uCi/ml
10-04125-06	TRG	1300-562-1MA1 100127	01/27/10 10:40	3/18/2010	5/3/2010	10-04125	Gross Beta	LANL MLR-100 Modified	1.40E-16	8.67E-16	8.67E-16	1.85E-15	uCi/ml
10-04125-07	TRG	1300-562-1MA1 100203	02/03/10 10:19	3/18/2010	5/3/2010	10-04125	Gross Beta	LANL MLR-100 Modified	-7.73E-16	9.13E-16	9.13E-16	2.06E-15	uCi/ml
10-04125-08	TRG	1300-562-1MA1 100210	02/10/10 10:35	3/18/2010	5/3/2010	10-04125	Gross Beta	LANL MLR-100 Modified	-4.18E-16	8.68E-16	8.68E-16	1.92E-15	uCi/ml
10-04125-09	TRG	1300-562-1MA1 100217	02/17/10 11:10	3/18/2010	5/3/2010	10-04125	Gross Beta	LANL MLR-100 Modified	-2.51E-16	9.70E-16	9.70E-16	2.11E-15	uCi/ml
10-04125-10	TRG	1300-562-1MA1 100224	02/24/10 09:45	3/18/2010	5/3/2010	10-04125	Gross Beta	LANL MLR-100 Modified	-2.75E-17	9.19E-16	9.19E-16	1.98E-15	uCi/ml
10-04125-11	TRG	1300-562-1MA1 100303	03/03/10 10:55	4/22/2010	5/3/2010	10-04125	Gross Beta	LANL MLR-100 Modified	3.07E-16	8.02E-16	8.02E-16	1.69E-15	uCi/ml
10-04125-12	TRG	1300-562-1MA1 100311	03/11/10 09:38	4/22/2010	5/3/2010	10-04125	Gross Beta	LANL MLR-100 Modified	9.61E-16	1.15E-15	1.15E-15	2.35E-15	uCi/ml
10-04125-13	TRG	1300-562-1MA1 100318	03/18/10 11:10	4/22/2010	5/3/2010	10-04125	Gross Beta	LANL MLR-100 Modified	-3.01E-17	1.19E-15	1.19E-15	2.54E-15	uCi/ml
10-04125-14	TRG	1300-562-1MA1 100325	03/25/10 10:10	4/22/2010	5/3/2010	10-04125	Gross Beta	LANL MLR-100 Modified	1.57E-15	9.98E-16	9.98E-16	1.95E-15	uCi/ml
10-04125-15	TRG	1300-562-1MA1 100331	03/31/10 11:12	4/22/2010	5/3/2010	10-04125	Gross Beta	LANL MLR-100 Modified	5.49E-16	1.17E-15	1.17E-15	2.45E-15	uCi/ml

CU=Counting Uncertainty;CSU=Combined Standard Uncertainty (2-sigma);MDA=Minimal Detected Activity;LCS=Laboratory Control Sample; MBL=Blank; DUP=Duplicate; TRG=Normal Sample; DO=Duplicate Original

Eberline Analytical
Final Report of Analysis

Report To:
Debra Edwards
LES
275 Hwy 176
Eunice, NM 88231

Work Order Details:
SDG: 10-06084
Purchase Order: LES-GSA-3080
Analysis Category: ENVIRONMENTAL
Sample Matrix: AF

Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Report Units
10-06084-01	LCS	KNOWN	06/18/10 00:00	6/18/2010	6/24/2010	10-06084	Uranium-234	EML U-02 Modified	8.28E-06	2.98E-07			uCi/ml
10-06084-01	LCS	SPIKE	06/18/10 00:00	6/18/2010	6/24/2010	10-06084	Uranium-234	EML U-02 Modified	7.87E-06	1.36E-06	1.36E-06	1.09E-07	uCi/ml
10-06084-02	MBL	BLANK	06/18/10 00:00	6/18/2010	6/24/2010	10-06084	Uranium-234	EML U-02 Modified	2.13E-14	4.07E-14	4.07E-14	8.78E-14	uCi/ml
10-06084-03	DUP	1300-562-1MA1 COMP	03/31/10 00:00	6/18/2010	6/24/2010	10-06084	Uranium-234	EML U-02 Modified	5.18E-14	4.32E-14	4.32E-14	4.77E-14	uCi/ml
10-06084-04	DO	1300-562-1MA1 COMP	03/31/10 00:00	6/18/2010	6/24/2010	10-06084	Uranium-234	EML U-02 Modified	2.16E-14	2.86E-14	2.86E-14	4.35E-14	uCi/ml
10-06084-01	LCS	SPIKE	06/18/10 00:00	6/18/2010	6/24/2010	10-06084	Uranium-235	EML U-02 Modified	4.16E-07	1.87E-07	1.87E-07	9.85E-08	uCi/ml
10-06084-02	MBL	BLANK	06/18/10 00:00	6/18/2010	6/24/2010	10-06084	Uranium-235	EML U-02 Modified	2.49E-14	3.81E-14	3.81E-14	6.97E-14	uCi/ml
10-06084-03	DUP	1300-562-1MA1 COMP	03/31/10 00:00	6/18/2010	6/24/2010	10-06084	Uranium-235	EML U-02 Modified	-1.68E-15	3.36E-15	3.36E-15	4.50E-14	uCi/ml
10-06084-04	DO	1300-562-1MA1 COMP	03/31/10 00:00	6/18/2010	6/24/2010	10-06084	Uranium-235	EML U-02 Modified	2.00E-14	2.85E-14	2.85E-14	2.66E-14	uCi/ml
10-06084-01	LCS	KNOWN	06/18/10 00:00	6/18/2010	6/24/2010	10-06084	Uranium-238	EML U-02 Modified	8.07E-06	2.91E-07			uCi/ml
10-06084-01	LCS	SPIKE	06/18/10 00:00	6/18/2010	6/24/2010	10-06084	Uranium-238	EML U-02 Modified	8.25E-06	1.42E-06	1.42E-06	9.61E-08	uCi/ml
10-06084-02	MBL	BLANK	06/18/10 00:00	6/18/2010	6/24/2010	10-06084	Uranium-238	EML U-02 Modified	1.15E-14	2.53E-14	2.53E-14	5.63E-14	uCi/ml
10-06084-03	DUP	1300-562-1MA1 COMP	03/31/10 00:00	6/18/2010	6/24/2010	10-06084	Uranium-238	EML U-02 Modified	5.95E-14	4.60E-14	4.60E-14	4.75E-14	uCi/ml
10-06084-04	DO	1300-562-1MA1 COMP	03/31/10 00:00	6/18/2010	6/24/2010	10-06084	Uranium-238	EML U-02 Modified	8.09E-15	1.62E-14	1.62E-14	2.14E-14	uCi/ml

CU=Counting Uncertainty;CSU=Combined Standard Uncertainty (2-sigma);MDA=Minimal Detected Activity;LCS=Laboratory Control Sample; MBL=Blank; DUP=Duplicate; TRG=Normal Sample; DO=Duplicate Original

Eberline Analytical
Final Report of Analysis

Report To:
Debra Edwards
LES
275 Hwy 176
Eunice, NM 88231

Work Order Details:

SDG:	10-05078
Purchase Order:	LES-GSA-3080
Analysis Category:	ENVIRONMENTAL
Sample Matrix:	AF

Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Report Units
10-05078-01	LCS	KNOWN	05/18/10 00:00	5/17/2010	5/24/2010	10-05078	Gross Alpha	LANL MLR-100 Modified	3.15E-04	1.35E-05			uCi/ml
10-05078-01	LCS	SPIKE	05/18/10 00:00	5/17/2010	5/24/2010	10-05078	Gross Alpha	LANL MLR-100 Modified	2.98E-04	7.69E-06	7.81E-06	3.02E-07	uCi/ml
10-05078-02	MBL	BLANK	05/18/10 00:00	5/17/2010	5/24/2010	10-05078	Gross Alpha	LANL MLR-100 Modified	1.02E-16	1.42E-16	1.42E-16	1.53E-16	uCi/ml
10-05078-03	DUP	1300-562-1MA1 100408	04/08/10 09:52	5/17/2010	5/24/2010	10-05078	Gross Alpha	LANL MLR-100 Modified	-4.85E-17	3.15E-16	3.15E-16	8.23E-16	uCi/ml
10-05078-04	DO	1300-562-1MA1 100408	04/08/10 09:52	5/17/2010	5/24/2010	10-05078	Gross Alpha	LANL MLR-100 Modified	2.42E-16	2.84E-16	2.84E-16	5.34E-16	uCi/ml
10-05078-05	TRG	1300-562-1MA1 100414	04/14/10 10:35	5/17/2010	5/24/2010	10-05078	Gross Alpha	LANL MLR-100 Modified	-3.55E-16	3.67E-16	3.67E-16	1.13E-15	uCi/ml
10-05078-06	TRG	1300-562-1MA1 100421	04/21/10 10:18	5/17/2010	5/24/2010	10-05078	Gross Alpha	LANL MLR-100 Modified	-2.49E-16	3.24E-16	3.24E-16	9.52E-16	uCi/ml
10-05078-07	TRG	1300-562-1MA1 100428	04/28/10 10:00	5/17/2010	5/24/2010	10-05078	Gross Alpha	LANL MLR-100 Modified	2.40E-16	2.82E-16	2.82E-16	5.30E-16	uCi/ml
10-05078-01	LCS	KNOWN	05/18/10 00:00	5/17/2010	5/24/2010	10-05078	Gross Beta	LANL MLR-100 Modified	2.37E-04	7.12E-06			uCi/ml
10-05078-01	LCS	SPIKE	05/18/10 00:00	5/17/2010	5/24/2010	10-05078	Gross Beta	LANL MLR-100 Modified	2.61E-04	5.96E-06	5.98E-06	8.20E-07	uCi/ml
10-05078-02	MBL	BLANK	05/18/10 00:00	5/17/2010	5/24/2010	10-05078	Gross Beta	LANL MLR-100 Modified	5.68E-16	9.92E-16	9.92E-16	2.06E-15	uCi/ml
10-05078-03	DUP	1300-562-1MA1 100408	04/08/10 09:52	5/17/2010	5/24/2010	10-05078	Gross Beta	LANL MLR-100 Modified	-9.13E-16	1.18E-15	1.18E-15	2.60E-15	uCi/ml
10-05078-04	DO	1300-562-1MA1 100408	04/08/10 09:52	5/17/2010	5/24/2010	10-05078	Gross Beta	LANL MLR-100 Modified	-1.40E-15	9.30E-16	9.30E-16	2.16E-15	uCi/ml
10-05078-05	TRG	1300-562-1MA1 100414	04/14/10 10:35	5/17/2010	5/24/2010	10-05078	Gross Beta	LANL MLR-100 Modified	2.75E-16	1.17E-15	1.17E-15	2.47E-15	uCi/ml
10-05078-06	TRG	1300-562-1MA1 100421	04/21/10 10:18	5/17/2010	5/24/2010	10-05078	Gross Beta	LANL MLR-100 Modified	-7.94E-16	1.02E-15	1.02E-15	2.28E-15	uCi/ml
10-05078-07	TRG	1300-562-1MA1 100428	04/28/10 10:00	5/17/2010	5/24/2010	10-05078	Gross Beta	LANL MLR-100 Modified	-1.36E-15	9.25E-16	9.25E-16	2.14E-15	uCi/ml

CU=Counting Uncertainty;CSU=Combined Standard Uncertainty (2-sigma);MDA=Minimal Detected Activity;LCS=Laboratory Control Sample; MBL=Blank; DUP=Duplicate; TRG=Normal Sample; DO=Duplicate Original

Eberline Analytical
Final Report of Analysis

Report To:	Work Order Details:	
Debra Edwards	SDG:	10-07040
LES	Purchase Order:	LES-GSA-3080
275 Hwy 176	Analysis Category:	ENVIRONMENTAL
Eunice, NM 88231	Sample Matrix:	AF

Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Report Units
10-07040-01	LCS	KNOWN	07/08/10 00:00	6/4/2010	7/8/2010	10-07040	Gross Alpha	LANL MLR-100 Modified	3.15E-04	1.35E-05			uCi/ml
10-07040-01	LCS	SPIKE	07/08/10 00:00	6/4/2010	7/8/2010	10-07040	Gross Alpha	LANL MLR-100 Modified	2.97E-04	7.68E-06	7.80E-06	4.49E-07	uCi/ml
10-07040-02	MBL	BLANK	07/08/10 00:00	6/4/2010	7/8/2010	10-07040	Gross Alpha	LANL MLR-100 Modified	-4.00E-16	3.37E-16	3.37E-16	1.01E-15	uCi/ml
10-07040-03	DUP	1300-562-1MA1 100505	05/05/10 11:26	6/4/2010	7/8/2010	10-07040	Gross Alpha	LANL MLR-100 Modified	-3.89E-16	3.81E-16	3.81E-16	1.11E-15	uCi/ml
10-07040-04	DO	1300-562-1MA1 100505	05/05/10 11:26	6/4/2010	7/8/2010	10-07040	Gross Alpha	LANL MLR-100 Modified	-1.94E-16	4.26E-16	4.26E-16	1.11E-15	uCi/ml
10-07040-05	TRG	1300-562-1MA1 100512	05/12/10 10:21	6/4/2010	7/8/2010	10-07040	Gross Alpha	LANL MLR-100 Modified	-2.86E-16	3.50E-16	3.50E-16	1.00E-15	uCi/ml
10-07040-06	TRG	1300-562-1MA1 100519	05/19/10 10:14	6/4/2010	7/8/2010	10-07040	Gross Alpha	LANL MLR-100 Modified	-3.40E-16	5.21E-16	5.21E-16	1.38E-15	uCi/ml
10-07040-07	TRG	1300-562-1MA1 100526	05/26/10 09:40	6/4/2010	7/8/2010	10-07040	Gross Alpha	LANL MLR-100 Modified	0.00E+00	0.00E+00	0.00E+00	1.52E-16	uCi/ml
10-07040-08	TRG	1300-562-1MA1 100602	06/02/10 09:48	6/4/2010	7/8/2010	10-07040	Gross Alpha	LANL MLR-100 Modified	-4.96E-16	4.12E-16	4.12E-16	1.21E-15	uCi/ml
10-07040-09	TRG	1001-562-1MA1 100505	05/05/10 09:43	6/4/2010	7/8/2010	10-07040	Gross Alpha	LANL MLR-100 Modified	4.76E-17	2.09E-16	2.09E-16	5.27E-16	uCi/ml
10-07040-10	TRG	1001-562-1MA1 100512	05/12/10 08:19	6/4/2010	7/8/2010	10-07040	Gross Alpha	LANL MLR-100 Modified	-4.35E-16	3.67E-16	3.67E-16	1.10E-15	uCi/ml
10-07040-11	TRG	1001-562-1MA1 100519	05/19/10 08:57	6/4/2010	7/8/2010	10-07040	Gross Alpha	LANL MLR-100 Modified	-9.39E-17	3.44E-16	3.44E-16	8.98E-16	uCi/ml
10-07040-12	TRG	1001-562-1MA1 100526	05/26/10 08:18	6/4/2010	7/8/2010	10-07040	Gross Alpha	LANL MLR-100 Modified	-2.35E-16	2.43E-16	2.43E-16	7.96E-16	uCi/ml
10-07040-13	TRG	1001-562-1MA1 100602	06/02/10 10:05	6/4/2010	7/8/2010	10-07040	Gross Alpha	LANL MLR-100 Modified	-1.38E-16	2.71E-16	2.71E-16	7.82E-16	uCi/ml
10-07040-14	TRG	1001-562-1MA2 100505	05/05/10 09:47	6/4/2010	7/8/2010	10-07040	Gross Alpha	LANL MLR-100 Modified	-3.48E-16	3.52E-16	3.52E-16	1.05E-15	uCi/ml
10-07040-15	TRG	1001-562-1MA2 100512	05/12/10 08:14	6/4/2010	7/8/2010	10-07040	Gross Alpha	LANL MLR-100 Modified	-2.43E-16	3.16E-16	3.16E-16	9.30E-16	uCi/ml
10-07040-16	TRG	1001-562-1MA2 100519	05/19/10 09:02	6/4/2010	7/8/2010	10-07040	Gross Alpha	LANL MLR-100 Modified	-3.43E-16	3.36E-16	3.36E-16	9.76E-16	uCi/ml
10-07040-17	TRG	1001-562-1MA2 100526	05/26/10 08:14	6/4/2010	7/8/2010	10-07040	Gross Alpha	LANL MLR-100 Modified	-1.63E-16	3.20E-16	3.20E-16	8.59E-16	uCi/ml
10-07040-18	TRG	1001-562-1MA2 100602	06/02/10 10:11	6/4/2010	7/8/2010	10-07040	Gross Alpha	LANL MLR-100 Modified	-3.48E-16	3.30E-16	3.30E-16	9.40E-16	uCi/ml

CU=Counting Uncertainty;CSU=Combined Standard Uncertainty (2-sigma);MDA=Minimal Detected Activity;LCS=Laboratory Control Sample; MBL=Blank; DUP=Duplicate; TRG=Normal Sample; DO=Duplicate Original

Eberline Analytical
Final Report of Analysis

Report To:
Debra Edwards
LES
275 Hwy 176
Eunice, NM 88231

Work Order Details:
SDG: 10-07040
Purchase Order: LES-GSA-3080
Analysis Category: ENVIRONMENTAL
Sample Matrix: AF

Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Report Units
10-07040-01	LCS	KNOWN	07/08/10 00:00	6/4/2010	7/8/2010	10-07040	Gross Beta	LANL MLR-100 Modified	2.37E-04	7.10E-06			uCi/ml
10-07040-01	LCS	SPIKE	07/08/10 00:00	6/4/2010	7/8/2010	10-07040	Gross Beta	LANL MLR-100 Modified	2.37E-04	5.72E-06	5.74E-06	8.49E-07	uCi/ml
10-07040-02	MBL	BLANK	07/08/10 00:00	6/4/2010	7/8/2010	10-07040	Gross Beta	LANL MLR-100 Modified	6.58E-16	9.42E-16	9.42E-16	1.94E-15	uCi/ml
10-07040-03	DUP	1300-562-1MA1 100505	05/05/10 11:26	6/4/2010	7/8/2010	10-07040	Gross Beta	LANL MLR-100 Modified	2.33E-16	1.06E-15	1.06E-15	2.24E-15	uCi/ml
10-07040-04	DO	1300-562-1MA1 100505	05/05/10 11:26	6/4/2010	7/8/2010	10-07040	Gross Beta	LANL MLR-100 Modified	-1.75E-16	1.04E-15	1.04E-15	2.24E-15	uCi/ml
10-07040-05	TRG	1300-562-1MA1 100512	05/12/10 10:21	6/4/2010	7/8/2010	10-07040	Gross Beta	LANL MLR-100 Modified	-6.61E-16	9.45E-16	9.45E-16	2.11E-15	uCi/ml
10-07040-06	TRG	1300-562-1MA1 100519	05/19/10 10:14	6/4/2010	7/8/2010	10-07040	Gross Beta	LANL MLR-100 Modified	1.90E-14	2.00E-15	2.00E-15	2.69E-15	uCi/ml
10-07040-07	TRG	1300-562-1MA1 100526	05/26/10 09:40	6/4/2010	7/8/2010	10-07040	Gross Beta	LANL MLR-100 Modified	-4.76E-16	1.05E-15	1.05E-15	2.30E-15	uCi/ml
10-07040-08	TRG	1300-562-1MA1 100602	06/02/10 09:48	6/4/2010	7/8/2010	10-07040	Gross Beta	LANL MLR-100 Modified	-8.32E-16	9.97E-16	9.97E-16	2.23E-15	uCi/ml
10-07040-09	TRG	1001-562-1MA1 100505	05/05/10 09:43	6/4/2010	7/8/2010	10-07040	Gross Beta	LANL MLR-100 Modified	-2.56E-16	9.56E-16	9.56E-16	2.08E-15	uCi/ml
10-07040-10	TRG	1001-562-1MA1 100512	05/12/10 08:19	6/4/2010	7/8/2010	10-07040	Gross Beta	LANL MLR-100 Modified	9.09E-16	1.09E-15	1.09E-15	2.22E-15	uCi/ml
10-07040-11	TRG	1001-562-1MA1 100519	05/19/10 08:57	6/4/2010	7/8/2010	10-07040	Gross Beta	LANL MLR-100 Modified	-8.67E-16	1.04E-15	1.04E-15	2.32E-15	uCi/ml
10-07040-12	TRG	1001-562-1MA1 100526	05/26/10 08:18	6/4/2010	7/8/2010	10-07040	Gross Beta	LANL MLR-100 Modified	-3.24E-16	9.81E-16	9.81E-16	2.14E-15	uCi/ml
10-07040-13	TRG	1001-562-1MA1 100602	06/02/10 10:05	6/4/2010	7/8/2010	10-07040	Gross Beta	LANL MLR-100 Modified	1.43E-15	1.07E-15	1.07E-15	2.13E-15	uCi/ml
10-07040-14	TRG	1001-562-1MA2 100505	05/05/10 09:47	6/4/2010	7/8/2010	10-07040	Gross Beta	LANL MLR-100 Modified	-1.12E-15	1.09E-15	1.09E-15	2.43E-15	uCi/ml
10-07040-15	TRG	1001-562-1MA2 100512	05/12/10 08:14	6/4/2010	7/8/2010	10-07040	Gross Beta	LANL MLR-100 Modified	5.12E-16	1.01E-15	1.01E-15	2.11E-15	uCi/ml
10-07040-16	TRG	1001-562-1MA2 100519	05/19/10 09:02	6/4/2010	7/8/2010	10-07040	Gross Beta	LANL MLR-100 Modified	2.80E-16	8.91E-16	8.91E-16	1.88E-15	uCi/ml
10-07040-17	TRG	1001-562-1MA2 100526	05/26/10 08:14	6/4/2010	7/8/2010	10-07040	Gross Beta	LANL MLR-100 Modified	-5.42E-16	8.10E-16	8.10E-16	1.80E-15	uCi/ml
10-07040-18	TRG	1001-562-1MA2 100602	06/02/10 10:11	6/4/2010	7/8/2010	10-07040	Gross Beta	LANL MLR-100 Modified	4.44E-14	2.14E-15	2.15E-15	1.84E-15	uCi/ml

CU=Counting Uncertainty;CSU=Combined Standard Uncertainty (2-sigma);MDA=Minimal Detected Activity;LCS=Laboratory Control Sample; MBL=Blank; DUP=Duplicate; TRG=Normal Sample; DO=Duplicate Original

Eberline Analytical
Final Report of Analysis

Report To:
Debra Edwards
LES
275 Hwy 176
Eunice, NM 88231

Work Order Details:

SDG:	10-07039
Purchase Order:	LES-GSA-3080
Analysis Category:	ENVIRONMENTAL
Sample Matrix:	AF

Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Report Units
10-07039-01	LCS	KNOWN	07/08/10 00:00	7/7/2010	7/8/2010	10-07039	Gross Alpha	LANL MLR-100 Modified	3.17E-04	1.36E-05			uCi/ml
10-07039-01	LCS	SPIKE	07/08/10 00:00	7/7/2010	7/8/2010	10-07039	Gross Alpha	LANL MLR-100 Modified	2.86E-04	7.55E-06	7.67E-06	5.16E-07	uCi/ml
10-07039-02	MBL	BLANK	07/08/10 00:00	7/7/2010	7/8/2010	10-07039	Gross Alpha	LANL MLR-100 Modified	3.40E-16	3.69E-16	3.69E-16	6.99E-16	uCi/ml
10-07039-03	DUP	1300-562-1MA1 100609	06/09/10 09:36	7/7/2010	7/8/2010	10-07039	Gross Alpha	LANL MLR-100 Modified	-4.63E-17	2.40E-16	2.40E-16	6.67E-16	uCi/ml
10-07039-04	DO	1300-562-1MA1 100609	06/09/10 09:36	7/7/2010	7/8/2010	10-07039	Gross Alpha	LANL MLR-100 Modified	0.00E+00	2.57E-16	2.57E-16	6.67E-16	uCi/ml
10-07039-05	TRG	1300-562-1MA1 100616	06/16/10 10:12	7/7/2010	7/8/2010	10-07039	Gross Alpha	LANL MLR-100 Modified	-4.71E-17	2.44E-16	2.44E-16	6.78E-16	uCi/ml
10-07039-06	TRG	1300-562-1MA1 100623	06/23/10 11:12	7/7/2010	7/8/2010	10-07039	Gross Alpha	LANL MLR-100 Modified	-5.97E-16	4.78E-16	4.78E-16	1.35E-15	uCi/ml
10-07039-07	TRG	1300-562-1MA1 100630	06/30/10 10:54	7/7/2010	7/8/2010	10-07039	Gross Alpha	LANL MLR-100 Modified	-9.94E-17	3.08E-16	3.08E-16	8.43E-16	uCi/ml
10-07039-08	TRG	1001-562-1MA1 100609	06/09/10 08:57	7/7/2010	7/8/2010	10-07039	Gross Alpha	LANL MLR-100 Modified	-7.32E-16	4.38E-16	4.38E-16	1.33E-15	uCi/ml
10-07039-09	TRG	1001-562-1MA1 100616	06/16/10 09:07	7/7/2010	7/8/2010	10-07039	Gross Alpha	LANL MLR-100 Modified	-1.84E-16	3.12E-16	3.12E-16	8.78E-16	uCi/ml
10-07039-10	TRG	1001-562-1MA1 100623	06/23/10 14:48	7/7/2010	7/8/2010	10-07039	Gross Alpha	LANL MLR-100 Modified	-5.04E-16	4.35E-16	4.35E-16	1.20E-15	uCi/ml
10-07039-11	TRG	1001-562-1MA1 100630	06/30/10 11:47	7/7/2010	7/8/2010	10-07039	Gross Alpha	LANL MLR-100 Modified	-3.91E-16	3.83E-16	3.83E-16	1.11E-15	uCi/ml
10-07039-12	TRG	1001-562-1MA2 100609	06/09/10 08:53	7/7/2010	7/8/2010	10-07039	Gross Alpha	LANL MLR-100 Modified	1.81E-16	2.13E-16	2.13E-16	4.01E-16	uCi/ml
10-07039-13	TRG	1001-562-1MA2 100616	06/16/10 09:12	7/7/2010	7/8/2010	10-07039	Gross Alpha	LANL MLR-100 Modified	-5.23E-16	3.78E-16	3.78E-16	1.09E-15	uCi/ml
10-07039-14	TRG	1001-562-1MA2 100623	06/23/10 14:42	7/7/2010	7/8/2010	10-07039	Gross Alpha	LANL MLR-100 Modified	-1.14E-15	5.87E-16	5.87E-16	1.67E-15	uCi/ml
10-07039-15	TRG	1001-562-1MA2 100630	06/30/10 11:49	7/7/2010	7/8/2010	10-07039	Gross Alpha	LANL MLR-100 Modified	-5.91E-16	3.88E-16	3.88E-16	1.17E-15	uCi/ml
10-07039-01	LCS	KNOWN	07/08/10 00:00	7/7/2010	7/8/2010	10-07039	Gross Beta	LANL MLR-100 Modified	2.38E-04	7.15E-06			uCi/ml
10-07039-01	LCS	SPIKE	07/08/10 00:00	7/7/2010	7/8/2010	10-07039	Gross Beta	LANL MLR-100 Modified	2.59E-04	6.02E-06	6.05E-06	9.04E-07	uCi/ml
10-07039-02	MBL	BLANK	07/08/10 00:00	7/7/2010	7/8/2010	10-07039	Gross Beta	LANL MLR-100 Modified	6.16E-16	1.11E-15	1.11E-15	2.30E-15	uCi/ml
10-07039-03	DUP	1300-562-1MA1 100609	06/09/10 09:36	7/7/2010	7/8/2010	10-07039	Gross Beta	LANL MLR-100 Modified	-1.13E-16	8.78E-16	8.78E-16	1.90E-15	uCi/ml
10-07039-04	DO	1300-562-1MA1 100609	06/09/10 09:36	7/7/2010	7/8/2010	10-07039	Gross Beta	LANL MLR-100 Modified	-5.36E-16	8.52E-16	8.52E-16	1.90E-15	uCi/ml
10-07039-05	TRG	1300-562-1MA1 100616	06/16/10 10:12	7/7/2010	7/8/2010	10-07039	Gross Beta	LANL MLR-100 Modified	8.50E-17	9.14E-16	9.14E-16	1.95E-15	uCi/ml
10-07039-06	TRG	1300-562-1MA1 100623	06/23/10 11:12	7/7/2010	7/8/2010	10-07039	Gross Beta	LANL MLR-100 Modified	-4.70E-16	1.09E-15	1.09E-15	2.37E-15	uCi/ml
10-07039-07	TRG	1300-562-1MA1 100630	06/30/10 10:54	7/7/2010	7/8/2010	10-07039	Gross Beta	LANL MLR-100 Modified	-2.29E-16	9.33E-16	9.33E-16	2.03E-15	uCi/ml
10-07039-08	TRG	1001-562-1MA1 100609	06/09/10 08:57	7/7/2010	7/8/2010	10-07039	Gross Beta	LANL MLR-100 Modified	2.79E-17	9.67E-16	9.67E-16	2.07E-15	uCi/ml
10-07039-09	TRG	1001-562-1MA1 100616	06/16/10 09:07	7/7/2010	7/8/2010	10-07039	Gross Beta	LANL MLR-100 Modified	-7.29E-16	8.62E-16	8.62E-16	1.94E-15	uCi/ml
10-07039-10	TRG	1001-562-1MA1 100623	06/23/10 14:48	7/7/2010	7/8/2010	10-07039	Gross Beta	LANL MLR-100 Modified	2.60E-15	9.75E-16	9.75E-16	1.80E-15	uCi/ml
10-07039-11	TRG	1001-562-1MA1 100630	06/30/10 11:47	7/7/2010	7/8/2010	10-07039	Gross Beta	LANL MLR-100 Modified	-5.71E-16	1.01E-15	1.01E-15	2.22E-15	uCi/ml
10-07039-12	TRG	1001-562-1MA2 100609	06/09/10 08:53	7/7/2010	7/8/2010	10-07039	Gross Beta	LANL MLR-100 Modified	6.81E-16	9.23E-16	9.23E-16	1.90E-15	uCi/ml
10-07039-13	TRG	1001-562-1MA2 100616	06/16/10 09:12	7/7/2010	7/8/2010	10-07039	Gross Beta	LANL MLR-100 Modified	-3.98E-16	8.24E-16	8.24E-16	1.81E-15	uCi/ml
10-07039-14	TRG	1001-562-1MA2 100623	06/23/10 14:42	7/7/2010	7/8/2010	10-07039	Gross Beta	LANL MLR-100 Modified	-1.38E-15	1.00E-15	1.00E-15	2.29E-15	uCi/ml
10-07039-15	TRG	1001-562-1MA2 100630	06/30/10 11:49	7/7/2010	7/8/2010	10-07039	Gross Beta	LANL MLR-100 Modified	1.32E-16	7.82E-16	7.82E-16	1.67E-15	uCi/ml

CU=Counting Uncertainty;CSU=Combined Standard Uncertainty (2-sigma);MDA=Minimal Detected Activity;LCS=Laboratory Control Sample; MBL=Blank; DUP=Duplicate; TRG=Normal Sample; DO=Duplicate Original

Eberline Analytical
Final Report of Analysis

Report To:
Debra Edwards
LES
275 Hwy 176
Eunice, NM 88231

Work Order Details:

SDG:	10-07063
Purchase Order:	LES-GSA-3080
Analysis Category:	ENVIRONMENTAL
Sample Matrix:	AF

Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Report Units
10-07063-01	LCS	KNOWN	07/14/10 00:00	7/13/2010	7/19/2010	10-07063	Uranium-234	EML U-02 Modified	8.24E-06	2.97E-07			uCi/ml
10-07063-01	LCS	SPIKE	07/14/10 00:00	7/13/2010	7/19/2010	10-07063	Uranium-234	EML U-02 Modified	8.38E-06	1.41E-06	1.41E-06	6.21E-08	uCi/ml
10-07063-02	MBL	BLANK	07/14/10 00:00	7/13/2010	7/19/2010	10-07063	Uranium-234	EML U-02 Modified	5.31E-17	6.58E-17	6.58E-17	8.58E-17	uCi/ml
10-07063-03	DUP	1300-562-1MA1 COMP	06/30/10 10:54	7/13/2010	7/19/2010	10-07063	Uranium-234	EML U-02 Modified	1.62E-16	1.22E-16	1.22E-16	1.13E-16	uCi/ml
10-07063-04	DO	1300-562-1MA1 COMP	06/30/10 10:54	7/13/2010	7/19/2010	10-07063	Uranium-234	EML U-02 Modified	2.66E-17	4.15E-17	4.15E-17	6.63E-17	uCi/ml
10-07063-05	TRG	1001-562-1MA1 COMP	06/30/10 11:47	7/13/2010	7/19/2010	10-07063	Uranium-234	EML U-02 Modified	9.21E-17	1.44E-16	1.44E-16	2.30E-16	uCi/ml
10-07063-06	TRG	1001-562-1MA2 COMP	06/30/10 11:49	7/13/2010	7/19/2010	10-07063	Uranium-234	EML U-02 Modified	-1.03E-17	2.07E-17	2.07E-17	2.77E-16	uCi/ml
10-07063-01	LCS	SPIKE	07/14/10 00:00	7/13/2010	7/19/2010	10-07063	Uranium-235	EML U-02 Modified	5.20E-07	2.02E-07	2.02E-07	4.44E-08	uCi/ml
10-07063-02	MBL	BLANK	07/14/10 00:00	7/13/2010	7/19/2010	10-07063	Uranium-235	EML U-02 Modified	4.63E-17	6.59E-17	6.59E-17	6.14E-17	uCi/ml
10-07063-03	DUP	1300-562-1MA1 COMP	06/30/10 10:54	7/13/2010	7/19/2010	10-07063	Uranium-235	EML U-02 Modified	5.21E-17	7.41E-17	7.41E-17	6.90E-17	uCi/ml
10-07063-04	DO	1300-562-1MA1 COMP	06/30/10 10:54	7/13/2010	7/19/2010	10-07063	Uranium-235	EML U-02 Modified	3.28E-17	5.12E-17	5.12E-17	8.18E-17	uCi/ml
10-07063-05	TRG	1001-562-1MA1 COMP	06/30/10 11:47	7/13/2010	7/19/2010	10-07063	Uranium-235	EML U-02 Modified	0.00E+00	1.28E-17	1.28E-17	1.65E-16	uCi/ml
10-07063-06	TRG	1001-562-1MA2 COMP	06/30/10 11:49	7/13/2010	7/19/2010	10-07063	Uranium-235	EML U-02 Modified	0.00E+00	1.55E-17	1.55E-17	1.98E-16	uCi/ml
10-07063-01	LCS	KNOWN	07/14/10 00:00	7/13/2010	7/19/2010	10-07063	Uranium-238	EML U-02 Modified	8.04E-06	2.89E-07			uCi/ml
10-07063-01	LCS	SPIKE	07/14/10 00:00	7/13/2010	7/19/2010	10-07063	Uranium-238	EML U-02 Modified	7.81E-06	1.32E-06	1.32E-06	6.18E-08	uCi/ml
10-07063-02	MBL	BLANK	07/14/10 00:00	7/13/2010	7/19/2010	10-07063	Uranium-238	EML U-02 Modified	3.42E-17	5.35E-17	5.35E-17	8.54E-17	uCi/ml
10-07063-03	DUP	1300-562-1MA1 COMP	06/30/10 10:54	7/13/2010	7/19/2010	10-07063	Uranium-238	EML U-02 Modified	3.85E-17	6.02E-17	6.02E-17	9.60E-17	uCi/ml
10-07063-04	DO	1300-562-1MA1 COMP	06/30/10 10:54	7/13/2010	7/19/2010	10-07063	Uranium-238	EML U-02 Modified	4.34E-17	5.04E-17	5.04E-17	3.83E-17	uCi/ml
10-07063-05	TRG	1001-562-1MA1 COMP	06/30/10 11:47	7/13/2010	7/19/2010	10-07063	Uranium-238	EML U-02 Modified	0.00E+00	1.28E-17	1.28E-17	1.33E-16	uCi/ml
10-07063-06	TRG	1001-562-1MA2 COMP	06/30/10 11:49	7/13/2010	7/19/2010	10-07063	Uranium-238	EML U-02 Modified	1.81E-16	2.12E-16	2.12E-16	1.60E-16	uCi/ml

CU=Counting Uncertainty;CSU=Combined Standard Uncertainty (2-sigma);MDA=Minimal Detected Activity;LCS=Laboratory Control Sample; MBL=Blank; DUP=Duplicate; TRG=Normal Sample; DO=Duplicate Original

APPENDIX C - Sampling Procedures

Alpha Monitor (ABPM 201 S) Operation

CH-3-4000-01

Revision 5

Level 2 - Reference Use

Chemistry Services Manager

Effective Date	3/17/2010

urenco

Revision Summary

Change	Reason for Change
Changed Radiation Protection and Chemistry Manager to Chemistry Services Manager	Corrected positions titles to match License Basis Documents– Editorial correction
Deleted reference to Operation Center through out procedure.	No longer in use. Editorial correction
Setpoints for 1001 alpha monitors units were changed from µCi/cc to Bq/m^3. Reference to setpoints in procedure in Attachment 9, 10 and F-3 were edited to include both units.	Compliance with Urenco commonality for effluents. Editorial correction.

TABLE OF CONTENTS

1. PURPOSE

1.1 This procedure provides instruction for operation, change-out of filters and filter cassette, and operational adjustments/calibration, and alarm response actions associated with the Alpha Beta Particulate Monitor, Model 201, Seismic (ABPM 201 S). Monitors at URENCO USA are configured for alpha detection only and used in-line with Gaseous Effluent Ventilation Systems (GEVS) and Special Filtration Unit.

1.2 This procedure provides instruction for collecting, analyzing, and providing results for the continuous on-line particulate filter. This filter is required to provide a monitored release and the data is used in reporting to the NRC for the gaseous portion of the Semiannual Effluent Radiological Release Rate Report. Release via any release point requires continuous sample collection.

2. SCOPE

2.1 This procedure applies to alpha monitors located in the Centrifuge Assembly Building, Technical Services Building, and Separations Building Modules and includes specific information for:

- 1300-562-1MA1
- 1001-562-1MA1
- 1001-562-1MA2

3. TERMS, DEFINITIONS, ABBREVIATIONS, AND ACRONYMS

NOTE:

In addition to those herein, other chemistry terms and definitions are defined in CH-4-1000-01, Chemistry Terms, Definitions, and Acronyms.

3.1 Acronyms

3.1.1 ABPM 201S: Alpha Beta Particulate Monitor, Model 201, Seismic

3.1.2 EEPROM: Electrically Erasable Programmable Memory:

3.1.3 LDU: Local Display Unit:

3.1.4 LPDU: Local Processing and Display Unit

3.1.5 MASS2: Maintenance and Setup Software

3.1.6 PDCU: Power Distribution and Control Unit

3.1.7 PFCV: Proportional Flow Control Valve

3.1.8 PIS: Particulate and Iodine Sampler

3.2 Definitions

3.2.1 Electrically Erasable Programmable Memory (EEPROM): Type of memory used on the measurement boards to store board parameters.

3.2.2 Flowmeter Box: Provides measured flow-rate independent of temperature and pressure variations.

3.2.3 FSLW Filter-Paper: Hydrophobic PTFE (fluorocarbon) membrane used to collect air samples in the Alpha monitors from the effluent stream.

3.2.4 Junction Box: Serves to operate the inputs/outputs from the Local Processing and Display Unit. It is comprised of two alarm relays, two isolated serial links, one analog input, one analog output, and one connector.

3.2.5 Local Display Unit (LDU): Receives analog signal from the stack flow element and relays signal information to the LPDU for control of the proportional flow control valve and calculations for release. The LDU also displays readings and alarms associated with ABPM 201S.

3.2.6 Local Processing and Display Unit (LPDU): Monitor interface unit that provides the following basic functions:

a. Detector coupling

b. Processing

c. Filter advance management

d. Alphanumeric screen display

e. Audible and light signals

f. Keypad

g. Testing

h. Interface management

3.2.7 Maintenance and Setup Software (MASS2): Software designed to configure and maintain the various radiation monitoring system units.

3.2.8 Particulate Detection Subassembly: Ensures trapping and measurement of sample stream particulate utilizing a detector head and filter-paper cassette.

3.2.9 Particulate and Iodine Sampler (PIS): Sampling unit used for collection of particulate for laboratory analysis comprised of a standard holder (three piece housing) and a fiberglass filter (to trap particulate). Charcoal for Iodine collection is not required for URENCO USA application.

3.2.10 Power Distribution and Control Unit (PDCU): Unit that provides power to the pump and LPDU, and also houses the pump switch.

3.2.11 Proportional Flow Control Valve (PFCV): Valve that regulates sample flow rate passing through the monitor to maintain proportionality with the stack flow rate.

3.2.12 Pump: An oil free dual head metal bellows pump sized to draw the air sample from a remote location, overcome pressure drop throughout the sampling lines, and discharge the sample from the skid.

3.2.13 Secondary Calibration Source: An Americium 241 (^{241}Am) alpha source used for initial and periodic source calibration of the ABPM 201S.

3.2.14 Spectrum Acquisition and Maintenance Software (SAMS): Software for analysis, trending, and storage of alpha spectra data from the detector.

4. RESPONSIBILITIES

4.1 Chemistry Supervisor

4.1.1 Review and approve data and filter results.

4.1.2 Provide Safeguards, Environmental Compliance Officer and Radiation Protection Manager with data access to facilitate review, assessment, trending, and reporting.

4.2 Chemistry Technicians

4.2.1 Perform periodic source calibration.

4.2.2 Perform periodic energy calibration.

4.2.3 Replace PIS fiberglass filter-paper.

4.2.4 Perform PIS filter cassette change-out.

4.2.5 Replace filter-paper in filter cassette.

4.2.6 Maintain accountability of PIS filter-paper samples.

4.2.7 Packaging and shipment of PIS filter-paper for analysis.

4.2.8 Generate Systems Acceptance Plan (SAP) work order for repairs, as required

4.2.9 Generate Condition Reports (CR) to document "out-of-service" condition for repairs.

4.2.10 Input setpoints, as required.

4.2.11 Update configuration based on calibration data from skid-flow transmitters and stack-flow transmitter.

4.3 Environmental Compliance Officer

4.3.1 Coordinate facility activities required to ensure local, state and federal environmental regulations, including submission of periodic effluent reports to appropriate regulating organizations are met.

4.4 Operator

4.4.1 Perform routine surveillance of Alpha Monitor using eSoms.

4.4.2 Alarm response actions

4.4.3 Power Up/Quick Start-up and Shutdown

4.4.4 PIS change-out

4.5 Chemistry Services Manager

4.5.1 Implement chemistry services programs and procedures, including effluent sample collection, chemical analysis of effluents, comparison of effluent analysis results to limits, and reporting, in conjunction with the Environmental Compliance Officer, of chemical analysis of effluents to appropriate regulatory agencies.

4.5.2 Ensure Safeguards, Environmental Compliance Officer and Radiation Protection Manager have access to data for review, assessment, trending and reporting.

4.6 Radiation Protection Manager

4.6.1 Ensure adequate Radiation Work Permits (RWPs) and controls are established for monitor operation, adjustments/calibrations and filter/cassette change-out, as required.

4.6.2 Calibration and quality assurance of all radiological instrumentation, including verification of required Lower Limits of Detection (LLD) or alarm levels.

4.6.3 Establish and approve all monitor setpoints.

5. PRECAUTIONS AND LIMITATIONS

5.1 Use and navigation of Local Processing and Display Unit (LPDU) and Local Display Unit (LDU) screens are per 15-00068 APBM 201 S Alpha Beta Particulate Monitor User's Manual, and the 110164EN-D Local Display Unit and RD Users Manual.

5.2 Internal surfaces of ABM 201S monitoring systems should be free of radioactive contamination. Utilize good nuclear safety worker practices when removing, replacing, and handling Particulate and Iodine Sampler (PIS) filter housing and filter cassette housing.

5.3 IF contamination is detected, THEN place work in a safe condition AND notify Radiation Protection Manager.

5.4 Perform filter/cassette change-out and adjustments/calibration per applicable Work Package, Procedure(s) and RWP(s).

6. EQUIPMENT, MATERIAL AND PARTS

6.1 For Particulate and Iodine Sampler (PIS) change-out:

- Standard PIS holder with filter-paper installed (The pre-staged PIS)
- PIS will normally be stored in the designated area
- Gloves, smears, and appropriate plastic sheets/bags as needed

6.2 For PIS FSLW filter-paper replacement:

- (1) 47mm, 3.0 micron (µm) PIS FSLW filter-paper (Millipore #: FSLW 04700, Mirion #: 52123, OR equivalent)
- Petri dish OR storage envelope for FSLW filter-paper storage
- Label
- Vacuum grease (as needed)
- Tweezers
- Gloves, smears, and appropriate plastic sheets/bags as needed

6.3 For filter cassette change-out:

- Filter cassette with new filter-paper installed (The pre-staged filter cassette)
- Filter cassette will normally be stored in the designated area.
- Gloves, smears, and appropriate plastic sheets/bags as needed.

6.4 For replacing filter cassette filter-paper:

- (1) roll of ABPM cassette (FSLW) filter-paper (Millipore part # AAA-8015 or equal)
- Gloves, smears, and appropriate plastic sheets/bags as needed

6.5 For energy calibration:

- Laptop computer with MASS2 and SAMS installed
- USB to RS 232 cable

6.6 For source calibration:

- Laptop computer with MASS2 and SAMS installed
- USB to RS 232 cable
- Calculator
- ^{241}Am (or other source(s), as required)
- Calibration source fixture
- Gloves, smears, and appropriate plastic sheets/bags

7. PREREQUISITES

7.1 Prior to removing an alpha monitor from service for routine maintenance and/or calibration, ensure the redundant alpha monitor OR an inline HF monitor from the same release point is in operation.

7.2 Out of service alpha monitor with no redundant alpha monitor during times of release via the stack requires compensatory actions to ensure continuous filter collection of the gaseous effluent to prevent unmonitored release.

7.3 A pre-job discussion/brief has been conducted prior to performing sections of this procedure as needed.

7.4 Control Room has been notified and any trips associated with alarms are disabled.

7.5 IF Chemistry Supervisor determines a valve lineup is required, THEN perform lineup per CH-3-4000-01-F-5, Normal Valve Line-Up for 1300-562-1MA1, for 1300-562-1MA1 for CAB, OR perform lineup per CH-3-4000-01-F-6, Normal Valve Line-Up for 1001-562-1MA1/1MA2, for 1001-562-1MA1/1MA2 for SBM.

NOTE:

In most cases throughout this procedure "alpha/beta" nomenclature has been changed to "alpha". However, some equipment labels have not been changed and procedure nomenclature is written to reflect field/equipment conditions.

Attachment 1, System Components and Information may be referenced as needed throughout this procedure.

8. MAIN BODY

8.1 Routine Adjustments/Calibration and Operations:

8.1.1 Perform PIS Change-Out per Attachment 2.

8.1.2 Replace PIS Filter-Paper per Attachment 3.

8.1.3 Perform Filter Cassette Change-Out per Attachment 4.

8.1.4 Replace Filter Cassette Filter-Paper per Attachment 5.

8.1.5 Perform an Energy Calibration per Attachment 6.

8.1.6 Perform Source Calibration per Attachment 7.

8.1.7 Perform Power-Up and Quick Start-Up per Attachment 8.

8.1.8 Perform Shutdown per Attachment 9.

8.2 Alarm Response

8.2.1 Alarm responses are performed per:

a. OP-3-2000-01, Hazardous Release Response

b. OP-3-0590-01, Centrifuge Test Facility Alarm Response

c. OP-3-0660-01, Gaseous Effluent Ventilation System

8.2.2 Additional Alarm Setpoint information is provided in Attachment 10.

8.3 Filter Analysis and Review

8.3.1 Filter Analysis and Review process instructions are provided in Attachment 11.

9. DOCUMENTATION AND RECORDS

9.1 Documentation and effluent monitoring records shall be established and maintained per RM-3-2000-01, Records Management Program.

9.2 Effluent monitoring documents shall be considered valid records only if authenticated (i.e., stamped, initialed or signed and dated as complete by authorized personnel).

9.2.1 IF record nature precludes stamping or signing, THEN other means of authentication by authorized personnel is permitted (e.g., a stamped and signed statement by the responsible individual or organization).

9.2.2 IF clearly identified as a statement by the reporting individual or organization, THEN handwritten signatures are not required.

10. LICENSE COMMITMENTS AND REQUIREMENTS

10.1 SAR 2.2.1

10.2 SAR 4.1

10.3 SAR 4.7

10.4 SAR, Section 9.2.2.1

10.5 ER, Section 6.1.1.1

10.6 ER, Section 6.2.8

11. REFERENCES

11.1 Use References

11.1.1 CA-3-1000-01, Performance Improvement Program

11.1.2 CH-4-1000-01, Chemistry Terms, Definitions, and Acronyms

11.1.3 EN-3-1000-02, Radiological Effluent and Environmental Monitoring

11.1.4 OP-3-0590-01, Centrifuge Test Facility Alarm Response

11.1.5 OP-3-0660-01, Gaseous Effluent Ventilation System

11.1.6 OP-3-2000-01, Hazardous Release Response

11.1.7 RM-3-2000-01, Records Management Program

11.1.8 15-00068 APBM 201 S Alpha Beta Particulate Monitor User's Manual

11.1.9 110164EN-D Local Display Unit and RD Users Manual

11.2 Source References

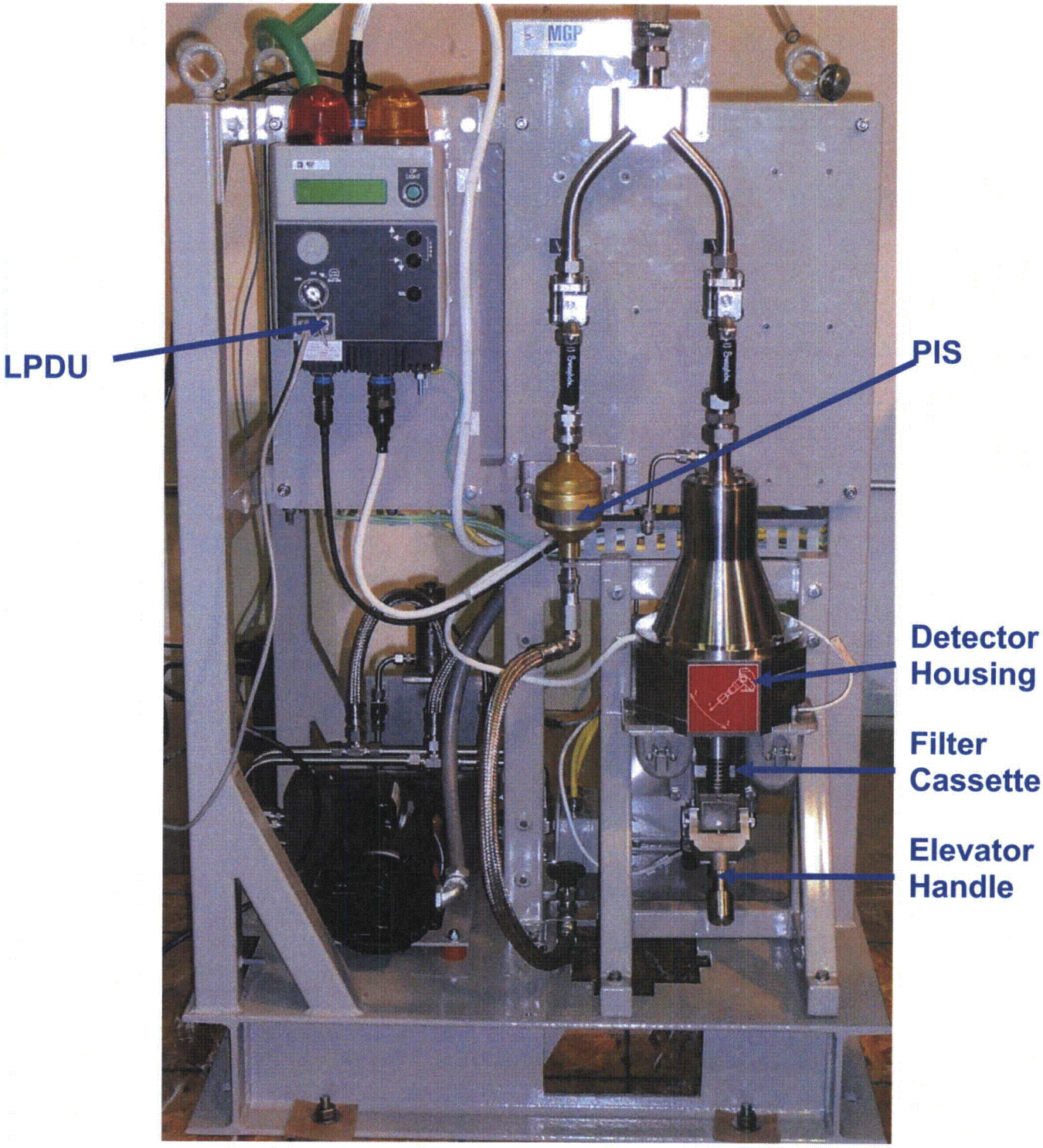
11.2.1 12-00124 Factory Acceptance Test Procedure

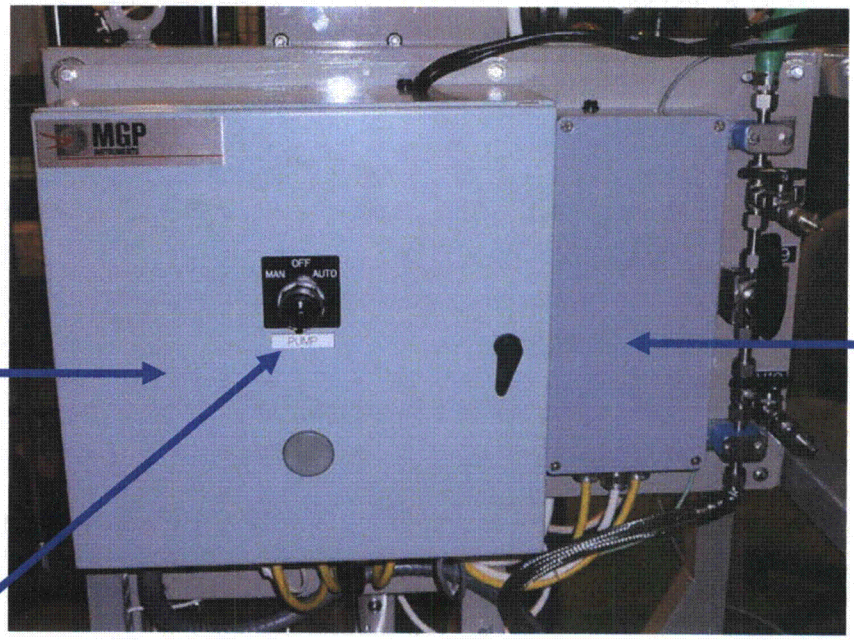
11.2.2 12-00136 Factory Acceptance Test Report for LES ABPM201S Alpha Monitor

11.2.3 14-00098 Post Production Test Data Sheet: APBM201S Alpha Beta Particulate Monitor

11.2.4 114868EN-E User's Manual for SAMS Software

11.2.5 133506EN-D MASS2 Maintenance and Setup Software User's Manual


LPDU
PIS
Detector Housing
Filter Cassette
Elevator Handle



PDCU

Signal Junction Box

Pump Control Hand Switch

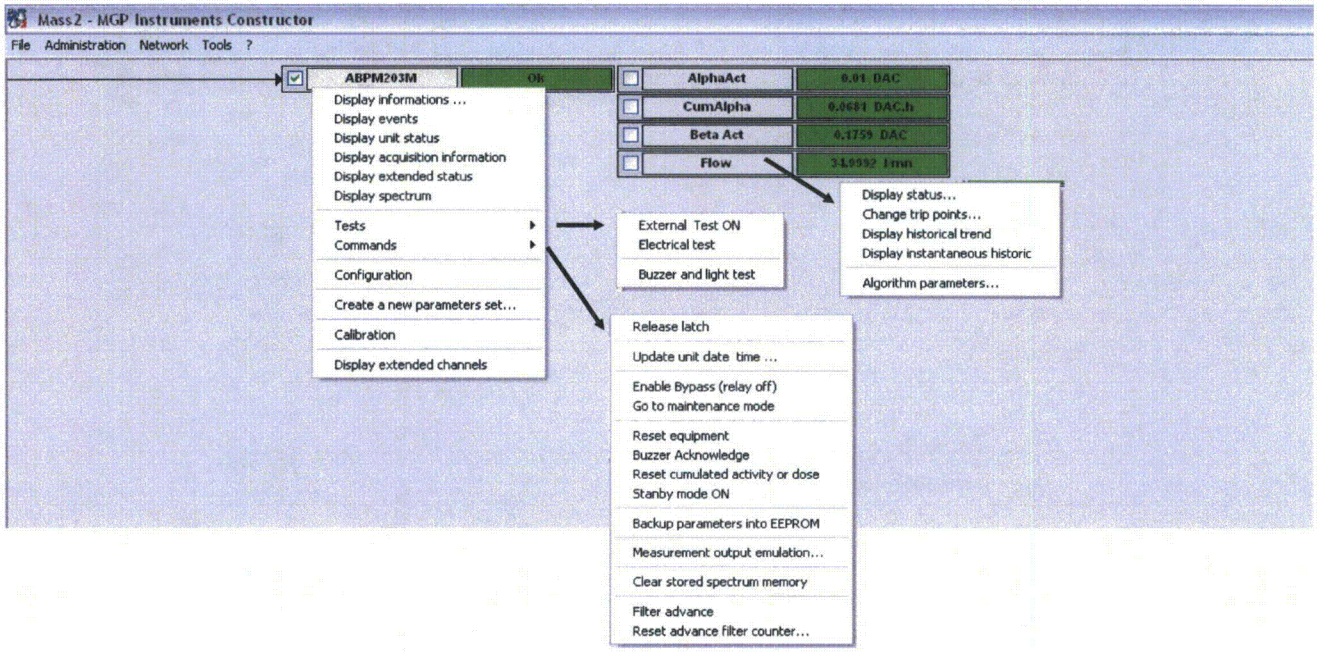
LDU

Scroll Keys

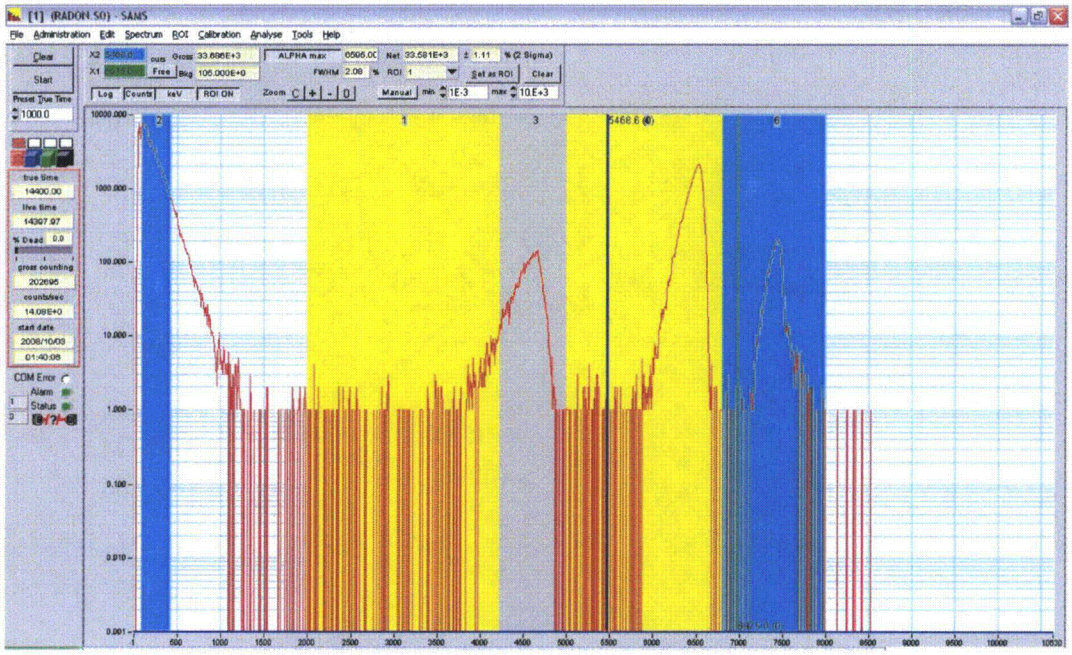
Select Key

LPDU Key Operated Switch

LPDU

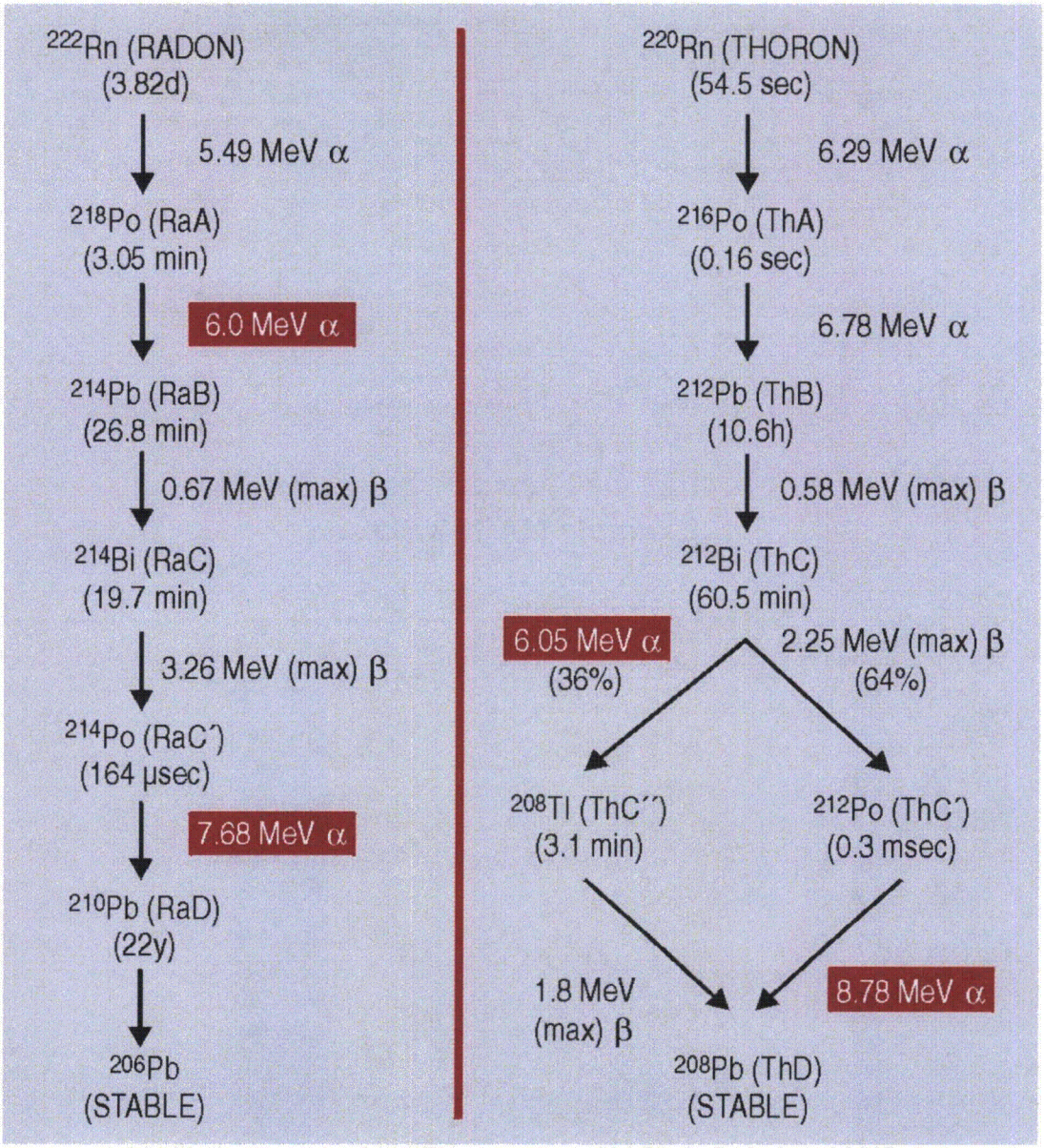


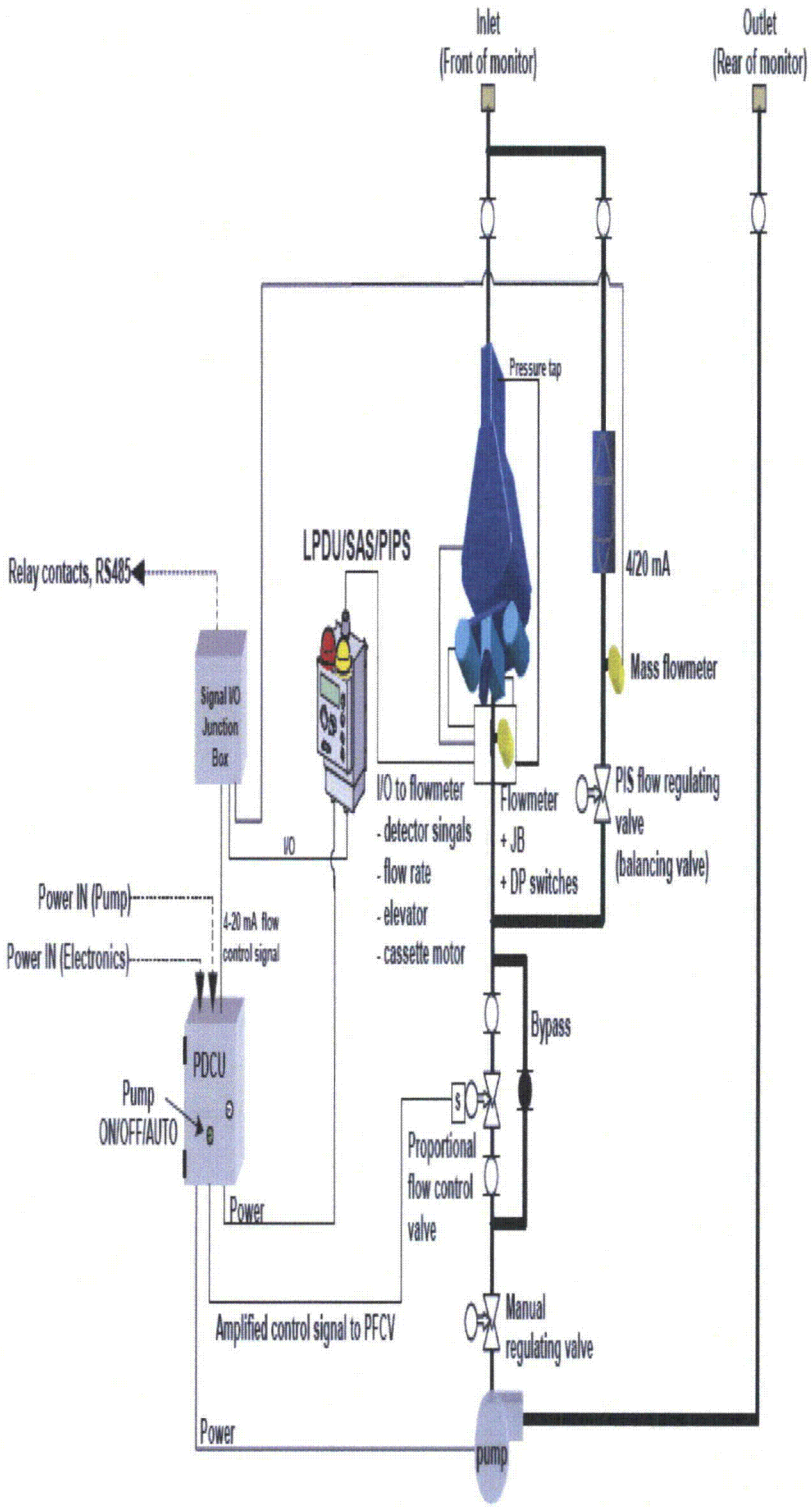
Example MASS2 Screen



Example SAMS Screen

Radon & Thoron Decay




Inlet
(Front of monitor)
Outlet
(Rear of monitor)
Pressure tap
LPDU/SAS/PIPS
Relay contacts, RS485
4/20 mA
Mass flowmeter
Signal I/O
Junction
Box
I/O to flowmeter
- detector singals
- flow rate
- elevator
- cassette motor
Flowmeter
+ JB
+ DP switches
PIS flow regulating
valve
(balancing valve)
I/O
Power IN (Pump)
Power IN (Electronics)
4-20 mA flow
control signal
Bypass
PDCU
Pump
ON/OFF/AUTO
Proportional
flow control
valve
Power
Amplified control signal to PFCV
Manual
regulating valve
Power
pump

NOTE:

All PIS Change-out data will be recorded on CH-3-4000-01-F-2, PIS Change-Out.

1. Notify Shift Manager prior to starting PIS change-out.

1.1 Notify Control Room of potential for a flow fault alarm due to PIS Change-out AND to disable trips associated with alarms.

1.2 Record "Functional Location of Monitor" AND "Date of PIS change-out".

1.3 Close V2 (PIS Isolation) AND record "Time/Date V2 Closed".

1.4 Acknowledge alarms as needed.

1.5 Scroll to LPDU "PIS VOL" screen AND record as "PIS Volume (L)".

1.6 IF volume is ≤ 2.25 E+5 L, THEN notify Chemistry Supervisor AND proceed as directed.

1.7 Scroll to "Stk Vol" AND record as "Stack Volume (scf).

1.8 Reset PIS totalizer from LPDU as follows:

1.8.1 Press both Scroll keys simultaneously.

1.8.2 Enter pass code (e.g., 0000).

1.8.3 Press Scroll key to "OK".

1.8.4 Press Select key until "COMMAND" screen is displayed.

1.8.5 Press Scroll key to "CD".

1.8.6 Press Select key until "RESET DOSE" is displayed.

1.8.7 Press Scroll key to "EXE".

1.8.8 Press "SELECT" key.

1.9 Loosen two line bracket screws holding PIS AND disconnect from sample line as follows:

1.9.1 Disconnect PIS outlet (bottom) quick disconnect.

1.9.2 Disconnect PIS inlet (top) quick disconnect.

1.10 Place PIS in a container (e.g., bag) for transport.

1.11 Connect pre-staged replacement PIS to sample line, as follows:

1.11.1 Connect PIS inlet (top) quick disconnect.

1.11.2 Connect PIS outlet (bottom) quick disconnect.

1.12 Put PIS in position AND tighten sample line bracket screws as required.

1.13 Open V2 (PIS Isolation) AND record Time/Date V2 Open.

1.14 Verify LPDU fault clears.

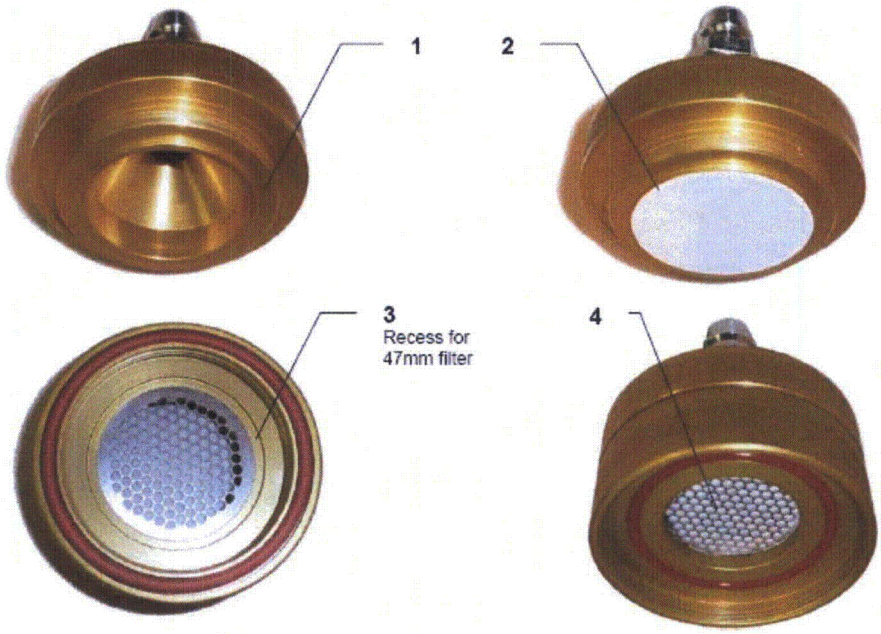
1.15 Notify Control Room that PIS change-out is complete AND to enable trips associated with alarms from applicable monitor.

1.16 IF PIS change-out was not performed on 7th day since most recent previous PIS filter replacement was performed, THEN record reason for deviation in "Remarks" section (e.g., Insufficient PIS volume due to [hrs/min] system outage on [mm/dd/yyyy]).

1.17 Turnover removed PIS to Chemistry Technician.

1.18 Ensure custody of the removed PIS and the completed form is turned over to a qualified Chemistry Technician.

1. Replace PIS Filter-Paper



NOTE:

Reference above photograph as required for completion of Attachment 3, Replace PIS Filter-Paper.

1.1 Unscrew top housing (1) of standard holder containing filter-paper.

1.2 Visually inspect o-rings for cracks, wear, proper seating AND replace as required.

1.3 IF placing filter paper in empty PIS, THEN go to step 1.4, otherwise proceed as follows:

1.3.1 With tweezers, gently remove filter-paper from holder and place into Petri dish or envelope, pre-labeled as follows:

a. Alpha monitor functional location

b. Date/Time ON

c. Date/Time OFF

d. PIS Volume (L)

e. Stack Volume (scf)

f. Initials of individual replacing filter-paper

1.4 Place a small amount of vacuum grease to inner lip of top housing (1), as required.

1.5 Using tweezers, place new filter-paper onto lip of top housing (2) ensuring Teflon side (smooth side) is facing the PIS inlet.

1.6 Screw middle housing onto top housing so that filter-paper seats in the recessed area (3).

1.7 Look up through the bottom of middle housing (4) to verify filter-paper is properly seated.

1.8 Perform survey to verify PIS is free of contamination; decontaminate as required.

1.9 Place PIS in approved storage location for subsequent change-outs.

1. Notify Shift Manager prior to performing filter change-out

1.1 Notify Control Room of potential for a fault due to filter cassette change-out AND to disable any trips associated with alarms.

1.2 Connect laptop to LPDU AND open MASS2.

1.3 Log-in to MASS2 at "Maintenance" level.

1.4 From MASS2 advance filter paper as follows:

1.4.1 Right click LPDU box AND select "COMMANDS" THEN "Filter advance".

1.4.2 Right click LPDU box AND select "COMMANDS" THEN "Go to Maintenance Mode".

1.5 Verify sample pump stops.

1.6 Close V1 (Detector subassembly Isolation).

1.7 Pull elevator handle to disengage, THEN lift gently to open (lower) elevator.

1.8 Remove filter cassette AND disconnect filter cassette power cable.

1.9 Place removed filter cassette in container (e.g., bag) for transport.

1.10 Connect pre-staged filter cassette to power cable AND place filter cassette in elevator.

1.11 Pull elevator handle to disengage, THEN push down gently to close (raise) elevator.

1.12 Open V1 (Detector Subassembly Isolation).

1.13 From MASS2, reset LPDU as follows:

1.13.1 Right click on LPDU box AND select "Configuration" THEN "Commands".

1.13.2 Select "Reset advance filter counter".

1.13.3 Right click on LPDU box and select "Commands".

1.13.4 Select "Reset equipment".

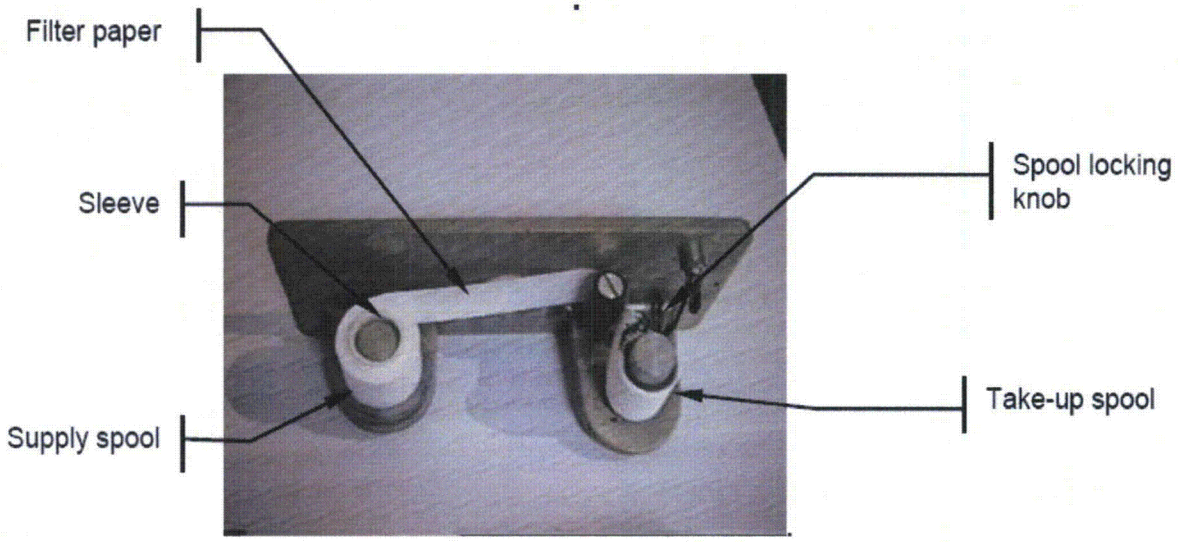
1.14 Verify sample pump starts.

1.15 Close MASS2 AND disconnect laptop.

1.16 Notify Control Room that filter cassette change-out is complete AND to enable any trips associated with applicable monitor.

1.17 Ensure custody of removed filter cassette is turned over to a qualified Chemistry Technician.

1. Replacing Filter Cassette Filter-Paper



NOTE:

Reference filter cassette picture (above) and the drawing on the following page as needed.

1.1 Release four clasps AND remove filter transport mechanism from metal housing.

1.2 Loosen knurled spool locking knob to release take-up spool.

1.3 Rotate take-up spool counter clockwise until all old filter-paper is on take-up spool.

1.4 Remove used filter roll AND dispose of as contaminated trash.

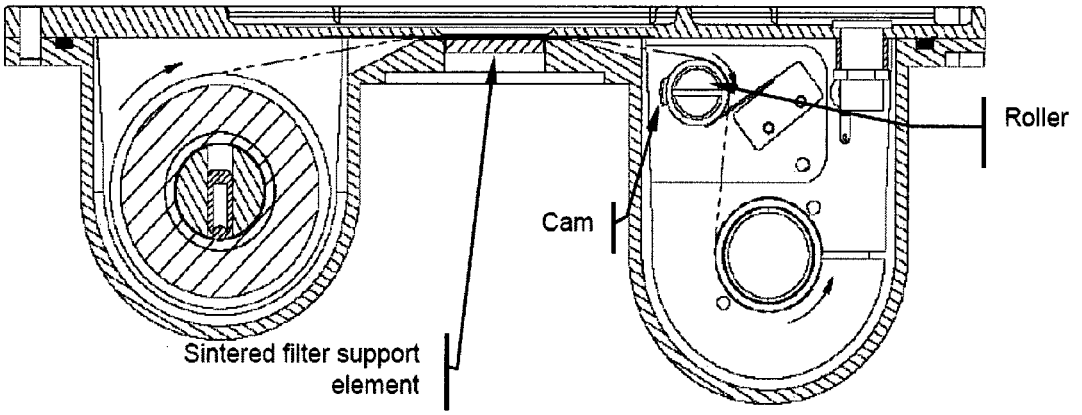
1.5 Ensure internal housing is free of radioactive contamination (Decontaminate as required).

1.6 Remove empty supply roll AND place on take-up spool.

1.7 Place new filter-paper roll on supply spool with Teflon (smooth side) facing upward.

1.8 Pull filter-paper under filter opening AND secure leading edge to take-up spool using attached self-adhesive paper.

1.9 Tighten knurled spool locking knob while holding take-up spool AND check that spool does not slip around pin.



CAUTION:

Turning the roller counter-clockwise may damage the cam mechanism. The roller is turned clockwise (take-up spoool turned counter-clockwise) to ensure paper is taut and the micro-switch engaged.

1.10 Ensure cam lobe on roller (see picture above) engages micro-switch.

1.11 Place filter transport mechanism into lower metal housing AND close four clasps.

1.12 Store filter cassette in an approved storage location for subsequent filter cassette change-outs.

NOTE:

All Energy Calibration data will be recorded on CH-3-4000-01-F-3, Energy Calibration Data Sheet.

1. Notify Shift Manager prior to performing Energy Calibration.

1.1 Record last approved "offset", "slope", and "quadratic" values in "Last Approved" column.

1.2 Notify Control Room that energy calibration is about to be performed on alpha monitor AND to disable any trips associated with alarms.

1.3 Verify that monitor has been running for ≥ 3 hours.

1.4 Connect laptop to LPDU or LDU.

1.5 Open SAMS AND verify communication is established as follows:

1.5.1 Ensure "Network address" is correct for LPDU being tested.

1.5.2 Click "Start Scanning" to find LPDU address.

1.5.3 Verify connector indicator shows communication established (green). 

1.5.4 IF connector indicator shows error (red X) THEN repeat from Step 1.5.2.

1.5.5 Click "Ok".

1.6 Log into SAMS at Supervisor level or higher.

1.7 Ensure SAMS Spectrum window selections are set as follows:

1.7.1 "Alpha Max" (not "Gamma Centroid")

1.7.2 "Log" (not "Lin")

1.7.3 "Counts" (not "cps")

1.7.4 "keV" (not "Channels")

1.8 From SAMS "Spectrum" menu select "From Database".

1.9 In text box below "Start", enter "0" (or number of other desired spectrum) to review a radon daughter-spectrum AND press "Start".

1.10 IF radon daughter-peaks are insufficient, THEN try one of the alternate methods:

1.10.1 From SAMS "Spectrum" menu, select "Cumulated".

1.10.2 Let monitor run for 30 additional minutes AND re-check spectrum.

1.10.3 To sample room air, let monitor run for approximately 2 hours or for as long as needed to obtain radon daughter-peaks as follows:

a. For monitor 1300-562-1MA1:

1. Remove end cap from piping adjacent to valve 1300-562-1A3.
2. Open valve 1300-562-1A3.
3. Close valve 1300-562-1A2.

b. For monitor 1001-562-1MA1:

1. Remove end cap from piping adjacent to valve 1001-562-1A46.
2. Open valve 1001-562-1A46.
3. Close valve 1001-562-1A43.

c. For monitor 1001-562-1MA2:

1. Remove end cap from piping adjacent to valve 1001-562-1A49.
2. Open valve 1001-562-1A49
3. Close valve 1001-562-1A47.

1.10.4 Obtain spectrum from alternate sources (such as Am-241, Th-230, or U-238).

1.11 IF radon daughter-peaks have sufficient activity, THEN perform the following:

1.11.1 Place markers around radon daughter-peaks and verify "Alpha Max" values are within expected energy ranges (ROI may be used if desired):

- ^{218}Po: 4743 keV±40keV [4703 to 4783]
- ^{214}Po: 6595 kev±50keV [6545 to 6645]

1.11.2 Record Alpha Max for each radon daughter-peak.

1.11.3 IF peaks are within tolerance, THEN perform the following:

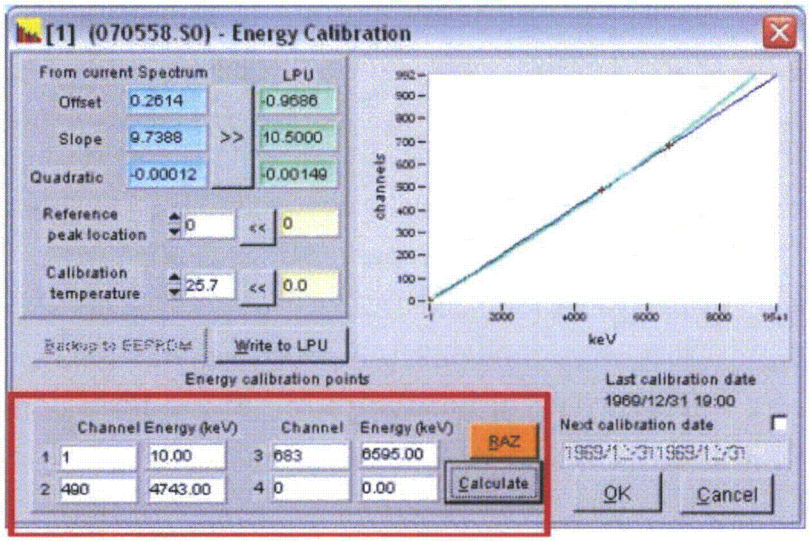
a. From SAMS "Calibration" menu select "Full Energy Calibration".

b. Record current LPDU offset, slope and quadratic in "As Found" and "As Left" column.

c. Go to step 1.13.

1.11.4 IF peaks are out of tolerance, THEN perform an energy calibration from SAMS using ^{218}Po and ^{214}Po as follows (ROI may be used if desired):

a. From the SAMS "Calibration" menu select "Full Energy Calibration".



b. Record current offset, slope and quadratic from LPDU under "As Found" column.

c. Press "Ok" to close calibration window.

d. Place markers around ^{218}Po peak so that SAMS can calculate alpha maximum energy.

e. From SAMS "Calibration" menu select "Set as energy cal point".

f. Enter expected energy (4743 keV) of ^{218}Po in corresponding energy box.

g. Press "Calculate".

h. Close window.

i. Place markers around ^{214}Po peak.

j. From SAMS calibration menu SAMS select "Set as energy cal point".

k. Enter expected energy (6595 keV) of ^{214}Po in corresponding energy box.

l. Press "Calculate".

m. Enter '10' for energy and '1' for channel number in one of the available sets of text boxes for energy and channel (for example, 3).

n. Press "Calculate".

o. Press >> (Transfer button) to transfer updated coefficients.

p. Press "Write to LPU".

q. Press "Backup to EEPROM".

r. Save adjustments/calibration by creating a backup of the parameter file on the laptop. (example: 2008 energy calibrations).

s. Record offset, slope, and quadratic from LPDU under "As Left" column.

1.12 IF sufficient radon daughter-peaks have not been obtained, THEN repeat from step 1.11 to perform an energy calibration from SAMS using alternate sources as required.

1.13 IF valves were opened in order to get a spectrum, THEN restore as follows:

1.13.1 For monitor 1300-562-1MA1, perform the following:

a. Open valve 1300-562-1A2.

b. Close valve 1300-562-1A3.

c. Replace end cap on piping adjacent to valve 1300-562-1A3.

1.13.2 For monitor 1001-562-1MA1, perform the following:

a. Open valve 1001-562-1A43.

b. Close valve 1001-562-1A46.

c. Replace end cap on piping adjacent to valve 1001-562-1A46.

1.13.3 For monitor 1001-562-1MA2, perform the following:

a. Open valve 1001-562-1A47.

b. Close valve 1001-562-1A49

c. Replace end cap on piping adjacent to valve 1001-562-1A49.

1.14 Set Points and Alarm Verification:

1.14.1 Open MASS2 software AND verify unit being calibrated is found.

1.14.2 Close SAMS software if required to improve response.

1.14.3 Right click on "AlphaAct" channel.

1.14.4 Select "Change trip points".

1.14.5 Verify/record setpoints for alpha activity in "As Found":

a. High: 3.7E-12 µCi/cc OR 0.14 Bq/m^3

b. High High: 7.3E-12 µCi/cc OR 0.27 Bq/m^3

1.14.6 IF setpoints are correct, THEN record "As Left" and proceed to Step 1.15.

1.14.7 IF setpoints are incorrect, THEN proceed as follows:

a. Change setpoints to approved values above.

b. Click "Save", "Write", and "OK".

c. Ensure corrected setpoint(s) are independently verified.

d. Notify Control Room.

e. Notify Radiation Protection Manager, Chemistry Services Manager, Chemistry Supervisor, and Environmental Compliance Officer immediately, AND Proceed as directed.

f. Initiate a condition report (CR) per CA-3-1000-01, Performance Improvement Program to document situation and subsequent investigation as required.

g. Record CR number under “Remarks” section of data sheet.

1.15 Perform a RamSys backup as required.

1.16 Close SAMS and MASS2 AND disconnect laptop.

1.17 Notify Control Room that Energy Calibration is complete satisfactorily AND to enable any trips associated with applicable monitor.

NOTE:

All Source Calibration data will be recorded on CH-3-4000-01-F-1, Source Calibration Data Sheet.

1. Test Conditions

1.1 Record ambient temperature of displayed channel (limits: 15 to 35 °C).

1.2 Record relative humidity of displayed channel (limits: <90% with no visible condensation).

1.3 IF test conditions are within limits, THEN proceed with source calibration. IF NOT, THEN coordinate with Operations to establish conditions within limits.

2. Preliminary Steps

2.1 Notify Shift Manager prior to performing this section (2).

2.2 Notify Control Room that alpha monitor source calibration (on functional Location XX) is ready to start AND to disable associated alarms/trips.

2.3 DO NOT proceed until notification by Operations that alarms are disabled.

2.4 Perform Energy Calibration.

2.5 Verify monitor is operational with NO alarming condition.

2.6 Connect laptop to LDU.

2.7 Open MASS2 AND verify LPDU is found.

2.8 Log into MASS2 at Supervisor level or higher.

2.9 Place LDU into bypass mode from MASS2 as follows:

2.9.1 Right click on LDU box AND select "Commands".

2.9.2 Select "Enable Bypass (relay off)".

2.10 Close MASS2 as required to improve computer performance.

2.11 Open SAMS AND verify communication as follows:

2.11.1 Ensure "Network address" is correct for LPDU being tested.

2.11.2 Click "Start Scanning" to find LPDU address.

2.11.3 Verify connector indicator shows communication established (green). 

2.11.4 IF connector indicator shows error (red X), THEN check connections AND repeat from Step 2.11.1.

2.11.5 Click "Ok".

2.12 Log into SAMS at Supervisor level or higher.

2.13 From PDCU place pump control switch to OFF.

3. Gain Verification

3.1 Pull elevator handle to disengage, THEN lift to lower elevator.

3.2 Remove filter cassette.

3.3 Disconnect filter cassette power cable.

3.4 Circle source being used on the datasheet.

> **NOTE:**
>
> The ^{241}Am source is fragile and must be handled with care. Care must be taken to avoid touching OR striking the active side of the source against objects that may damage it.

3.5 Place ^{241}Am source in calibration source fixture such that source seats in the small recess and active area faces up out of the fixture.

3.6 Place calibration source fixture with source on elevator, ensuring proper seating.

3.7 Pull elevator handle out to disengage, THEN push down gently to close (raise) elevator.

3.8 Set up SAMS Spectrum window ensuring the following selections:

3.8.1 "Alpha Max" (not "Gamma Centroid")

3.8.2 "Log" (not "LIN")

3.8.3 "Counts" (not "cps")

3.8.4 "Channels" (not "keV")

3.9 From SAMS "Spectrum" menu select "Real time".

3.10 Enter "300" in "True Time" box.

3.11 Click "Start" to perform spectrum acquisition.

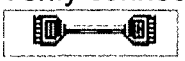
3.12 IF (after a short delay) spectrum does not start acquiring ("true time" not changing), THEN close SAMS software AND restart if needed, as follows:

3.12.1 Open SAMS AND verify communications as follows:

a. Ensure "Network address" is correct for LPDU being tested.

b. Click "Start Scanning" to find LPDU address.

c. Verify connector indicator shows communication established (green).



d. IF connector indicator shows error (red X) THEN check connections AND repeat from step 3.12, as required.

e. Click "Ok".

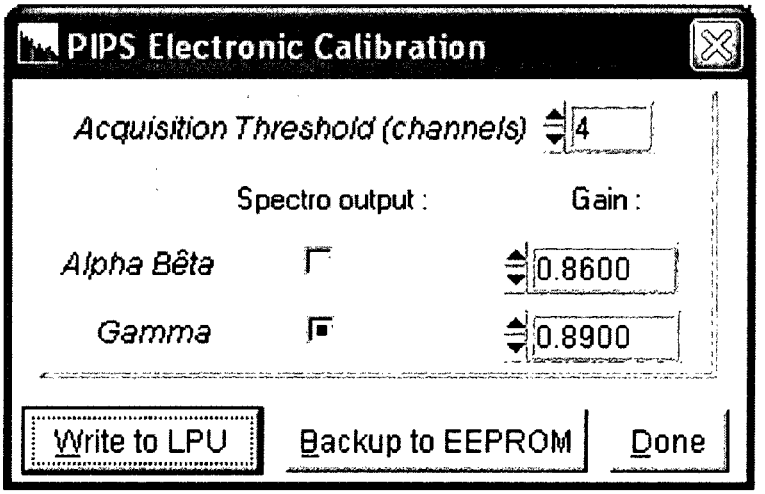
3.12.2 Log into SAMS at Supervisor level or higher.

3.13 Check that a clear alpha peak is visible.

3.14 Place markers around peak and record Alpha Max value in "Peak Channel" As Found box (ROI may be used if desired).

3.15 IF peak is 419 ± 20 (399 to 439) channels it is acceptable, THEN proceed as follows:

3.15.1 From "Calibration" menu, select "Electronic Calibration" submenu.



3.15.2 Record displayed alpha-beta gain in "Alpha-Beta Gain" As Found box.

3.15.3 Record displayed gamma gain in "Gamma Gain" As Found box.

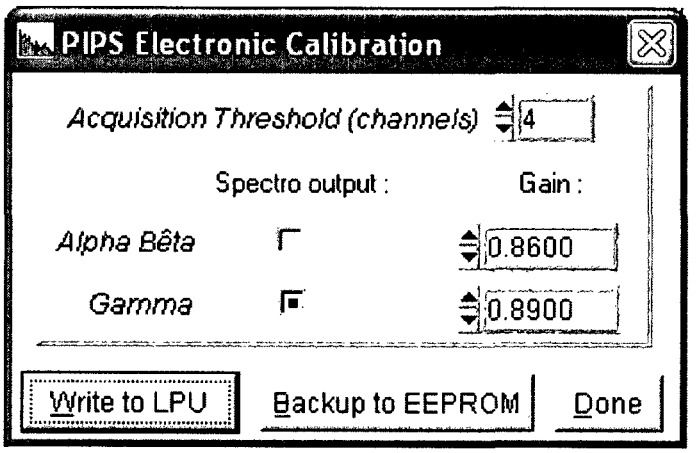
3.15.4 Record "N/A" in the following boxes:

- "Peak Channel" As Left.
- "Alpha-Beta Gain" As Left.
- "Gamma Gain" As Left.

3.15.5 Go to step 3.17.

3.16 IF peak is NOT within limits, THEN adjust alpha-beta gain as follows:

3.16.1 From "Calibration" menu, select "Electronic Calibration" submenu.



3.16.2 Record displayed alpha-beta gain in "Alpha-Beta Gain" As Found box.

3.16.3 Record displayed gamma gain in "Gamma Gain" As Found box.

3.16.4 Adjust the "Alpha Beta" gain (increase gain to shift to a higher channel).

3.16.5 From SAMS "Spectrum" menu select "Real time".

3.16.6 Enter "300" in "True Time" box.

3.16.7 Click "Start" to perform spectrum acquisition.

3.16.8 Repeat from steps 3.16 until alpha peak location is correct.

3.16.9 Record Alpha Max value in "Peak Channel" As Left box.

3.16.10 Record alpha-beta gain in "Alpha-Beta Gain" As Left box.

3.16.11 Calculate as follows and record in "Gamma Gain" As Left box.

$$\text{Gamma Gain As Left} = \frac{(\text{Alpha} - \text{Beta Gain As Left})\,(\text{Gamma Gain As Found})}{(\text{Alpha} - \text{Beta Gain As Found})}$$

3.16.12 Update gamma gain in Electronics Calibration window.

3.16.13 Press "Write to LPU".

3.17 Close SAMS software as needed to improve computer performance.

3.18 Pull elevator handle to disengage, THEN lift to lower elevator.

3.19 Remove calibration source from calibration source fixture.

3.20 Place empty fixture on elevator AND push handle down to gently raise elevator.

4. Detection Efficiency Check

4.1 Open MASS2.

4.2 Log into MASS2 at Supervisor level or higher.

4.3 From MASS2, display historical trend for "Alpha_cps" AND "Po21x_cps" gross counting rate channels as follows:

4.3.1 Right click on "Alpha_cps" channel AND select "Display historical trend".

4.3.2 Right click on "Po21x_cps" channel AND select "Display historical trend".

4.3.3 Ensure "Automatic Refresh" is selected for "historic" menu window.

NOTE:

A minimum of five data points (discard first point) are used in the historical trend for each channel to determine average.

4.4 Wait until measurement is stable.

4.5 From "Alpha_cps" AND "Po21x_cps" historic menu in each window select "10 minute average" AND analyze historical trend for each channel.

4.6 Record average background count rate for "Alpha_cps" AND "Po21x_cps".

4.7 IF background count rate is ≥0.005 cps, THEN decontaminate housing and repeat section 4, "Detection Efficiency Check" until correct readings are obtained.

5. Measurement with ^{241}Am Alpha Source

5.1 Pull elevator handle to disengage, THEN lift to lower elevator.

5.2 Remove empty calibration source fixture from elevator.

NOTE:

The ^{241}Am source is fragile and must be handled with care. Care must be taken to avoid touching OR striking the active side of the source against objects that may damage it.

5.3 Place ^{241}Am source in the calibration source fixture such that source seats in the small recess and the active area faces up out of the fixture.

5.4 Place calibration source fixture with source on elevator ensuring proper seating.

5.5 Pull elevator handle to disengage, THEN push down to gently close (raise) elevator.

5.6 Open SAMS.AND Login at Supervisor level or higher.

5.7 From SAMS "Spectrum" menu, select "Real Time" and start acquisition.

5.8 Verify alpha peak is visible.

> **NOTE:**
>
> A minimum of five data points (discard first point) are used in the historical trend for each channel to determine the average.

5.9 From MASS2 perform the following:

5.9.1 Right click on "Alpha_cps" channel AND select "display historical trend".

5.9.2 From "historic" menu, select "10 minute average".

5.9.3 Right click on "Po21x_cps" channel AND select "display historical trend".

5.9.4 From historic menu, select "10 minute average".

5.9.5 Record Alpha_cps channel average count rate (use as "S" in Step 6.1).

5.9.6 Record average count rate for Po21x_cps channel.

6. Detection Efficiency Calculation for Source

> **NOTE:**
>
> Because ^{241}Am half-life is ~432 years, source decay correction is not required.

6.1 Calculate AND record detector efficiency (Eff) in cps/Bq as follows:

$$Eff = S/A$$

Where "S" = Alpha_cps source value determined in Step 5.9.5
Where "A" = ^{241}Am source activity,
(e.g., 2980 Bq for Serial number F5-247 or 3295 Bq for Serial number F8-940)

6.2 IF efficiency is between ±10% of 0.037 (0.0333 to 0.0407) cps/Bq (factory Pu-238 solid source determined rate), THEN detector is satisfactory; proceed to step 7.

6.3 IF efficiency is outside limits THEN detector must be replaced. Perform the following:

6.3.1 Notify Control Room that detector is out of service.

6.3.2 Notify Radiation Protection Manger, Chemistry Services Manager, Chemistry Supervisor and Environmental Compliance Officer.

6.3.3 Initiate a condition report (CR) per CA-3-1000-01, Performance Improvement Program to document status.

6.3.4 Record CR number in "Remarks" section of data sheet.

6.3.5 Initiate a Maintenance work request (or equivalent) to replace detector, including, "source calibration shall be performed prior to return to service".

6.3.6 Ensure compensatory actions for out-of-service monitor are in place.

6.4 IF detector is replaced, THEN repeat entire Source Calibration.

7. Alarms Verification

7.1 Pull elevator handle to disengage, THEN lift to lower elevator.

7.2 Remove source and source fixture.

7.3 Replace filter cassette AND reconnect power cable.

7.4 Pull elevator handle to disengage, THEN push down to gently close (raise) elevator.

7.5 From PDCU place pump control switch to AUTO.

7.6 Ensure system is operating properly with no faults.

7.7 Right click appropriate LPDU box, select "Commands", THEN select "Go to Maintenance Mode".

7.8 Right click appropriate LDU box select "Configuration", THEN select "LEDS and Relays".

7.9 Uncheck "Invert Relay Logic" as required THEN "Save".

7.10 Right click appropriate LDU box, select "Commands", THEN select "Go to Normal Mode"

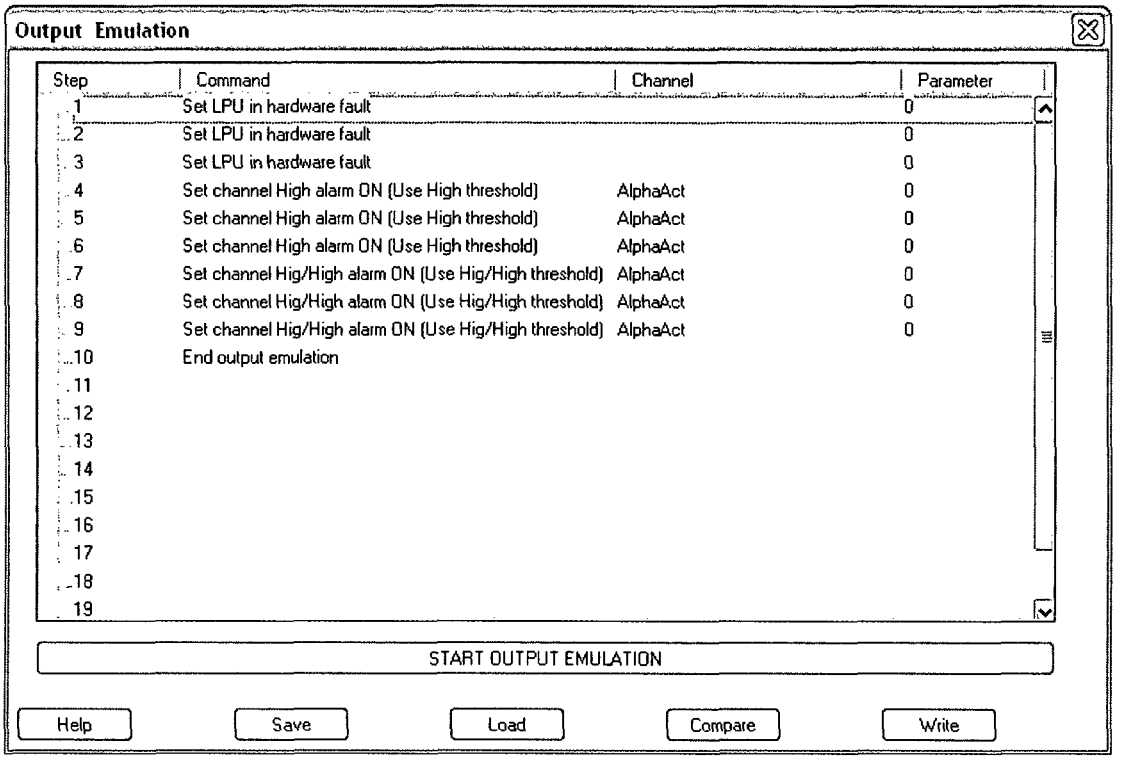
7.11 Right click LDU THEN click "Display Relay Status".

7.12 Verify relays status as follows:

Relay	Status
Operate	ON
Test	OFF
Alert	OFF
High	OFF
High/High	OFF

7.13 Right click appropriate LDU box, select "Commands" THEN select "Measurement Output Emulation" to open output emulation window.

7.14 Ensure "Output Emulation" is similar to example below:



7.15 Click on "Start Output Emulation" AND verify the response is as follows:

Scenario	Monitor Status	Relay Status (read from MASS2)				Buzzer
		OP	TST	H	H/H	
High alarm (modify LPDU threshold)	H alarm	ON	ON	ON	OFF	Medium
H/H alarm (modify LPDU threshold)	H/H alarm	ON	ON	ON	ON	Fast
Fault (shut down sample pump)	Slave fault	OFF	ON	OFF	OFF	Continuous

7.16 Ensure system is returned to normal (verify setpoints and not in bypass).

7.17 IF system provides expected responses, THEN proceed to Step 8.

7.18 IF system failed to provide expected response, THEN monitor is out of service.

7.18.1 Notify Control Room.

7.18.2 Notify Radiation Protection Manager, Chemistry Services Manager, Chemistry Supervisor and Environmental Compliance Officer immediately.

7.18.3 Initiate a condition report (CR) using CA-3-1000-01, Performance Improvement Program to document the situation.

7.18.4 Record CR number under "Remarks" section of data sheet.

7.18.5 Initiate a Maintenance work request (or equivalent) for repairs.

7.18.6 Ensure compensatory actions for out of service monitor are in place.

8. Final Steps

8.1 IF gain adjustment was performed, THEN, after valid radon daughter-spectrum has been acquired, perform energy calibration per Attachment 6, Energy Calibration.

8.2 Close MASS2 and SAMS software as required.

8.3 Shut down computer AND remove cables.

8.4 IF all tasks are complete, THEN notify Control Room that source calibration is completed satisfactorily AND to enable any trips associated with applicable monitor.

1. Power Up and Quick Start-Up

1.1 Notify Shift Manager prior to performing this section.

1.2 Notify Control Room that power up is about to be performed on alpha monitor AND to disable any trips associated with alarms.

1.3 Ensure there is flow through system being monitored.

1.4 Ensure elevator is closed (up).

1.5 Position LPDU key operated switch to ON.

1.6 Verify startup tests of LPDU as follows:

1.6.1 Buzzer sounds for approximately one second.

1.6.2 Orange light illuminates for approximately one second.

1.6.3 Red light illuminates for approximately one second.

1.7 IF startup tests fail, THEN turn LPDU key operated switch to OFF AND repeat from Step 1.5.

1.8 IF startup test fails a second time, THEN proceed as follows:

1.8.1 Initiate a Condition Report to document out of service status.

1.8.2 Initiate a Maintenance work request (or equivalent) for repairs.

1.8.3 Notify Control Room that monitor is out of service and that compensatory measures may be required.

1.8.4 Notify Chemistry Supervision that monitor is out of service and compensatory measures may be required.

1.9 Open V6 (PFCV Bypass).

1.10 Position pump control hand switch on PDCU to AUTO.

1.11 Verify the sample pump starts.

1.12 Close V6 (PFCV Bypass).

1.13 Verify LPDU comes up to normal operating status.

1.14 Turn power switch inside LDU cabinet to ON.

1.15 Verify LDU comes up to normal operating status (green light is on).

1.16 IF LDU fault light is on, THEN re-cycle power switch inside LDU cabinet OFF, THEN ON, AND verify LDU comes to normal operating status.

1.17 Notify Control Room that startup is complete and satisfactory on alpha monitor AND to enable any trips associated with applicable monitor

.1.18 Ensure Chemistry is notified of monitor start-up date and time.

1. Shutdown

> **CAUTION:**
>
> **Monitor should not be turned OFF without compensatory actions in place when there is discharge from this release point (flow out the stack).**

1.1 Notify Shift Manager prior to performing this section.

1.2 Notify Control Room that shutdown is about to be performed on the alpha monitor AND to disable any trips associated with alarms.

1.3 Verify plant conditions support shutdown of monitor.

1.4 Position power switch inside LDU cabinet to OFF.

1.5 Position pump control hand switch on PDCU to OFF.

1.6 Position LPDU key operated switch to OFF.

1.7 Notify Control Room that shutdown is complete and satisfactory on the alpha monitor AND to enable any trips associated with this monitor.

1.8 Ensure Chemistry is notified of date and time monitor is shutdown.

NOTE:

- Alarm setpoints are established to prevent exceeding any regulatory limits.
- Alarm Setpoint changes must be evaluated and approved by the Radiation Protection Manager.
- Information for determining α setpoints is found in Attachment 12, Alpha Setpoint Information and Background.
- Daily readings and alarm setpoints are recorded by the Operator using eSoms or an equivalent system.

1. Alarm Response

1.1 Alpha Activity

1.1.1 Setpoint for 1300-562-1MA1 (in µCi/cc), 1001-562-1MA1 (in Bq/m^3), and 1001-562-1MA2 (in Bq/m^3):

a. High: 3.7E-12 µCi/cc OR 0.14 Bq/m^3

b. High High: 7.3E-12 µCi/cc OR 0.27 Bq/m^3

1.1.2 Actions for a valid alarm response are contained in the following procedures:

-
- OP-3-2000-01, Hazardous Release Response
- OP-3-0590-01, Centrifuge Test Facility Alarm Response
- OP-3-0660-01, Gaseous Effluent Ventilation System

1.2 Inoperable Monitor

1.2.1 Perform compensatory actions to ensure continuous collection of particulate sample during times of effluent release from the stack.

1.2.2 HF monitor may be used for trending activity release from the stack but an air filter must be collected as well.

1.2.3 Examples of compensatory actions include:

- Alternate alpha monitor is in service.
- Collection of particulate sample using a CAM.
- Collection of particulate sample using portable air sampler.

1.3 Latch Release

1.3.1 After performing alarm response actions, it may be necessary to release the LPDU latch, as follows:

a. Simultaneously press both "Scroll" keys.

b. Enter the pass code (for example, 0000).

c. Press "Scroll" key to "OK" AND press "Select" key until the command screen is displayed.

d. Press "Scroll" key to "CD" THEN press "Select" key until "RELEASE LATCH" is displayed.

e. Press "Scroll" key to "EXE" AND press "Select" key.

NOTE:

Changing setpoints requires notification and approval by the Radiation Protection Manager AND revision of this procedure.

1.4 Changing Setpoints

1.4.1 Notify Control Room that setpoints are about to be changed on the alpha monitor AND to disable any trips associated with alarms.

1.4.2 Change setpoints as follows:

a. Connect a laptop to LPDU and log into MASS2 as Supervisor or higher.

b. Right click on LPDU channel to be changed.

c. Select "Change trip points".

d. Change incorrect setpoint.

e. Click "Save", "Write", and "OK".

f. Ensure a independent verification of corrected setpoint(s) is performed.

1.4.3 Log off and disconnect laptop.

1.4.4 Notify Control Room that alpha monitor setpoints have been changed and verified AND to enable trips associated with alarms, as applicable.

1. Filter Analysis and Review

> **NOTE:**
>
> Effluent samples may be analyzed onsite or shipped to an independent laboratory approved for analysis URENCO USA Quality Assurance. Samples may be shipped to offsite vendor on monthly OR quarterly basis.

1.1 Weekly Filter Analysis

1.1.1 Gaseous samples collected from the same sample point may be combined for analysis if they represent a sampling period of one week or less.

1.1.2 Complete and retain a copy of a Chain of Custody Form for shipment of sample (Chain of Custody form is supplied by the vendor).

a. Ensure the form is marked to notify the vendor to retain samples for quarterly composite analysis.

1.1.3 Sample is to be analyzed for gross alpha and gross beta.

1.1.4 Package the filter for shipment.

1.1.5 WHEN results are returned, THEN fill in appropriate fields on CH-3-4000-01-F-4, Quarterly Filter Data.

1.2 Quarterly Filter Analysis

1.2.1 Complete a Chain of Custody Form for shipment of composite sample (Chain of Custody form is supplied by the vendor).

1.2.2 Composite is to be analyzed for isotopic content of Uranium.

1.2.3 WHEN analysis is complete, THEN fill in appropriate fields on CH-3-4000-01-F-4.

1.3 Review of Filter Results

1.3.1 Verify that Minimum Detectable Concentration/Lower Limits of Detection (MDC/LLD) have been met for the analysis performed.

1.3.2 As prescribed by 10 CFR 20.2101, radioactivity shall be reported in the Curie unit, including multiples and subdivisions, and the units of all quantities clearly indicated.

a. Radionuclide concentrations shall be reported in microcuries per milliliter.

b. Quantities may be recorded in SI units in parentheses following the units specified above.

1.3.3 The verified results of effluent sample analyses shall be compared against the action level values listed in the table below:

Analysis Frequency	Analysis Type	MDC / LLD (µCi/ml)	Action Level 1 (µCi/ml)	Action Level 2 (µCi/ml)	Action Level 3 (µCi/ml)
Weekly	Gross alpha	1.0E-14	2.5E-14	1.0E-13	N/A
	Gross beta	1.0E-14	2.5E-14	1.0E-13	N/A
Quarterly (composite by sample point)	^{234}U, ^{235}U, ^{236}U and ^{238}U Isotopic	1.0E-14	2.5E-14	1.0E-13	1.0E-12

1.3.4 Effluent related corrective actions shall be instituted when an action level value for any measured parameter is exceeded.

1.3.5 IF the verified result of any analysis exceeds an action item value, THEN a Condition Report shall be initiated.

1.3.6 Additional actions to be taken are dependent on the action level exceeded, and are as follows:

a. Action Level 1: Consideration given to increasing the frequency of sampling and analysis, reviewing plant operations for the possible source(s) of the increase, obtaining and analyzing a replicate sample, and /or restricting personnel access to affected areas.

b. Action Level 2: Frequency of sampling and analysis increased; plant operations reviewed for the possible source(s) of the increase; a replicate sample obtained and analyzed and personnel access to affected areas restricted, as appropriate; and corrective measures implemented to reduce future results to below any action level.

c. Action Level 3: Actions listed for action Level 2 performed. Additionally, corrective actions shall be implemented to ensure root cause(s) are immediately identified and corrected; appropriate regulatory agencies notified, as required; communications to address lessons learned are made to appropriate personnel; and applicable procedures as needed.

1.3.7 IF any dose limit of 10 CFR 20, 40 CFR 190, or 10 CFR 70 is exceeded, OR any sample analysis action level described herein is exceeded, THEN a condition report (CR) shall be generated.

1.3.8 IF an incident results in a dose limit or constraint in 10 CFR 20, 40 CFR 190, or 10 CFR 70 being exceeded, THEN:

1) The URENCO USA Compliance Officer and staff shall immediately determine reportability as per 10 CFR 20.2202, 10 CFR 20.2203 and/or 10 CFR 70.50, and 10 CFR 70.74 AND take appropriate action.

2) The NRC shall be informed of corrective action(s) taken OR planned to prevent recurrence and the schedule established to achieve full compliance.

1.3.9 Filter analysis results, copies of the analysis report and the chain of custody paperwork will be forwarded to Environmental Compliance Officer to be used in the Semi-Annual Radiological Effluent Release Rate Report for the NRC.

1.3.10 Daily reading and/or historical trends will be correlated against the gross **αβ** reading and the isotopic analysis results by the Radiation Protection Manager. Results shall be made available to the Environmental Compliance Officer and Safeguards.

Alpha Monitor Setpoints

Regulatory requirements that deal with dose limits and compliance with dose limits for individual members of the public are found in 10 CFR 20.

With respect to using § 20.1302(b)(2)(i) for demonstrating compliance with the annual dose limit, the URENCO USA Environmental Report (ER) states that ^{234}U, ^{235}U, ^{236}U, and ^{238}U are expected to be the primary isotopes of concern in gaseous effluent, with ^{234}U and ^{238}U being the principal isotopes with respect to the dose equivalent contribution to individuals. The ER also states that the most significant UF_6 reaction products will be hydrogen fluoride (HF), uranyl fluoride (UO_2F_2), and small amounts of uranium tetrafluoride (UF_4).

Based on the above, the annual average effluent concentration selected from table 2 of appendix b to part 20 for demonstrating compliance should be based on the most restrictive concentration listed for any of the four uranium isotopes, ^{234}U, ^{235}U, ^{236}U, and ^{238}U, based on their retention time in the pulmonary region of the lung. With respect to selecting an annual average effluent concentration to be used as a limit, two of the three ER described chemical forms, HF and UO_2F_2, are listed in part 20 as Class D compounds, but UF_4 is listed as a Class W compound. However, the average effluent concentration for Class W compounds is the same for all four isotopes and is listed as 1.0E-12 µCi/ml. This means that breathing contaminated air at this concentration would result in 50 mrem TEDE, if inhaled continuously for a year.

Based on the above, the effluent concentration specified in table 2 of appendix B to part 20 must be reduced by a factor of 5 (50 mrem / 10 mrem = 5) in order to ensure compliance with § 20.1101 (d). Therefore, the annual average effluent concentration to be used would be:

1.0E-12 µCi/ml / 5 = 2.0E-13 µCi/ml ($7.4x10^{-9}$ Bq/m^3) **[1]**

The specified effluent concentrations in Table 2 are partially based on the occupational stochastic inhalation ALI (2 µCi for all four uranium isotopes) which includes an exposure time assumption of 2000 hours per year for an occupational worker multiplied by an additional factor to adjust for the differences in exposure time and inhalation rate between a worker and members of the public. As exposure time for members of the public is assumed to be 8760 hrs per year, a ratio determined by dividing 8760 by a shorter or longer exposure time-period can be multiplied by the annual average effluent concentration and the result would be a new effluent concentration that, if inhaled continuously for the selected time-period, would yield the same dose. Therefore, to establish an effluent concentration in air that would result in 10 mrem TEDE, if inhaled continuously over 24 hours, determine the ratio between 8760 and 24 and multiply the result by the effluent concentration determined in [1] above:

(8760 hrs / 24 hrs) x 2.0E-13 µCi/ml = 7.3E-11 µCi/ml ($2.7x10^{-6}$ Bq/m^3) **[2]**

It is also advisable to base effluent alarm setpoints on a small fraction of the limiting concentration to ensure doses to members of the public are ALARA. Herein the fraction used is 10%. Using the value determined in [2], the average effluent concentration that, if inhaled continuously over 24 hours, would result in a dose of 1 mrem TEDE (10 mrem x 0.1) would be:

7.3E-11 µCi/ml x 0.1 = 7.3E-12 µCi/ml ($2.7x10^{-7}$ Bq/m^3) **[3]**

It should be noted that the requirement in § 20.1302(b)(2)(i) applies "at the boundary of the unrestricted area" and as the NEF release points are some distance from this boundary (approximately 1,400 ft) and at ground level, the effluent concentration measured at the release point would be reduced to a very small fraction (0.002% - 0.005% from dispersion) by the time it reaches the unrestricted area boundary. This would introduce an additional and very large level of conservatism in the estimated TEDE to members of the public because of atmospheric dispersion (χ/Q) and plume depletion.

To determine whether the effluent monitor to be used at the NEF has the required sensitivity to meet the concentration in [3] without applying factors to account for dispersion and depletion, the user manual for the ABPM 201-S Alpha Beta Particulate Monitor[1] was reviewed and was found to list the measurement range for alpha volumetric activity as 10^{-2} Bq/m^3 to 10^4 Bq/m^3 which results in a range of 2.7E-13 µCi/ml to 2.7E-7 µCi/ml. The manual also states that the monitor provides dynamic compensation for the progeny of ^{220}Rn (Radon) and ^{222}Rn (Thoron), thus eliminating potential confounders to a reasonably accurate determination of volumetric activity.

[1] ABPM 201-S Alpha Beta Particulate Monitor User's Manual, 15-00068, Measurement Channels

Based on the cited monitor measurement range, a monitor alarm setpoint at the value in [3] above (in µCi/ml), would be more than a decade above the minimum sensitivity of the monitor and would not require any correction for the presence of naturally occurring radioisotopes on the filter. Therefore, the concentration determined in [3] will be established as the "HH" (Hi-Hi) alarm setpoint.

For Hot Acceptance Testing (HAT) there will be only one effluent release point, while during full operation there may be as many as four. Therefore, concentration used for the "HH" alarm setpoint could be reduced by another factor to account for the potential of multiple releases at the same time during facility operation. While the factor could be as low as 25%, it is thought highly unlikely that releases would occur simultaneously from multiple release points. Based on this, an additional reduction factor to be used herein to account for the potential for simultaneous releases is 50%. As a result, the monitor alarm setpoint concentration determined in [3] would be reduced to a level that, if inhaled continuously over 24 hours at the unrestricted area boundary, would result in a dose of 0.5 mrem TEDE (1 mrem x 0.50):

7.3E-12 µCi/ml x 0.50 = 3.7E-12 µCi/ml ($1.4x10^{-7}$ Bq/m^3) **[4]**

Based on the cited monitor measurement range, a monitor alarm setpoint at the value in [4] above (in µCi/ml), would be still be more than a decade above the minimum sensitivity of the monitor and should not result in a large number of spurious false alarms caused by establishing a setpoint close to the monitor lower detection limit. Therefore, the concentration determined in [4] will be established as the "H" (Hi) alarm setpoint.

Calculations:

1: Flow rate from CT&PM Facilities Exhaust Filtration System to be 4000 scf.

- 4E+3 ft^3/min x 1 min/60s x 28,317 ml/ft^3 = 1.89E+6 ml/s
- 1.89E+6 ml/s x 7.3E-12 µCi/ml (HH setpoint) = 1.38E-5 µCi/s
- 1.38E-5 µCi/s x 1E-5 s/m^3 (χ/Q) x 1 m3/1E+6 ml = 1.38E-16 µCi/ml (concentration at unrestricted boundary)
- (1.38E-16 µCi/ml / 7.3E-12 µCi/ml) x 100 = 0.0019%

2: ER 3.12.1.1.1: Flow rate from GEVS are:
Separations Building = 6,474 scf and TSB = 11,000 scf.

- Concentrations at the unrestricted area boundary would be: 2.23E-16 µCi/ml and 3.79E-16 µCi/ml, respectively.
- (2.23E-16 µCi/ml / 7.3E-12 µCi/ml) x 100 = 0.0031%
- (3.79E-16 µCi/ml / 7.3E-12 µCi/ml) x 100 = 0.0052%

Monitor Functional Location	
Date/Time	

Test Conditions		
	Required Value	**Measured Value**
Temperature	15 - 35°C	
Relative Humidity	90%	
Energy Calibration Complete? (Circle one)		**Yes / No**

Gain Verification			
Description	**Acceptance Criteria**	**As Found**	**As Left**
Peak Channel	399 - 439 channel		
Alpha-Beta gain	0.7 - 1.3 cps		
Gamma gain	0.7 - 1.3 cps		①

① $\text{Gamma Gain As Left} = \dfrac{(\text{Alpha} - \text{Beta Gain As Left})(\text{Gamma Gain As Found})}{(\text{Alpha} - \text{Beta Gain As Found})}$

Detection Efficiency Check				
Background	**Acceptance Criteria**	**Measured Values**	**Average**	**Comments**
Alpha_cps	< 0.005 cps			
Po21x_cps	< 0.005 cps			

Measurement with Alpha Source			
	Measured Values (cps)	**Average**	**Comments**
Alpha_cps		②	

Measurement with Alpha Source			
	Measured Values (cps)	**Average**	**Comments**
Po21x_cps			

Source Activity (circle source used)			
Source Material	**Source Type**	**M&TE/Serial Number**	**③A (Bq)**
^{241}Am	Alpha	F5-247	2980 (A)
^{241}Am	Alpha	F8-940	3295 (A)

Source Detection Efficiency Calculation			
Alpha Efficiency (Eff)	**Acceptance Criteria**	**Measured Value**	**Comments**
	0.0333 to 0.0407 cps/Bq	④	
④ Alpha Efficiency (cps/Bq) = **S/A** = ②/③ = Average Alpha_cps/Source Activity in Bq			

Alarm Verification						
Scenario	**Monitor Status**	**Relay Status (read from MASS2)**				**Acceptable? (Yes / No)**
		OP	**TST**	**H**	**H/H**	
High alarm	H alarm	On	On	On	Off	
H/H alarm	H/H alarm	On	On	On	On	
Fault	Slave fault	Off	On	Off	Off	

Remarks: _____

Performed By: _____ / _____ / _____
Print Signature Date

Reviewed By: _____ / _____ / _____
Print Signature Date

Performer Badge Number/Initials:	/
Functional Location of Monitor:	
① **Date of PIS change-out:**	
Time V2 Closed:	
② **PIS Volume (L):**	
Acceptance Criteria (L):	**> 2.25 E+5**
Stack Volume (scf):	
Time V2 Open:	
Chain-of-Custody; PIS turned over to Chemistry Technician (Badge Number/Initials):	

① If date of change-out is anything other than 7 days since the last PIS filter replacement was performed, provide a reason (and CR number if generated).

② If volume is ≤ 2.25E+5, Contact Chemistry Supervision prior to removing PIS.

Remarks:

Performed By: _____ / _____ / _____
Print Signature Date

Reviewed By: _____ / _____ / _____
Print Signature Date

Name of Person Performing Calibration	
Monitor Functional Location	
Date/Time	

Calibration Values:			
	Last Approved	**As Found**	**As Left**
Alpha Max ^{218}Po①			
Alpha Max ^{214}Po①			
Offset			
Slope			
Quadratic			
①Acceptable Range for Alpha Max Values			
^{218}Po: 4743 keV±40keV [4703 to 4783]		^{214}Po: 6595 kev±50keV [6545 to 6645]	

Setpoints for Alpha Activity:			
	Last Approved	**As Found**	**As Left**
Hi Setpoint	3.7E-12 μCi/ml OR 0.14 Bq/m^3		
Hi Hi Setpoint	7.3 E-12 μCi/ml OR 0.27 Bq/m^3		

RamSys backup performed? (Check one):	**Yes** ☐	**No** ☐

Comments:

Performed by:

Printed Name	**Signature**	**Date**

Verified by:

Printed Name	**Signature**	**Date**

Reviewed by:

Printed Name	**Signature**	**Date**

Monitor Functional Location:	**Quarter/Year:** /

FIRST MONTH

Date/Time On and Off	Filter Total Volume (L)	Stack Volume (scf)	Gross Alpha (µCi/ml)	Gross Beta (µCi/ml)	Performed By Initials
Sum					

SECOND MONTH

Date/Time On and Off	Filter Total Volume (L)	Stack Volume (scf)	Gross Alpha (µCi/ml)	Gross Beta (µCi/ml)	Performed By Initials
Sum					

THIRD MONTH

Date/Time On and Off	Filter Total Volume (L)	Stack Volume (scf)	Gross Alpha (µCi/ml)	Gross Beta (µCi/ml)	Performed By Initials
Sum					

QUARTERLY COMPOSITE DATA

^{234}U (µCi/ml)	^{235}U (µCi/ml)	^{236}U (µCi/ml)	^{238}U (µCi/ml)	Performed By Initials

Comments:

Performed by:

Printed Name	Signature	Date

Reviewed by:

Printed Name	Signature	Date

Valve Number	Nomenclature	Position	Initial
V1	Detector Subassembly Isolation	OPEN	
V2	PIS Isolation	OPEN	
V3	Main Flow Rate Adjustment	THROTTLE	
V4	PFCV Inlet	OPEN	
V5	PFCV Outlet	OPEN	
V6	PFCV Bypass	CLOSED	
V7	Sample Pump Isolation	OPEN	
V8	Sample Pump Vacuum Break		
V9	Grab Sample Bypass	OPEN	
V10	Grab Sample Inlet	CLOSED	
V11	Grab Sample Outlet	CLOSED	
1300-562-1A1	Test Valve	CLOSED	
1300-562-1A2	Alpha/Beta Monitor Isolation	OPEN	
1300-562-1A3	Test Valve	CLOSED	

Comments:

Performed by:			
	Printed Name	**Signature**	**Date**
Reviewed by:			
	Printed Name	**Signature**	**Date**

*Position varies as needed to balance flow between sampler and the monitor legs of the monitor

Valve Number	Nomenclature	Valve Position	Performed By Initials
V1	Detector Subassembly Isolation	OPEN	
V2	PIS Isolation	OPEN	
V3	Main Flow Rate Adjustment	THROTTLED*	
V4	PFCV Inlet	OPEN	
V5	PFCV Outlet	OPEN	
V6	PFCV Bypass	CLOSED	
V7	Sample Pump Isolation	OPEN	
V8	Sample Pump Vacuum Break		
V9	Grab Sample Bypass	OPEN	
V10	Grab Sample Inlet	CLOSED	
V11	Grab Sample Outlet	CLOSED	
1001-562-1MA1 **OR** 1001-562-1MA2	Monitor Functional Location *(Circle Location)*	OPEN	
1001-562-1A1 **OR** 1001-562-1A2	Nozzle Isolation Valves *(Circle Valve Number)*	OPEN	
1001-562-1A43 **OR** 1001-562-1A47	Test Valve *(Circle Valve)*	CLOSED	
1001-562-1A44 **OR** 1001-562-1A48	Alpha/Beta Monitor Isolation *(Circle Valve)*	OPEN	
1001-562-1A46 **OR** 1001-562-1A49	Test Valve *(Circle Valve)*	CLOSED	

Comments:

Performed by:			
	Printed Name	**Signature**	**Date**
Reviewed by:			
	Printed Name	**Signature**	**Date**

*Position varies as needed to balance flow between sampler and the monitor legs of the monitor.

GL Environmental, Inc.

F007
Date: December 9, 2008

Standard Operating Procedure

Subject: Domestic wastewater sampling

Author: _____ Date: 12/9/08
Vance Oas, Environmental Scientist

Approved by: _____ Date: 9 Dec 2008
Jerusha Rawlings, QA Manager

Approved by: _____ Date: 12/9/08
Matthew Lane, Project Manager

1.0 Purpose

This procedure establishes a method to collect a sample of domestic wastewater.

2.0 Scope

This procedure is applicable to domestic waste stream generated by the NEF.

3.0 References

American Public Health Association. 2005. *Standard Methods for the Examination of Water and Wastewater, 22nd edition.* Baltimore, Maryland.

4.0 Definitions

- **Grab sample** – a sample collected at a particular time and place. This sample is representative of a longer time or larger volume if the source is relatively constant over an extended time or over substantial distances in all directions.

5.0 Procedure

5.1 Equipment

- Analytical lab-provided container, properly labeled, attached to a rope, chain or pole
- Cooler with ice
- Personal protective equipment – i.e. nitrile gloves, protective eyewear, and tyvek suit
- If sampling is conducted in an enclosed space a half mask cartridge respirator must be used

- Handheld multi-parameter instrument

5.2 Sample collection

- The sample will be collected from the main sewer line at an access location where the effluent has sufficient velocity to keep effluent solids in suspension.
- Sampler will don personal protective equipment.
- Grab samples will be collected by submerging the lab sample container in the wastewater stream until full. Retrieve the container, cap, and store on ice in cooler.
    - Lab Analysis Samples – sample containers intended for shipment to an off-site analytical laboratory will be sealed, labeled, and logged according to appropriate chain-of-custody procedures.
    - Field Samples – sample containers intended for field measurements will be taken from the last volume removed from the sewer line.
- Measure field samples with the handheld multi-parameter instrument (temperature, pH, and conductance) according to operating instructions and record results.
- Refer to NEF Standard Operating Procedures for Decontamination of Sampling Equipment

6.0 Personal Protective Equipment

- Refer to SOP F001, Section 5.4 for use of Personal Protective Equipment.

APPENDIX D - Calibration Procedures

Calibration Procedures for CTPMF System:

Name of Person Performing Change Out	Michael Bollings
Badge Number	1552
Functional Location of Monitor	1300-562-1MA1
Date	9-9-9
Time after V2 Closed	9:19
Volume since last PIS Change Out	2.61e5
Time after V2 Open	9:22
Custody of PIS turned over to Chem. Tech	**Signature:** Dina Edwards

* Monitor was secured 9-3-09 1100-1515 for GEVS filter instillation/ maintenance.

△ Flow verification was performed on 9-8-09 with the following results: with the aid of maintenance.

Flowmeter (L/min)	Skid (L/min)
63	60
51	45
35	33.2

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Information Only - ISSUED

Site Acceptance Testing was performed on the 1300-S62-1MA1 Alpha Monitor in for the Centrifuge Assembly Building with final signatures being on 2/6/2009. During the testing, Section 9.3.5, Flow Rate Verification for Monitor, could not be performed for the full operating range of the vacuum pump for the skid. The following data was obtained on 2/2/2009 using a calibrated flow meter with limited range.

Calibrated Flowmeter l/min	**Monitor Reading l/min**	**Readings within +/- 10 %**
30	36.1	ΔTO
36.6	40.1	Yes
39.7	42.3	Yes
43.5	47.7	Yes

The flow rate recorded is for the total skid flow which is a combination of the Particulate/Iodine Sampler and the Continuous Alpha Monitor.

The calibrated flow meter that maintenance will be using to perform this surveillance in the future was not available at the time. Condition Report 2009-427 was generated to ensure the flow verification was performed when we had the calibrated equipment and hook ups available.

On 6/15/2009 we performed the verification of the flow meter using:

Omega Mass flow meter, Model #FMA1843, Serial # 230235-3, Cal Due 4/1/2010

We got the following data:

Calibrated Flow meter (lpm)	Monitor Reading (lpm)	Reading within +/- 10%
64	58.6	Yes
59	55	Yes
55	50.6	Yes
47	35	No

We test each leg of the skid and found that the Particulate/Iodine Sampler read:

Calibrated Flow meter (lpm)	Monitor Reading (lpm)	Reading within +/- 10%
40	44.2 (PIS)	Yes
40	53.1 (Monitor)	No

This indicates the total volume we have been using for our effluent filters were acceptable because it is calculated from the Particulate/Iodine flow transmitter. Based on these results, we calibrated the monitor using the manual and the vendor recommendations. The attached document contains the results from the calibration.

The flow rate test was performed again following the calibration with the following results:

Calibrated Flow meter (lpm)	Monitor Reading (lpm)	Reading within +/- 10%
63	58.7	Yes
58	55.2	Yes
54	50	Yes
49	45.1	Yes
43	40.1	Yes
36	35	Yes
30	30.1	Yes
23	25	Yes
18	20.2	Yes
14	15.4	Yes

Flow verification/calibration process:
Refer to post production test procedure for MGP instruction on flow verification.

NOTE: In channel parameter of InputAdj % (the last channel) switch between "LPU A/D converter" for the PIS leg and "Internal flowmeter" for the detector leg. Also, "Source [LPU analog input]"

Obtain 2-7 points of flow for each leg. Use V7 to create different flow rates, valve out the leg not being tested. Extrapolate for last point of 100%; don't actually measure to 100% analog input.

- Isolate PIS to test detector leg
- Isolate solenoid valve (close V4, V5, open V6)
- Change InputAdj channel to "Internal flowmeter"
- Place tubes/flowmeter to inlet (0-100 L/min range is preferable for our uses)
- Turn pump switch to manual mode
- Ensure V7 is fully open
- Read InputAdj on LPDU (let it stabilize)
- Crank down V7 to get another point, continue
- Use excel to extrapolate last point of 100% (guess), refer associated excel sheet for more info

Detector Leg	
%AI	**Flow (L/min)**
20	**0**
56	**15**
63	**20**
69	**25**
74	30
78	**35**
82	40
85	**45**
89	51
100 (estimated)	***71***

NOTE: round to whole numbers on the % analog input
Points in **bold red** used for calculating coefficients.

- Isolate detector to test PIS leg
- Change InputAdj channel to "LPU A/D converter"
- Open V7 fully, adjust and collect points
- Adjust V3 to get higher flow ~95% InputAdj, don't want 100%
- Stop pump

- Use excel to extrapolate last point of 100% (guess), refer associated excel sheet for more info
- Don't use excess points in graph that are already in a straight line (only need 7 points) for inputting data on parameter channels
- Go to MASS2, input data into PartFlow channel and SplrFlow channel

PIS Leg	
%AI	**Flow (L/min)**
0	**0**
43	**15**
53	**20**
61	25
67	**30**
73	35
79	**40**
83	45
87	**50**
95	56
100 (estimated)	***60***

NOTE: round to whole numbers on the % analog input
Points in **bold red** used for calculating coefficients.

Now that data is put into channel parameters, check flow tolerances on each leg with V3 fully open

- +/- 3 L/min tolerance check on each leg, before combined flow check
- Start pump (in manual mode)
- Ensure that SplrFlow reads within +/- 3 L/min of flowmeter, ensure that PartFlow also reads within +/- 3 L/min of flowmeter (the numbers checked aren't necessarily the same numbers put into the parameter tables)

- Before tolerance check on skidflow, Open V1 and V2 and balance the legs of flow with V3, it is best to balance the legs at the highest flow rate, within 6L/min of each other (ensure V7 is fully open)
- Compare flow rates of LPDU and external flowmeter

Measured flow (L/min)	LPDU indicated flow (L/min)
25	25.9
35	31.3
45	37

NOTE: indicated flow should typically be lower than measured flow, if not, check that the legs are balanced

- Ratio of measured to indicated

Measured flow	Indicated Flow	Ratio
43	33.8	1.27
56	44.9	1.25
65	50.3	1.29

- Take average of flow ratios (1.27) and apply to points
- Once this is done, update these data points in the channel parameters. Flow calibration and verification is now complete.

Detector Leg		
%AI	**Flow (L/min)**	**Adjusted flow rate (L/min)**
20	**0**	**0**
56	**15**	**19**
63	**20**	**25**
69	**25**	**32**
60	30	
78	**35**	**44**
69	40	
85	**45**	**57**
74	54	
100 (estimated)	***71***	**90**

PIS Leg		
%AI	**Flow (L/min)**	**Adjusted flow rate (L/min)**
0	**0**	**0**
43	**15**	**19**
53	**20**	**25**
61	25	
67	**30**	**38**
73	35	
79	**40**	**51**
83	45	
87	**50**	**64**
95	65	
100 (estimated)	***60***	**76**

Calibration Procedures for SBM-1001 GEVS Systems:

Procedure Title: **Alpha Monitor (ABPM 201 S) Operation**	
CH-3-4000-01-F-1 **Source Calibration Data Sheet**	CH-3-4000-01 Rev.5 Level 2 Reference Use Page 1 of 2

Monitor Functional Location	1001-562-1MA1
Date/Time	4-27-10 / 1500

Test Conditions		
	Required Value	**Measured Value**
Temperature	15 - 35°C	
Relative Humidity	90%	
Energy Calibration Complete? (Circle one)		**Yes / No**

Gain Verification			
Description	**Acceptance Criteria**	**As Found**	**As Left**
Peak Channel	399 - 439 channel		
Alpha-Beta gain	0.7 - 1.3 cps		
Gamma gain	0.7 - 1.3 cps		①

① Gamma Gain As Left = $\frac{(\text{Alpha} - \text{Beta Gain As Left})(\text{Gamma Gain As Found})}{(\text{Alpha} - \text{Beta Gain As Found})}$

Detection Efficiency Check				
Background	**Acceptance Criteria**	**Measured Values**	**Average**	**Comments**
Alpha_cps	< 0.005 cps			
Po21x_cps	< 0.005 cps			

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Measurement with Alpha Source			
	Measured Values (cps)	**Average**	**Comments**
Alpha_cps		②	

Measurement with Alpha Source			
	Measured Values (cps)	**Average**	**Comments**
Po21x_cps			

Source Activity (circle source used)			
Source Material	**Source Type**	**M&TE/Serial Number**	**③A (Bq)**
^{241}Am	Alpha	F5-247	2980 (A)
^{241}Am	Alpha	F8-940	3295 (A)

Source Detection Efficiency Calculation			
Alpha Efficiency (Eff)	**Acceptance Criteria**	**Measured Value**	**Comments**
	0.0333 to 0.0407 cps/Bq	④	
④ Alpha Efficiency (cps/Bq) = **S/A** = ②/③ = Average Alpha_cps/Source Activity in Bq			

Alarm Verification						
Scenario	**Monitor Status**	**Relay Status (read from MASS2)**				**Acceptable? (Yes / No)**
		OP	**TST**	**H**	**H/H**	
High alarm	H alarm	On	On	On	Off	
H/H alarm	H/H alarm	On	On	On	On	
Fault	Slave fault	Off	On	Off	Off	

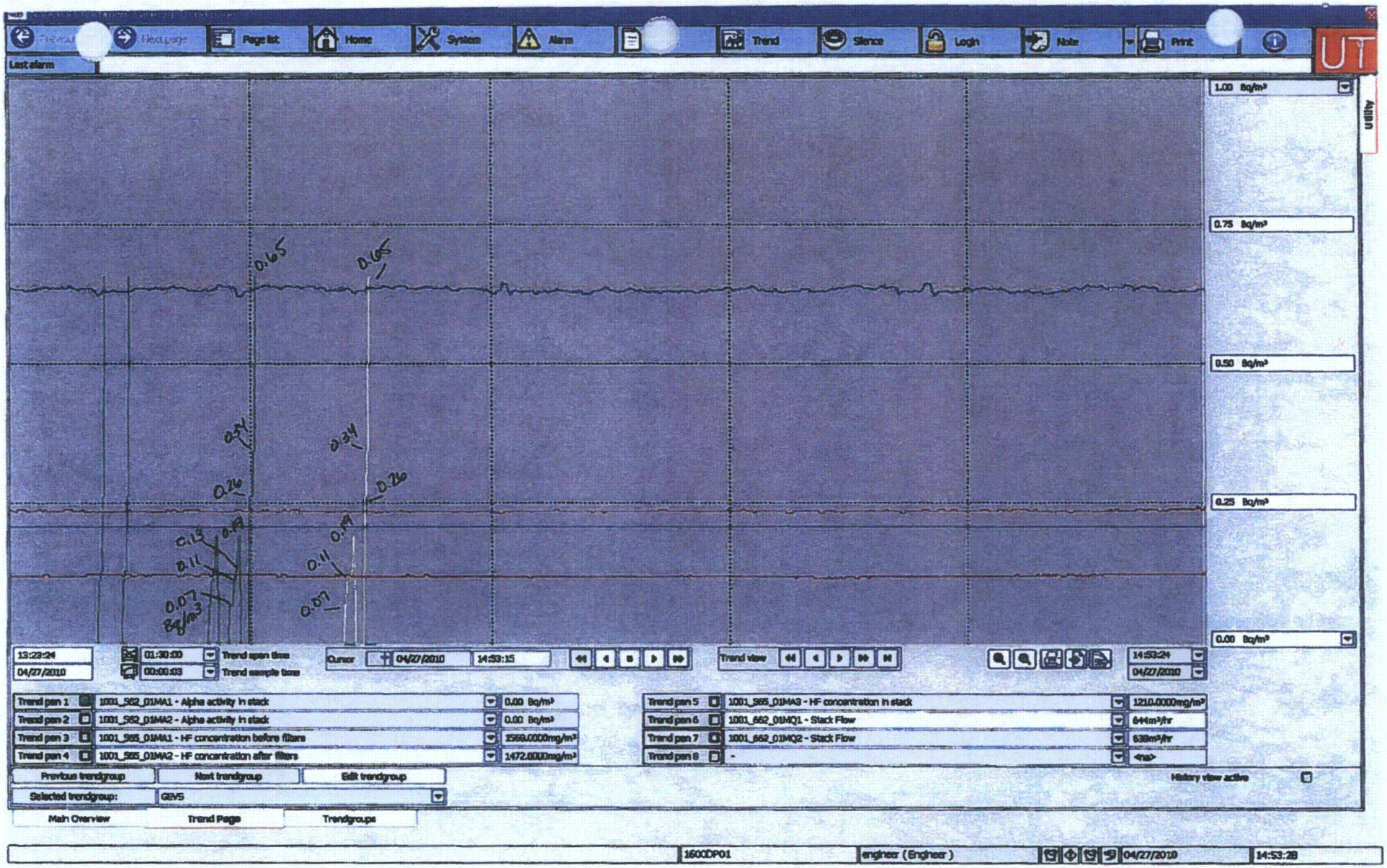
Remarks: See attached

Performed By: Holly Hilbar (Print) / Holly Hilbar (Signature) 4-27-10 (Date)

Reviewed By: Debra Edwards (Print) / D Edwards (Signature) 4-27-10 (Date)

This package is to provide a means of documenting a more detailed post CAT-CH-ABPM-201S test for the SBM effluent alpha monitors. The alarm test was conducted to compare monitor values with values read from the Plant Control System (PCS) in further detail from the test that was performed during the CAT. The following pages include data from this test. In the next procedure revision of CH-3-4000-01 it is planned to include this test with the annual source calibration.

1001-562-1MA1		
Read out at monitor (Bq/m3)	**Output at monitor (mA)**	**Readout on PCS (Bq/m3)**
0.08	5.122	0.07
0.12	5.787	0.11
0.14	6.100	0.13
0.20	7.077	0.19
0.27	8.211	0.26
0.35	9.501	0.34
0.65	14.350	0.65
1.00	20.000	offscale



5 of 5 page

all the readings were Bq/m³ .. if you need anything further, lemme know!

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Alpha Monitor Site Acceptance Test Plan

CAT-CH-ABPM-201S

Revision 0

ABPM Monitor System Number: 1001-562-1MA1

Approved: _____ 10/14/09

Signature/Date

Revision Summary

Change	Reason for Change
New test plan.	

TABLE OF CONTENTS

1. PURPOSE

1.1 The purpose of this procedure is to confirm functionality for the start-up and acceptance of the ABPM 201-S Alpha Particulate Monitor. It will include verification of the following aspects of operation:

1.1.1 The proper startup and operation of the Alpha Particulate Monitor.

1.1.2 Verification of correct measurement of activity levels and functioning of instrument fault conditions and alarms.

2. SCOPE

2.1 This procedure governs the start-up and testing of the ABPM 201-S Alpha Particulate Monitor and its supporting components.

3. TERMS, DEFINITIONS, ABBREVIATIONS, AND ACRONYMS

3.1	CAT	Commissioning and Acceptance Test
3.2	FAT	Factory Acceptance Test
3.3	LDU	Local Display Unit
3.4	LPDU	Local Processing and Display Unit
3.5	MASS	Maintenance and Setup Software
3.6	PDCU	Power Distribution and Control Unit (provides power to the pump and LPDU)
3.7	PFCV	Proportional Flow Control Valve (regulates flow through PIS proportionally to the stack flow
3.8	PIS	Particulate Iodine Sampler (for collecting particulate samples)
3.9	SAM	Spectrum Acquisition and Manipulation Software.
3.10	SAT	Site Acceptance Test

4. PRECAUTIONS AND LIMITATIONS

4.1 Ensure that appropriate electrical safety practices are utilized during this test in accordance with MA-3-1000-06, Electrical Safety.

5. EQUIPMENT, MATERIAL AND PARTS

5.1 Basic Tools and Software:

5.1.1 Laptop or workstation PC

5.1.2 Mass2 software

5.1.3 SAS/PIPS Application Software

5.1.4 RS232 serial link cable with DB9 connectors or equivalent

5.1.5 Vacuum/pressure pump

5.1.6 Level

5.1.7 Tape Measure

5.2 Calibrated Instruments

5.2.1 Digital multi-meter

5.2.2 Thermometer or temperature sensor for the DMM (0.1°C resolution)

5.2.3 Pressure/vacuum gauge (0.2 psig resolution, 20 psig max full scale)

5.2.4 Mass flow meter or equivalent

5.2.5 Dose rate meter (0.1 mR/hr resolution)

5.2.6 Loop calibrator, as required (input the 4 to 20 mA signal for isokinetic test)

5.3 Radioactive Sources

5.3.1 ^{241}Am, ~1500 alpha/s nominal activity

5.3.2 Source holder, MGP reference number 69553

6. ACCEPTANCE CRITERIA

6.1 Proper operation and calibration of the ABPM 201S monitor as verified by positive checks using the Checklist provided in Attachment 1.

6.2 Proper operation of the alarms and faults.

6.3 Proper operation of the monitor.

7. PREREQUISITES

7.1 Power available for the monitor.

8. DATA REQUIRED

8.1 Other than the information recorded on the checklist and the data sheets from CH-3-4000-01, Alpha/Beta Monitor (ABPM201S) Operation, there is no additional data required for this test.

8.2 Calibration Data

NOTE:

1. Record all observations and data on the ABPM 201S Datasheet & Log unless otherwise directed.
2. Steps may be performed in a sequence other than specified in the test plan if approved by the person leading the testing.
3. If any parameter cannot be achieved, document the actual results and list the exceptions in the log.
4. Make any necessary corrections and repeat as necessary for out of specification parameters.
5. Use 12-00098, Post Production Test Procedure for ABPM201S Alpha Beta Particulate Monitor and 12-00124, Factory Acceptance Test Procedure for LES ABPM201S as needed for reference in performing this test.

9. MAIN BODY

9.1 Physical Inspection

9.1.1 Verify Alpha Monitor Identification and Condition:

a. Serial numbers of components match serial numbers on FAT data sheet.

b. No visible damage.

c. Adequate clearances have been provided for servicing.

d. Name plate affixed to Instrument showing model number, contract number, date of manufacture, UL listing.

e. Calibration data sheet available for flow meter.

f. Monitor skid is level and properly bolted to the building.

g. All packing material and debris have been removed from the equipment, inside and exterior of all components are clean and dust-free.

9.1.2 Check that pipe connections from the sampling nozzle in the stack are compliant with the following:

a. Sample inlet line 1 inch OD seamless stainless steel.

b. Sample outlet line ½ inch OD seamless stainless steel.

c. No internal diameter change along line after union to nozzle.

d. Minimal horizontal runs, no upward flowing sections between sampling nozzle and instrument inlet.

e. Horizontal distance between nozzle and instrument $\leq$ 15 feet.

f. Radius of bends at least 3 times pipe outside diameter.

g. Pipe connections made with Swagelok fittings.

h. Verify sample inlet/sample return manual isolation valves are operable.

i. Ensure components of system (line between nozzle and monitor, and monitor) have been leak checked. To leak check the monitor, open all internal valves, close inlet and exit valves, and connect a pressure gauge and manual hand pump to the inlet manifold. Draw a vacuum of approximately 6 inches mercury in the system and hold for 10 minutes. The vacuum shall not decrease by more than 10%.

NOTE:

UPS is not tested as part of this test plan.

9.2 Electrical Inspection

9.2.1 Power supply and instrument voltages are compatible.

9.2.2 LDU is connected to LPDU (RS485 link between the LDU and the LPDU).

9.2.3 The LDU used for isokinetic flow has the following connections:

a. 120 V AC 60 Hz instrument quality power line

b. Analog input from the stack flow transmitter

9.2.4 Using a DMM or milli-ohmmeter, check the resistance between the building ground and the skid ground bus (welded threaded stud at lower left side of the skid). Resistance shall be less than 0.1 ohm.

9.3 Start-up

9.3.1 Filter paper and cartridge

a. Check that a filter paper roll has been placed in the filter cassette.

b. Check that a filter paper is installed in the PIS.

9.3.2 Monitor Power On

a. In the Power Distribution and Control Unit (PDCU), check that fuses are installed in the fuse holders, and close the fuse holders.

b. Check that the filter cassette elevator is closed (up).

c. Verify the LPDU power supply circuit breaker on the distribution unit is "ON".

d. Power on the LPDU by turning the front panel key switch to "ON". The buzzer should sound for approximately one second, the orange light illuminate for one second, and the red light briefly flash.

9.4 LPDU Software Check

9.4.1 Connect a PC to the LPDU (RS232 port on front of unit) and perform network setup as required.

9.4.2 Scan with MASS2 and verify that the LPDU is found.

9.4.3 Verify that the LPDU base software (Ref.735 index 1) is revision E or later,

9.4.4 Verify that the LPDU/SAS/PIPS application (Ref.774 index 2) is revision P or later.

9.4.5 Record the index and revision levels of the base and application software, and the parameter set.

9.4.6 Update LPDU time and date, if necessary.

9.4.7 Verify the LPDU serial number.

9.4.8 Backup any changes required, clear histories and events, and reset the unit.

9.4.9 Test the communication by reading the event summary of the unit using MASS2.

9.4.10 Perform a configuration verification and document.

9.5 LDU Software Check

9.5.1 Connect a PC to the LDU (RS232 port on front of unit) and perform network setup as required.

9.5.2 Scan with MASS2, and verify that the LDU is found.

9.5.3 Perform a configuration verification and document.

9.6 Flow Rate Verification

9.6.1 Place a calibrated flowmeter on the inlet or outlet manifold.

9.6.2 Bypass the isokinetic PFCV (Proportional Flow Control Valve).

9.6.3 Place the pump manual switch to "MAN" (operates the pump in manual mode).

9.6.4 Provide sample flow to the monitor and adjust the flow regulating valve to obtain the approximate flow rates listed below and verify the value indicated for the flow channel against the reading from the calibrated flowmeter. Record the actual flow rate achieved.

Measurement Test #	Reference flow rate in L/min (CFM)
1	30 (1.1)
2	45 (1.6)
3	60 (2.1)

9.6.5 The measurements shall match the gauge reading within ± 10%.

NOTE:

A 4-20 mA signal may be used to test the proportional valve response in place of changing the stack flow rate.

9.7 Isokinetic Flow Control Test

The purpose of this test is to verify that the sample flow rate is maintained at a value which is proportional to the process flow rate, above a certain sample flow threshold. The stack flow scaling and the target sample flow rate may be modified and calibrated during this test.

9.7.1 With the PC connected to the LPDU and/or LDU, scan with MASS 2.

9.7.2 Ensure the monitor components (LPDU and LDU) are configured to accept stack flow data.

9.7.3 Record the stack flow as indicated on the Remote Electronic Enclosure for the flow element used by the LDU which is located in the Local Control panel.

9.7.4 Record the stack flow rate indicated on the LPDU display or by MASS2.

9.7.5 Record the sample flow rate to the Alpha monitor, as indicated by the total flow rate channel (SkidFlow).

9.7.6 Verify sample flow rate is within acceptable tolerance for the stack flow rate (± 25% of the expected value).

9.7.7 Adjust the Fan Speed on the Ventilation System to achieve the Target Stack Flow Values for this test.

9.7.8 If the scaling data must be updated, only the stack flow rate (StkFlow) and target sample flow rate (Target) channels need to be modified. See Section 10 in the User's Manual for ABPM 201-S, Appendix 2: Isokinetic Flow Control. Update information in the StkFlow and Target sample flow rate channels, If required.

9.7.9 If changes to the calibration are required, repeat steps until acceptable sample flow rates are obtained.

9.7.10 Record final results.

9.8 Detector Fault Test

9.8.1 With the monitor in normal operating condition, turn off power to the LPDU and the sampling pump and disconnect the detector cable at the LPDU side.

9.8.2 Restore power to the LPDU and check that the events list is similar to the following list:

Date	Time	Event
06/07/00	15:05:21	Stop unit
06/07/00	15:05:37	Start unit
06/07/00	15:05:44	Unit in normal operation mode ON
06/07/00	15:05:48	Detector probe not present ON
06/07/00	15:05:54	Electrical test counting : : 0
06/07/00	15:05:54	Electrical test fault ON
06/07/00	15:05:57	Internal fault ON
06/07/00	15:05:57	Temperature fault ON

9.8.3 Turn off power to the LPDU and reconnect the detector cable.

9.8.4 Restore power to the pump and the LPDU and check that the events list is similar to the following list:

Date	Time	Event
06/07/00	15:05:21	Stop unit
06/07/00	15:05:37	Start unit
06/07/00	15:05:44	Unit in normal operation mode ON
06/07/00	15:05:44	Filter advance ON
06/07/00	15:05:54	Filter advance OFF

9.9 Energy Calibration, Source Calibration, Relay Test, Alarm Test and Setpoint Verification,

Perform this section IAW CH-3-4000-01 and the source comparison data from the Factory Acceptance Test. Record the data on CH-3-4000-01-F-1, Source Calibration Data Sheet and CH-3-4000-01F-3, Energy Calibration Data Sheet and attach to the test plan.

9.10 Temperature calibration verification

9.10.1 Using the MASS software, and a calibrated temperature sensor, measure the temperature near the PIPS detector, and record the measured value as $T_{Measured}$ in °C.

9.10.2 Read the "Temp" channel in °C on the MASS main screen, and record as T_{LPDU}

9.10.3 Calculate the offset (difference) between measured and read, $T_{LPDU} - T_{Measured}$.

9.10.4 If the offset is within ± 2 °C , the temperature measurement calibration is acceptable.

9.11 Restoration and final check

9.11.1 If applicable, restore any parameters modified for the test to the normal operating values.

9.11.2 Put the LPDU into maintenance mode.

9.11.3 Back up parameters into flash memory, and onto a diskette or CD, if required.

9.11.4 Reset the LPDU and run the pump for 24 hours.

9.11.5 Check that there are no unusual events in the event summaries and that there is no activity in the historical trends which cannot be accounted for.

9.11.6 Review the test procedure and verify that all tests have been completed.

9.11.7 Review the test log and verify that all required entries are complete.

9.11.8 Repeat any steps if required.

9.11.9 Sign the test log .

10. DOCUMENTATION AND RECORDS

10.1 Retain this procedure, the Installer's Checklist, and a record of any calibration performed, with required initials, in accordance with RM-3-2000-01, Records Management program.

11. LICENSE COMMITMENTS AND REQUIREMENTS

11.1 SAR 4.1

11.2 SAR 4.7

11.3 SAR, Section 9.2.21

12. REFERENCES

12.1 CH-3-4000-01, Alpha/Beta Monitor (ABPM 201S) Operation

12.2 MA-3-1000-06, Electrical Safety

12.3 RM-3-2000-01, Records Management Program

12.4 SU-3-1000-01, Release for Operation

12.5 User's Manual, ABPM 201-S Alpha Beta Particulate Monitor, 15-00068 Rev. 0, dated 10-10-2008, MGP Instruments

12.6 Post Production Test Procedure for ABPM201S Alpha Beta Particulate Monitor, Document 12-00098, MGP Instruments

12.7 Factory Acceptance Test Procedure for LES ABPM201S, Document 12-00124, MGP Instruments

12.8 Post Production Test Data Sheet, ABPM201S Alpha Beta Particulate Monitor, Document 14-00098, MGP Instruments

12.9 LES ABPM201S Factory Acceptance Test Log, MGP Instruments

12.10 MASS Software User's Manual

12.11 LPDU User's Manual

12.12 ANSI/HPS N13.1-1999 Sampling and Monitoring Releases of Airborne Radioactive Substances From the Stacks and Ducts of Nuclear Facilities

ABPM 201S Monitor System Number: 1001-562-1MA1

Part Number: ABPM 201S

Serial Number: 090501-04

Test Date(s) 11/10/09 to ~~3/15/10~~ ~~3/25/10~~ 3/26/10

Calibrated Instruments and Standards

Item	Model Number	Serial Number	Calibration Due	Comments
Digital Multimeter	Fluke 87 V	94910331	22Jul2010	Certificate attached Page ~~31 33~~ 34 to 40 ~~3/5/10~~
Temperature Sensor	Fluke 87 V	94910331	22Jul2010	↓
Pressure/Vacuum Gauge and hand vacuum pump	Mityvac XNXT ~~AP42~~ 3/10/10	81161094	N/A	(1) Handpump purchased from Cole Palmer to perform test. Vendor recommends different setup.
Mass Flow Meter	FMA 1843	230235-3	01 Apr2010	Certification attached Pg. 31 to 33
~~Doce Rate Meter~~ Scaler/ratemeter 11/10/09	2224	247506	08 Sept2010	Certification attached Pg 41 to 42

(1) See comments on Page 21 of 85.

ABPM201S System and Component Numbers

Item	FAT Log Part Number	FAT Log Serial Number	Installed Part Number	Installed Serial Number	Comments
Skid	02-00384	090501-04	02-0384	090501-04	ULcert# 0115483 10/21/09
LPDU/PIPS	131839	090503	131839	090503	
Particulate Flow Meter	~~120114~~ 120114 HMH 11-10-09	091774	120114	091774	verified in FAT log
PIS flow Meter	120112	080693	120112	080693	
Filter Cassette	43775	081190	43775	081190	
Flow Control Valve	700055	29225	700055	29225	
LDU	N/A	N/A	134475	090631	ULcert# 0115487

Physical Inspection	Yes	No	Verified By Initials	Verified By Date/Time	Verified By Initials	Verified By Date/Time	Comments
Serial Numbers match FAT Data Sheet	✓		HMH	11-10-09 0838	JRB	11/10/09 0838	FAT paperwork attached as per Pg 45 of 68.
No visible damage	✓		HMH	11-10-09 0839	JRB	11/10/09 0839	
Adequate clearance >42"	✓		JRB	11/12/09 0800	HMH	11-12-09 1000	
Label affixed	✓		HMH	11-10-09 0839	JRB	11/10/09 0839	
Calibration data sheet for flow meter	✓		HMH	11-8-09 1130	DAS	12/9/09 12:00	② See comment on Page 21. of 85
Monitor skid level	✓		HMH	11-10-09 0831	JRB	11/10/09 0838	
Monitor is bolted down	✓		HMH	11-10-09 0840	JRB	11/10/09 0839	

Physical Inspection	Yes	No	Verified By		Verified By		Comments
			Initials	Date/Time	Initials	Date/Time	
Packing material removed and interior/exterior clean	✓		HMH	3-16-10 0820	DAE	3/16/10 0820	
Inlet pipe 1 inch OD seamless stainless steel	✓		JRB	12/18/09 1430	NR	NR	
Return pipe diameter ½ inch OD seamless stainless steel	✓		JRB	12/18/09 1430			
No diameter change along inlet line after union with nozzle	✓		JRB	12/18/09 1430			
Minimal horizontal runs, no upward flowing sections between sampling nozzle and instrument inlet	✓		JRB	12/18/09 1430			
Horizontal distance between nozzle and monitor is <15'	✓		JRB	12/18/09 1430			
Radius of bends at least 3X OD	✓		JRB	12/18/09 1430			
Pipe connections made with Swagelok fittings	✓		JRB	12/18/09 1430			
Manual isolation valves operable	✓		JRB	12/18/09 1430			
Initial vacuum: 6			NR	NR			
Decrease in vacuum after 10 minutes: 6 (no change)							
Decrease in vacuum < 10%	✓		HMH	11-16-09 1120			

Electrical Inspection	Yes	No	Verified By		Verified By		Comments
			Initials	Date/Time	Initials	Date/Time	
Correct Voltage	✓		HMH	11-12-09 1036	RSB	11-12-2009 1042	118.6 volts (4) See page 21 of 85
LDU in communication with LPDU	✓		HMH	11-18-09 1236	SOS	11-18-09 1324	
LDU has input from flow element	✓		HMH	3-16-10 0820	DLS	3/16/10 0820	
Skid grounded – Resistance < 0.1 ohms	✓		HMH	11-12-09 1036	RSB	11-12-2009 1042	
UL equivalency Report	✓		DLS	12-15-09 1200	NR	NR	attached Report Page 69 to 84

Start up	Yes	No	Verified By		Verified By		Comments
			Initials	Date/Time	Initials	Date/Time	
Filter paper roll in cassette	✓		HMH	11-10-09 0840	JRB	11-10-09 0840	
Filter paper in PIS	✓		HMH	11-10-09 0841	JRB	11-10-09 0841	
Fuses checked	✓		HMH	11-10-09 0842	JRB	11-10-09 0842	
Elevator up	✓		HMH	11-10-09 0841	JRB	11-10-09 0841	
LPDU powered up	✓		HMH	11-10-09 0843	JRB	11/10/09 0843	
LPDU display on	✓		HMH	11-10-09 0843	JRB	11-10-09 0843	
LPDU found by MASS2	✓		HMH	11-10-09 0851	JRB	11-10-09 0850	

LPDU Software Check	Yes	No	Verified By		Verified By		Comments
			Initials	Date/Time	Initials	Date/Time	
LPDU: • Base Software number: 735 • Base Software revision: 1E • Application Software number: 774 • Application Software revision: 2R • Parameter Set number: 827 • Parameter Set revision: 104A • Acquisition board number: 60875 • Acquisition board revision: 178 25561	✓		HMH	11-10-09 0857	JRB	11/10/09 0900	
Time and date set	✓		HMH	11-10-09 0858	JRB	11/10/09 0858	
LPDU serial number: 090503	✓		HMH	11-18-09 1242	NR	NR	
Any changes backed up , unit reset?	✓		HMH	3-16-10 0820	↓	↓	
Event summary correct?	✓		HMH	3-16-10 0820	↓	↓	
Configuration verified and documented	✓		HMH	11-10-09 0948	JRB	11-10-09 0948	

LDU Software Check	Yes	No	Verified By		Verified By		Comments
			Initials	Date/Time	Initials	Date/Time	
LDU is receiving information?	✓		HMH	11-18-09 1242	SDS	11-18-09 1242	
Configuration verified and documented	✓		HMH	11-18-09 1242	SDS	11-18-09 1242	

Flow Rate Verification	Yes	No	Verified By		Verified By		Comments
			Initials	Date/Time	Initials	Date/Time	
Monitor Flow Rate (Skidflow) acceptable?	✓		HMH	11-10-09 1345	←	11/10/09 1347	56 Lpm was the maximum flow achieved

Calibrated Flowmeter (Lpm)	Monitor Reading (Lpm)	Reading within ±10%
30	33.0	yes
45	47.3	yes
56	53.3	yes

Isokinetic Flow Control Test	Yes	No	Verified By		Verified By		Comments
			Initials	Date/Time	Initials	Date/Time	
Test complete and satisfactory?	✓		AdeZ	3/26/10@1640	NR	NR	Test results on Page 85

Target Stack Flow (or mA)	Measured Stack Flow from Process Flow Meter (iPNL1A)	Measured Alpha Monitor Process Flow Rate	Portable Flow Meter Stack Measurement	Target Alpha Monitor Sample Flow Rate	Actual Alpha Monitor Sample Flow Rate	Within Tolerance?
4.066 mA	~~2 scfm~~ (1.9)	3.4 scfm	0.5 scfm	40 Lpm	40.1 Lpm	
5.435 mA	5.2 scfm	~~2.19 scfm~~ 52.7 scfm 11/3/09	2.19 scfm	40 Lpm	40.0 Lpm	

(3) See comment Page 21

Detector Fault Test	Yes	No	Verified By		Verified By		Comments
			Initials	Date/Time	Initials	Date/Time	
Event log for detector unplugged and pump off correct?	✓		HMH	11-18-09 1410	SDS	11-18-09 1410	
Event log for detector plugged in and pump on correct?	✓		HMH	11-18-09 1410	SDS	11-18-09 1410	

CH-3-4000-01	Yes	No	Verified By		Verified By		Comments
			Initials	Date/Time	Initials	Date/Time	
Energy Calibration complete and passed?	✓		HMH	11-11-09 1520	NR	NR	Page 24 to 25 of 85.
Setpoint Verification complete and passed?	✓		HMH	1-8-10 1000	↓	↓	Page 29 of 85.
Source Calibration complete and passed?	✓		HMH	11-17-09 1420	↓	↓	Page 26 to 28 of 85.
Relay Test complete and passed?	✓		HMH	11-18-09 1410	SDS	11-18-09 1410	Page 27 of 85
Alarm Test complete and passed?	✓		HMH	11-18-09 1410	SDS	11-18-09 1410	Page 27 of 85

Temperature Calibration	Yes	No	Verified By		Verified By		Comments
			Initials	Date/Time	Initials	Date/Time	
Reference Temperature: 22.2			HMH	11-18-09 1410	NR	NR	
Monitor Temperature: 21.4			HMH	11-18-09 1410	↓	↓	
Reading within ± 2°C?	✓		HMH	11-18-09 1410	SDS	11-18-09 1410	

Restoration and Final Check	Yes	No	Verified By		Verified By		Comments
			Initials	Date/Time	Initials	Date/Time	
Parameters restored	✓		HMH	3-16-10 0820	NR	NR	
LPDU in maintenance mode	✓		HMH	3-16-10 0820			
Reset LPDU	✓		HMH	3-16-10 0820			
Pump run for 24 hours	✓		HMH	3-16-10 0820			
All tests complete	✓		[illegible]	3-26-10 1700			
Entries complete	✓		[illegible]	3-26-10 1700			
Test log signed	✓		[illegible]	3-26-10 1700			

Observation/Comments:

Note: Vendor attended CAT and stated that use of a doserate meter is unnecessary. Procedure revision to follow to make corrections based on Vendor recommendation.

(1) Pressure/Vacuum gauge and hand pump purchased for test does not have a traceable calibration. Vendor recommended using swagelok quick connects and a different setup. Leak test provided FAT results. Leak test will be performed again when parts arrive. (AIT 2010-969) written to track.

(2) The flow meter was replaced during the testing interval. EPI. S#29061101 11-8-09 meter was replaced by Dwyer 641-6 S#N3611-2 and calibration performed on 12/9/09. Only final calibration data included in package on Page ~~85~~ dl 2/11/10 43 to 44.

(3) Problems with installed flow meter referenced in comment (2) resulted in test being performed at a later time. Data to support Isokinetic flow test can be found on Page 85 of 85.

(4) Voltage reading performed by ETI during UL equivalency testing. Cal certificate attached (Fluke 87V, S#96260073 Calibration due date 2/13/10) Page ~~38~~ dl 2/11/10 30 of 85 UL equivalency documentation attached as Page 69 to 84.

Observation/Comments:

N/A

Initials/Name (Print/Signature HMH / Holly Huber / [signature]

Initials/Name (Print/Signature SDS / Silas Stark / [signature] for Silas Stark

Initials/Name (Print/Signature RSB / Ross Bender / DEdwards for Ross Bender

Initials/Name (Print/Signature DE2 / Debra Edwards / DEdwards

Initials/Name (Print/Signature JRB / John Berstler / DE for John Berstler

Initials/Name (Print/Signature ____ / _____ / _____

The ABPM 201S Alpha monitor is acceptable for use: [signature] 3/15/2010

Signature Date

The ABPM 201S Alpha monitor is acceptable for use: [signature] 3/15/2010

Signature Date

The ABPM 201S Alpha monitor is acceptable for use: _____

Signature Date

Procedure Title: **Alpha/Beta Monitor (ABPM 201 S) Operation**	
CH-3-4000-01-F-3 **Energy Calibration Data Sheet**	CH-3-4000-01 Rev.3 Level 2 - Reference Use Page 1 of 1

Name of Person Performing Calibration	Holly Huber
Monitor Functional Location	1001-862-1MA1
Date/Time	11-11-09 / 1520

Calibration Values:			
	Last Approved	**As Found**	**As Left** ③
Alpha Max ^{218}Po ①	②	4897.27	4743
Alpha Max ^{214}Po ①		6700.43	6595
Offset		0.4294	1.1847
Slope		9.5699	8.8137
Quadratic		0.00074	~~0.00162~~ HH 11-11-09 0.00163

①Acceptable Range for Alpha Max values:

- ^{218}Po: 4743 keV±40keV [4703 to 4783]
- ^{214}Po: 6595 kev±50keV [6545 to 6645]

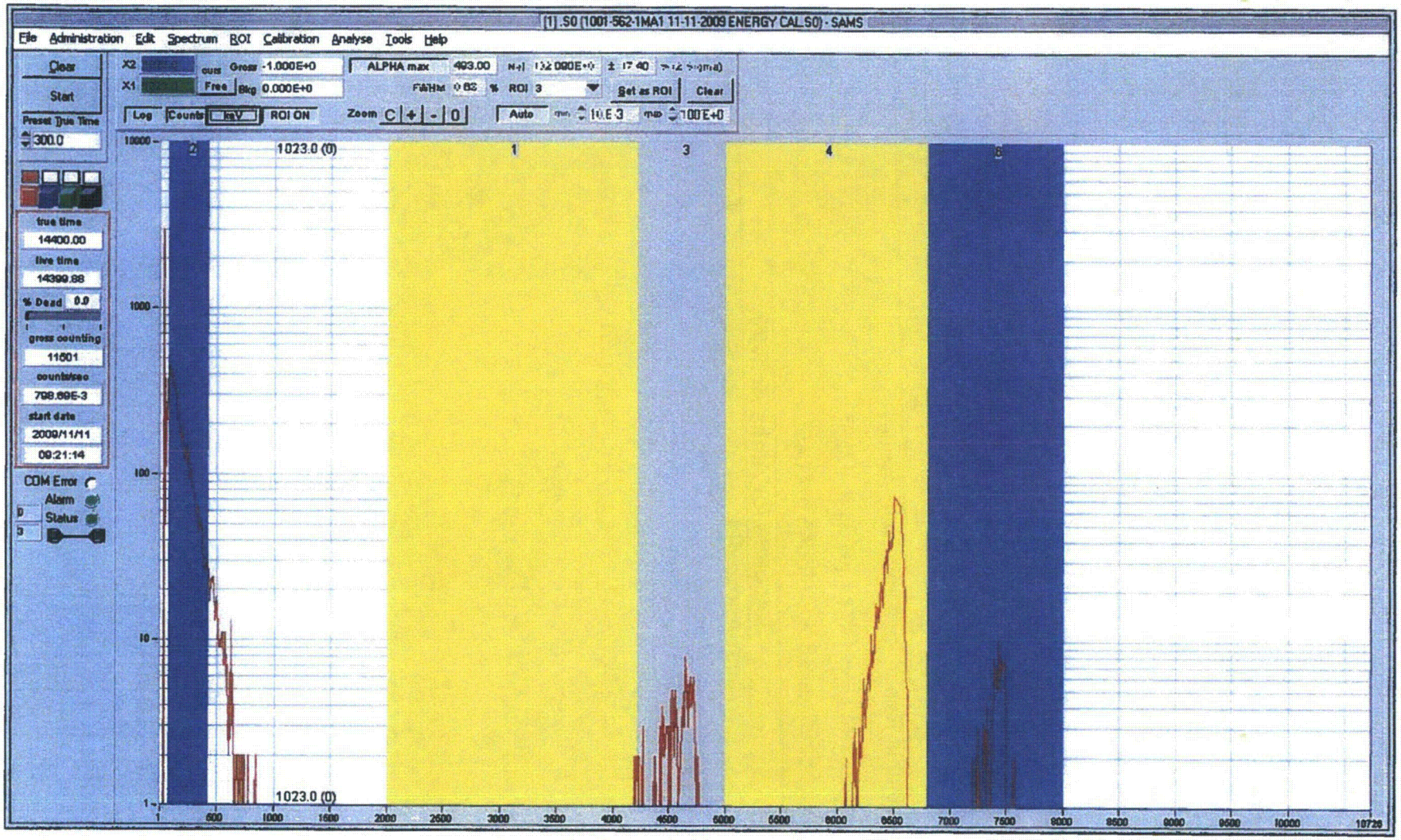
Setpoints for Alpha Activity: ⑧			
	Last Approved	**As Found**	**As Left**
Hi Setpoint	3.7E-12 µ Ci/ml	NA	
Hi Hi Setpoint	7.3 E-12 µ Ci/ml		

Remarks: ⑧ Setpoints NA because of CAT. Final verification on Page 29

② Initial site test. No last approved. DEZ

③ Spectrum attached on Page 25 of 85.

Reviewed By: Debra E. Edwards / DEdwards / 11/11/09
Print Signature Date


[1] .S0 (1001-562-1MA1 11-11-2009 ENERGY CAL.S0) - SAMS
File Administration Edit Spectrum ROI Calibration Analyse Tools Help
Clear
Start
Preset True Time
300.0
true time
14400.00
live time
14399.88
% Dead 0.0
gross counting
11601
counts/sec
798.695-3
start date
2009/11/11
09:21:14
COM Error
Alarm
Status
ALPHA max 493.00
ROI 3
Set as ROI
Clear
Log
Counts
keV
ROI ON
Zoom C + - 0
Auto
1023.0 (0)
1023.0 (0)
1
2
3
4
6
10000
1000
100
10
1
1
600
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000
6500
7000
7500
8000
8500
9000
9500
10000
10720

Procedure Title: **Alpha/Beta Monitor (ABPM 201 S) Operation**	
CH-3-4000-01-F-1 **Source Calibration Data Sheet**	CH-3-4000-01 Rev.3 Level 2 - Reference Use Page 1 of 2

Technician Performing Calibration	Holly Huber
Monitor Functional Location	1001-562-1MA1
Date/Time	11-17-09 / 1315

Test Conditions		
	Required Value	**Measured Value**
Temperature	15 - 35°C	22
Relative Humidity	25 - 75%	26
General Area Radiation	< 0.1 mR/hr (<100µR/hr)	134 cpm (βγ, α 0)
Energy Calibration complete? (Circle)		**Yes** / **No**

Source Activity			
	Source Type	**Serial No.**	**A (Bq)**
~~^{241}Am~~	~~Alpha~~	~~F5-247~~	~~2980 (A)~~ OK 11/17/09
Am-241	alpha	F8-940	3295

Gain Verification			
Description	**Acceptance Criteria**	**As Found**	**As Left**
Peak Channel	399 - 439 channel	434 ***	NA ***
Alpha-Beta gain	0.7 - 1.3 cps	0.96	NA
Gamma gain	0.7 - 1.3 cps	0.99	① NA

① Gamma Gain As Left = $\frac{(\text{Alpha} - \text{Beta Gain As Left})\,(\text{Gamma Gain As Found})}{(\text{Alpha} - \text{Beta Gain As Found})}$

Detection Efficiency Check				
Background	**Acceptance Criteria**	**Measured Values**	**Average**	**Comments**
Alpha_cps	< 0.005 cps	0 0 0 0 0	0	None
Po21x_cps	< 0.005 cps	0 0 0 0 0	0	None

Measurement with the Alpha Source			
	Measured Values (cps)	**Average**	**Comments**
Alpha_cps	121.48	120.462	None
	120.40		
	120.57		
	120.12		
	119.74		
Po21x_cps	0.0539	0.05152	None
	0.0465		
	0.0556		
	0.0524		
	0.0492		

Detection Efficiency Calculation for Source			
	Acceptance Criteria	**Measured Value**	**Comments**
Alpha Efficiency (Eff)	0.0326 to 0.0398 cps/Bq	② 0.03656	None
	1206.2 to 1472.6 cps/μCi	③ 1352.68	↓

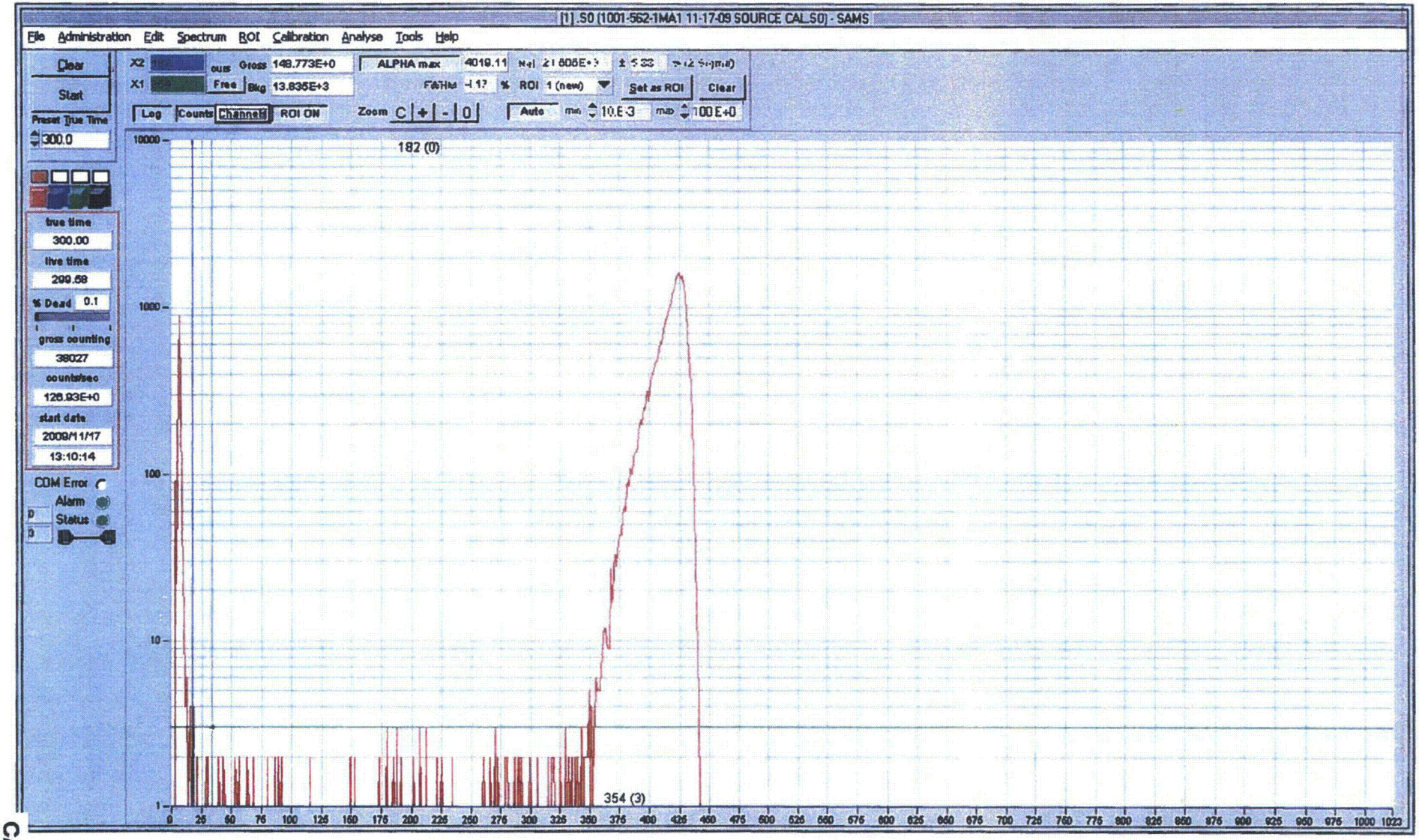
② Alpha Efficiency (cps/Bq) = **S/A** = Alpha_cps/2980 Bq

③ Alpha Efficiency (cps/μ Ci) = ② x 37000

Alarm Verification						
Scenario	**Monitor Status**	**Relay Status (read from MASS2)**				**Acceptable? (Yes/No)**
		OP	**TST**	**H**	**H/H**	
High alarm (modify LPDU threshold)	H alarm	On	Off	On	Off	Yes
H/H alarm (modify LPDU threshold)	H/H alarm	On	Off	Off/On*	On	Yes
Fault (turn off the sample pump)	Slave fault	Off	Off	Off	Off	Yes
Test (place LPDU in Bypass mode)	Bypass	On	On	Off	Off	Yes

Remarks: post production test value for alpha efficiency. 0.0362 cps/Bq
* high alarm is on during H/H alarm.
** Spectrum attached. No change required. "As found" is the same as "As left".

Reviewed By: Debra Edwards / Debra Edwards / 11/17/10
Print / Signature / Date


[1].S0 (1001-562-1MA1 11-17-09 SOURCE CAL.S0) - SAMS
File Administration Edit Spectrum ROI Calibration Analyse Tools Help
Clear
Start
Preset True Time
300.0
true time
300.00
live time
299.68
% Dead 0.1
gross counting
38027
counts/sec
126.93E+0
start date
2009/11/17
13:10:14
COM Error
Alarm
Status
Gross 148.773E+0
Bkg 13.835E+3
ALPHA max
4019.11
ROI 1 (new)
Set as ROI
Clear
Log
Counts
Channels
ROI ON
Zoom C + - 0
Auto
10.E-3
100E+0
182 (0)
354 (3)
10000
1000
100
10
1

Procedure Title: **Alpha Monitor (ABPM 201 S) Operation**	
CH-3-4000-01-F-3 **Energy Calibration Data Sheet**	CH-3-4000-01 Rev.4 Level 2 Reference Use Page 1 of 1

Name of Person Performing Calibration	Holly Huber
Monitor Functional Location	1001-362-1MA1
Date/Time	1-27-10 / 1045

Calibration Values:			
	Last Approved	**As Found**	**As Left**
Alpha Max ^{218}Po①			
Alpha Max ^{214}Po①			
Offset		NA	
Slope			
Quadratic			
①Acceptable Range for Alpha Max Values			
^{218}Po: 4743 keV±40keV [4703 to 4783]		^{214}Po: 6595 kev±50keV [6545 to 6645]	

Setpoints for Alpha Activity:			
	Last Approved	**As Found**	**As Left**
Hi Setpoint	3.7E-12 µ Ci/ml	3.7e-12 µCi/ml	0.14 Bq/m^3
Hi Hi Setpoint	7.3 E-12 µ Ci/ml	7.3e-12 µCi/ml	0.27 Bq/m^3

RamSys backup performed? (Check one):	**Yes** ☒	**No** ☐

Comments: Datasheet used to document setting of final setpoints
Setpoints units changed to agree with TOD dtd 1/27/10
Editorial revision to procedure will be effective prior to next verification.
Revision 5 effective 3/17/10 with setpoints in both uCi/ml + Bq/m^3.
{3.7E-12 uCi/ml = 0.14 Bq/m^3}
{7.3E-12 uCi/ml = 0.27 Bq/m^3}

Performed by:	Holly Huber Printed Name	Holly Huber Signature	1-27-10 Date
Verified by:	William Havenkorn Printed Name	 Signature	1-27-10 Date
Reviewed by:	D Edwards Printed Name	D Edwards Signature	1-27-10 Date

CERTIFICATE OF CALIBRATION

EMERSON.
Process Management

San Francisco-Los Angeles-San Diego-Seattle-Denver-Portland-Albuquerque-Kansas City-Las Vegas-Reno-Phoenix-Salt Lake City-El Paso

NOMENCLATURE: Fluke 87 V Digital Multimeter

True RMS Multimeter

INSTRUMENT DATA	
INVENTORY NUMBER Ross Bender Div. 093	PROCEDURE eti/Mfr
MANUFACTURER Fluke	DATE OF LAST CALIBRATION OR TEST 2/2008
MODEL NUMBER 87 V	RESUBMISSION DATE 2/13/2010
SERIAL NUMBER 96260273	WERE ADJUSTMENTS OR PARTS REQUIRED? YES NO X

TEST DATA	
TEST ENGINEER Juan Escobar	JOB NUMBER 3094874
TEST DATE 02/13/2009	PURCHASE ORDER NA
AMBIENT TEMPERATURE 70 oF	TEST LOCATION Albuquerque, New Mexico
RELATIVE HUMIDITY 50%	

		TEST EQUIPMENT					
		ASSET NO.	DUE DATE	MFG.	MODEL NO.	ASSET NO.	DUE DATE
Fluke	5500A	20-01200	03/14/2009				

DETAILS

COPY

ETI certifies that this instrument was calibrated / tested in accordance with and traceable to the National Institute of Standards and Technology (N.I.S.T.) or acceptable natural physical standard as per MIL-STD-45662A.

2001 ETI

Procedure Title: **Receipt Inspection**	
QA-3-3000-18-F-1 **QC Receipt Inspection Plan Report**	QA-3-3000-18 Rev. 1 Level 3 - Information Use Page 1 of 3

PO No.	RIP No.	Date	Time	Quality Level
1853-10	2009-074	01-June-2009	11:50 am	Maintenance M&TE QL-1

Shipment General Description:
Calibration of Maintenance Instrument ID: FM-2; Model #:FMA1843; Serial #: 230235-3
Davis Certificate of Calibration #: 3232029
Davis Technician: Outside Vendor (Dick Munns Company)

Sampling Method (if applicable)	N/A

Shelf life expiration date (if applicable)	01-Apr-2010

Suspect/Counterfeit Check	☒ NA	☐ SAT ☐ UNSAT

Inspection Acceptable?	☒ Yes	☐ No

Inspector Comments:

M&TE Description	ID No.	Calibration Due Date
N/A	N/A	N/A
N/A	N/A	N/A

Performed By	Matthew Graves, Print/Sign	6/1/09 Date	11:50 am Time
Reviewed By	RL Whitford Print/Sign	6/1/09 Date	1235 Time

LES RIR: 2009-074

Davis Calibration

Certificate of Calibration

3232029

Instrument Identification

Company ID: 88636
LOUISIANA ENERGY SERVICES, L.P.
QUALITY ASSURANCE
LES
275 ANDREWS HWY 176
EUNICE, NM 88231

PO Number: 1853-10

Instrument ID: **FM-2**
Manufacturer: OMEGA
Description: MASS FLOW METER

Model Number: FMA1843
Serial Number: 230235-3

Certificate Information

Reason For Service: CALIBRATION
Type of Cal: NORMAL
As Found Condition: IN TOLERANCE
As Left Condition: LEFT AS FOUND
Procedure: VENDORS PROCEDURE REFER TO ATTACHED CERT.

Technician: OUTSIDE VENDOR
Cal Date 01Apr2009
Cal Due Date: 01Apr2010
Interval: 12 MONTHS
Temperature: 70.0 F
Humidity: 50.0 %

Remarks: *Unit calibrated by Dick Munns Co.*

The instrument(s) listed on this certificate has been calibrated by a vendor evaluated and approved in accordance with the Davis Calibration quality system.

All calibrations are traceable to the National Institute of Standards and Technology (NIST), derived from ratio type measurements, or compared to nationally or internationally recognized consensus standards.

A calibration uncertainty ratio of 4:1 [K=2, 95% Confidence Level, calculated using the expanded measurement uncertainty] was maintained unless otherwise stated.

Davis Calibration Laboratory is certified to ISO 9001:2000, and meets the requirements of ANSI/NCSL Z540-1-1994 and ISO 10012:2003.

When noted in Type of Cal an ISO/IEC 17025-2005 accredited calibration has been accomplished.

All results contained within this certification relate only to item(s) calibrated. Any number of factors may cause the calibration item to drift out of calibration before the instrument's calibration interval has expired.

This certificate shall not be reproduced except in full, without written consent of Davis Calibration Laboratory.

Approved By: MARK GOODMAN
Service Representative

DICK MUNNS COMPANY
Liquid and Gas - Flowmeter Calibration Service
10572 Calle Lee - 138 • Los Alamitos, California 90720
Telephone (714) 827-1215 • Telefax (714) 827-0823

CERTIFICATE OF CALIBRATION

Client Name:	DAVIS CALIBRATION	Calibration Date:	04-01-2009
Reference Number:	PO# 4040680	Calibration Due:	04-01-2010
Instrument Manufacturer:	OMEGA	Calibration Fluid:	GN2 @ 70F
Instrument Description:	MASS FLOWMETER	Standard(s) Used:	A4,A312 DUE 01-2011
Model Number:	FMA1843	NIST Traceability Per:	MS131414,MS13431
Serial Number:	230235-3	Ambient Conditions:	759 mmHGA 50% RH 70F
Rated Uncertainty:	+/- 1.5% F.S.	Procedure Number:	NAVAIR-17-20MG-02
Uncertainty Given:	AS RECEIVED WITHIN SPECS.	Certificate/File Number:	433347

REFERENCE CONDITIONS ARE: 760 mmHGA 70F. (A/N: FM-2)

INDICATED UUT SLPM	ACTUAL DM.STD. SLPM
0	0.000
5	5.031
15	15.064
50	50.120
100	100.241
150	150.361
200	200.482

All instruments used in the performance of the above calibration have direct traceability to the National Institute of Standards and Technology (NIST). The accuracy ratio between the calibration standards used and the unit under test is a minimum of 4:1, unless otherwise noted. Calibration has been performed per the above listed procedure number, in accordance with ISO 10012-1,17025, ANSI/NCSL-Z-540-1, and/or MIL-STD-45662A.

Calibration Performed By:

DICK MUNNS COMPANY

Approved By:

R.L.MUNNS

Procedure Title: Receipt Inspection	
QA-3-3000-18-F-1 QC Receipt Inspection Plan Report	QA-3-3000-18 Rev. 2 Level 3 Information Use Page 1 of 7

PO No.	RIPR No.	Date	Time	Quality Level
1853-10	2009-229	20-Aug-2009	1:44 pm	Maintenance M&TE QL-1

Shipment General Description:
Calibration of Maintenance Instrument ID: M87-2; Model #: 87 V; Serial #: 94910331
Davis Certificate of Calibration #: 3380524
Davis Calibration Technician: Steve Galla

Sampling Method (if applicable)	N/A
Shelf life expiration date (if applicable)	22-Jul-2010

Suspect/Counterfeit Check	☒ NA	☐ SAT ☐ UNSAT
Safe-By-Design Verification	☒ NA	☐ SAT ☐ UNSAT
Inspection Acceptable?	☒ Yes	☐ No

Quality Records Validation
Validated by: [signature]
Printed Name: R. Schumacher
Date of Validation: 8/26/09

Inspector Comments: Fluke, True RMS Multimeter; Model No. 87 V; Serial No. 94910331

M&TE Description	ID No.	Calibration Due Date
N/A	N/A	N/A
N/A	N/A	N/A

Performed By	Matthew Graves, [signature] Print/Sign	8/20/09 Date	1:46 pm Time
Reviewed By	R. Whitford [signature] Print/Sign	8/25/09 Date	1202 Time

Davis Calibration

ACLASS ACCREDITED CALIBRATION

Certificate of Calibration

3380524

Instrument Identification

Company ID: 88636
LOUISIANA ENERGY SERVICES, L.P.
QUALITY ASSURANCE
LES
275 ANDREWS HWY 176
EUNICE, NM 88231

PO Number: 1853

Instrument ID: **M87-2**
Manufacturer: FLUKE
Description: TRUE RMS MULTIMETER

Model Number: 87 V
Serial Number: 94910331

Accuracy: Mfr. Specifications

Certificate Information

Reason For Service: CALIBRATION
Type of Cal: ACCREDITED 17025 WITH UNCERTAINTIES
As Found Condition: IN TOLERANCE
As Left Condition: LEFT AS FOUND
Procedure: FLUKE , 80 SERIES V MANUFACTURERS MANUAL

Technician: STEVE GALLA
Cal Date 22Jul2009
Cal Due Date: 22Jul2010
Interval: 12 MONTHS
Temperature: 21.0 C
Humidity: 32.0 %

Remarks:

The instrument on this certification has been calibrated against standards traceable to the National Institute of Standards and Technology (NIST) or other recognized national metrology institutes, derived from ratio type measurements, or compared to nationally or internationally recognized consensus standards.

A test uncertainty ratio (T.U.R.) of 4:1 [K=2, approx. 95% Confidence Level] was maintained unless otherwise stated.

Davis Calibration Laboratory is certified to ISO 9001:2000 by Eagle Registrations (certificate # 3046). Lab Operations meet the requirements of ANSI/NCSL Z540-1-1994, ISO 10012:2003, 10CFR50 AppxB, and 10CFR21.

ISO/IEC 17025-2005 accredited calibrations are per ACLASS certificate # AC-1139 within the scope for which the lab is accredited.
All results contained within this certification relate only to item(s) calibrated. Any number of factors may cause the calibration item to drift out of calibration before the instrument's calibration interval has expired.

This certificate shall not be reproduced except in full, without written consent of Davis Calibration Laboratory.

Approved By: STEVE GALLA
Service Representative

Calibration Standards

NIST Traceable#	Inst. ID#	Description	Model	Cal Date	Date Due
2927994	04-0453	CALIBRATOR	5520A W/SC1100	14Jan2009	14Jan2010

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Calibration Data

✓ In Tolerance ✗ Out of Tolerance

Range	Nominal	As Found		As Left		Min	Max
AC VOLTS							
mV / 60 Hz	330.0	329.6	✓	329.6	✓	327.3	332.7
mV / 13 kHz	600.0	606.0	✓	606.0	✓	586.0	614.0
V / 60 Hz	3.300	3.297	✓	3.297	✓	3.275	3.325
V / 20 kHz	3.300	3.290	✓	3.290	✓	3.214	3.386
V / 60 Hz	33.00	32.97	✓	32.97	✓	32.75	33.25
V / 20 kHz	33.00	32.93	✓	32.93	✓	32.14	33.86
V / 60 Hz	330.0	329.8	✓	329.8	✓	327.5	332.5
V / 2.5 kHz	330.0	330.2	✓	330.2	✓	323.0	337.0
V / 60 Hz	500.0	499.8	✓	499.8	✓	494.0	506.0
V / 1 kHz	1000	1002	✓	1002	✓	986	1014
AC VOLTS FREQUENCY							
150 mV @ 99.95 kHz	99.95	99.95	✓	99.95	✓	99.93	99.97
150 mV @ 199.50 kHz	199.50	199.50	✓	199.50	✓	199.48	199.52
FREQUENCY SENSITIVITY							
V @ 99.95 kHz	99.95	99.96	✓	99.96	✓	99.93	99.97
V @ 99.95 kHz	99.95	99.95	✓	99.95	✓	99.93	99.97
DCV Hz TRIGGER LEVEL							
3.4 V,1 kHz SQ Wave	1000.0	1000.0	✓	1000.0	✓	999.8	1000.2
DCV Hz DUTY CYCLE							
5 V,1 kHz DC offset 2.5V SQ.W	50.0	49.9	✓	49.9	✓	49.7	50.3
DC VOLTS							
V	3.300	3.300	✓	3.300	✓	3.297	3.303
V	33.00	33.00	✓	33.00	✓	32.97	33.03
V	330.0	330.0	✓	330.0	✓	329.7	330.3
V	1000	1000	✓	1000	✓	998	1002
mV DC							
mV	33.0	33.0	✓	33.0	✓	32.9	33.1
mV	330.0	330.0	✓	330.0	✓	329.6	330.4
RESISTANCE TEST							
Ohms	330.0	330.1	✓	330.1	✓	329.1	330.9
kOhms	3.300	3.300	✓	3.300	✓	3.292	3.308
k	33.00	33.00	✓	33.00	✓	32.92	33.08
kOhms	330.0	330.1	✓	330.1	✓	327.9	332.1

Calibration Data

✓ In Tolerance ✗ Out of Tolerance

Range	Nominal	As Found		As Left		Min	Max
RESISTANCE TEST							
MOhms	3.300	3.301	✓	3.301	✓	3.279	3.321
MOhms	30.00	30.01	✓	30.01	✓	29.67	30.33
nS CONDUCTANCE							
Open Input	0.00	0.01	✓	0.01	✓	-0.30	0.30
100 MOhms	10.00	10.01	✓	10.01	✓	9.60	10.40
DIODE							
3 V DC	3.000	3.000	✓	3.000	✓	2.939	3.061
AC AMPS							
A / 60 Hz	3.000	3.000	✓	3.000	✓	2.968	3.032
DC AMPS							
A	3.000	3.001	✓	3.001	✓	2.990	3.010
AC MILLIAMPS							
/ 60 Hz	33.00	32.99	✓	32.99	✓	32.65	33.35
mA / 60 Hz	330.0	330.0	✓	330.0	✓	326.5	333.5
DC MILLIAMPS							
mA	33.00	33.00	✓	33.00	✓	32.89	33.11
mA	330.0	330.0	✓	330.0	✓	329.1	330.9
AC MICROAMPS							
µA / 60 Hz	330.0	329.9	✓	329.9	✓	326.5	333.5
µA / 60 Hz	3300	3300	✓	3300	✓	3265	3335
DC MICROAMPS							
µA	330.0	330.0	✓	330.0	✓	328.9	331.1
µA	3300	3300	✓	3300	✓	3291	3309
CAPACITANCE							
Open Input	0.26	0.26	✓	0.26	✓	0.21	0.31
5 nF	5.00	4.97	✓	4.97	✓	4.70	5.30
9.5 uF	9.50	9.52	✓	9.52	✓	9.20	9.80
ACV LOW PASS FILTER							
applied 400 V / 400 Hz	400.0	390.7	✓	390.7	✓	376.0	408.0
d 400 V / 800 Hz	283.0	282.1	✓	282.1	✓	226.0	340.0
TEMPERATURE in °C							

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Davis Calibration

ACCREDITED CALIBRATION

Certificate of Calibration

3380524

Calibration Data

✓ In Tolerance ✗ Out of Tolerance

Range	Nominal	As Found		As Left		Min	Max
TEMPERATURE in °C							
0 ° C	0.0	-0.7	✓	-0.7	✓	-1.0	1.0
100 ° C	100.0	98.8	✓	98.8	✓	98.0	102.0
BACKLIGHT TESTS							
Backlight on	Check	Pass	✓	Pass	✓	Pass/Fail	Pass/Fail
Intensifies	Check	Pass	✓	Pass	✓	Pass/Fail	Pass/Fail
Backlight off	Check	Pass	✓	Pass	✓	Pass/Fail	Pass/Fail

End of Datasheet

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LES ID#: 209-229

6 7

Davis Calibration Laboratory

Measurement Uncertainty Report

Certificate #	3380524
Date	7/22/2009
Description	**True RMS Multimeter**
Mfr.	**Fluke**
Model	**87V**
Standards	04-0453

[k=2, approx. 95% Confidence Level]

Function	Range	Nominal	Uncertainty
AC Volts	mV / 60 Hz	330.00	5.77E-02
AC Volts	mV / 13kHz	600.00	5.77E-02
AC Volts	V / 60 Hz	3.300	7.51E-05
AC Volts	V / 20 kHz	3.300	5.92E-04
AC Volts	V / 60 Hz	33.00	8.78E-03
AC Volts	V / 20 kHz	33.00	5.93E-03
AC Volts	V / 60 Hz	330.0	5.91E-02
AC Volts	V / 2.5 kHz	330.0	5.89E-03
AC Volts	V / 60 Hz	500.0	5.91E-02
AC Volts	V / 1k Hz	1000	1.20E-02
AC Volts Frequency	150 mV @ 99.95 kHz	99.95	8.23E-03
AC Volts Frequency	150 mV @ 199.95 kHz	199.50	8.23E-03
Frequency Sensitivity	0.7 v @ 99.95 kHz	99.95	8.23E-03
Frequency Sensitivity	7 v @ 99.95 kHz	99.95	8.23E-03
DCV Hz Trigger Leval	3.4V, 1kHz SQ Wave	1000.0	5.79E-02
DCV Hz Duty Cycle	5v, 1kHz DC Offset 2.5V SQ wave	50.0	5.79E-02
DC Volt	Volt	3.300	5.77E-04
DC Volt	Volt	33.00	1.20E-03
DC Volt	Volt	330.0	5.78E-02
DC Volt	Volt	1000	1.07E-03
mV Dc	mV	33.0	5.77E-02
mV Dc	mV	330.0	5.77E-02
Resistance	Ohms	330.0	5.78E-02
Resistance	kOhms	3.300	9.68E-02
Resistance	kOhms	33.00	2.30E-01
Resistance	kOhms	330.0	2.90E+00
Resistance	Mohms	3.300	8.88E-02
Resistance	Mohms	30.00	5.77E-02
nS Conductance	Open Input	0.00	N/A
nS Conductance	100 Mohms	10.00	5.82E-03
Diode	3VDc	3.000	5.77E-04
AC Amps	A / 60Hz	3.000	5.77E-02
DC Amps	A	3.000	5.77E-02
AC Milliamps	mA / 60Hz	33.00	5.77E-02
AC Milliamps	mA / 60Hz	330.0	5.77E-02
DC Milliamps	mA	33.00	5.77E-02
DC Milliamps	mA	330.0	5.77E-02
Microamps	µA / 60Hz	330.0	5.77E-02

AC Microamps	µA / 60Hz	3300	5.77E-02
DC Microamps	µA	330.0	5.77E-02
DC Microamps	µA	3300	5.77E-02
Capacitance	Open Input	0.00	N/A
Capacitance	5.00	5.00	2.70E-02
Capacitance	9.50	9.500	3.50E-01
ACV Low Pass Filter	Applied 400V / 400Hz	400	N/A
ACV Low Pass Filter	Applied 400V / 800Hz	283	N/A
Temperature in °C	0.0	0.0	2.99E-01
Temperature in °C	100.0	100.0	2.99E-01

Davis Calibration utilizes the Root Sum Squared method of estimating measurement uncertainty as described in Appendix A of NIST technical note 1297, 1994 edition, and ANSI/NCSL Z540-2-1997 "American National Standard for Expressing Uncertainty – U.S. Guide to the Expression of Uncertainty in Measurement".
A coverage factor (k) of 2 is applied to all calculations to insure a Confidence Level of approx. 95%.

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 325-235-5494
501 OAK STREET FAX NO. 325-235-467
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER LOUISIANA ENERGY SERVICES LP ORDER NO. 20140302/341995

Mfg. Ludlum Measurements, Inc. Model 2224 Serial No. 242506

Mfg. Ludlum Measurements, Inc. Model 43-93 Serial No. PR 268991

Cal. Date 8-Sep-09 Cal Due Date 8-Sep-10 Cal. Interval 1 Year Meterface 202-783

Check mark ☑ applies to applicable instr and/or detector IAW mfg. spec. T 73 °F RH 38 % Alt 699.8 mm Hg

☐ New Instrument Instrument Received ☑ Within Toler +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair ☐ Other-See comments

☑ Mechanical ck. ☑ Meter Zeroed ☐ Background Subtract ☐ Input Sens. Linearity
☐ F/S Resp. ck ☑ Reset ck. ☐ Window Operation ☐ Geotropism
☑ Audio ck. ☐ Alarm Setting ck. ☑ Batt. ck. (Min. Volt) 2.2 VDC
☑ Calibrated in accordance with LMI SOP 14.8 rev 12/05/89. ☐ Calibrated in accordance with LMI SOP 14.9 rev 02/07/97

Instrument Volt Set 725 V Input Sens. Comment mV Det. Oper. 725 V at Comment mV Threshold Dial Ratio ____ = ____ mr

☑ HV Readout (2 points) Ref./Inst. 500 / 494 V Ref./Inst. 1500 / 1501 V

COMMENTS:

Alpha threshold = 120mv
Beta threshold = 3.5mv
Beta window = 30mv
Overload set to simulated light leak.
High voltage set with detector not connected.
Firmware: 390063

Gamma Calibration: GM detectors positioned perpendicular to source except for M 44-9 in which the front of probe faces source.

RANGE/MULTIPLIER	REFERENCE CAL. POINT	INSTRUMENT REC'D "AS FOUND READING"	INSTRUMENT METER READING*
x1000	400kcpm	400	400
x1000	100kcpm	100	100
x100	40kcpm	400	400
x100	10kcpm	100	100
x10	4kcpm	400	400
x10	1kcpm	100	100
x1	400cpm	400	400
x1	100cpm	100	100

*Uncertainty within ± 10% C.F. within ± 20%

ALL Range(s) Calibrated Electronically

	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
Digital Readout	400kcpm	399613	399613
	40kcpm	39958	39958
	4kcpm	3996	3996
	400cpm	399	399
	40cpm	40	40
Log Scale			

Ludlum Measurements, Inc. certifies that the above instrument has been calibrated by standards traceable to the National Institute of Standards and Technology, or to the calibration facilities of other International Standards Organization members, or have been derived from accepted values of natural physical constants or have been derived by the ratio type of calibration techniques. The calibration system conforms to the requirements of ANSI/NCSL Z540-1-1994 and ANSI N323-1978 State of Texas Calibration License No. LO-1963

Reference Instruments and/or Sources: ☐ S-394/1122 ☐ 1131 ☐ 781 ☐ 059 ☐ 280 ☐ 60646
Cs-137 Gamma S/N ☐ 1162 ☐ G112 ☐ M565 ☐ 5105 ☐ T1008 ☐ T879 ☐ E552 ☐ E551 720 ☐ 734 ☐ 1616 ☐ Neutron Am-241 Be S/N T-304

☑ Alpha S/N Pu239 SN:2928 25081dpm ☑ Beta S/N Tc99 SN:5280 93200dpm ☑ Other SrY90 SN:4016 55367dpm

Ratemeter 500 S/N 190566 Oscilloscope S/N ☑ Multimeter S/N 86250390

Calibrated By: Jason Flores Date 8-SEPT-09

Reviewed By: Rhonda Haines Date 9 Sep 09

CAT-CH-ABPM-201S
Page 41 of 85

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FORM C22A 10/15/2008

AC Inst. Only ☐ Passed Dielectric (Hi-Pot) and Continuity Test ☐ Failed:

Designer and Manufacturer
of
Scientific and Industrial
Instruments

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 325-235-5494
501 OAK STREET FAX NO. 325-235-46
SWEETWATER, TEXAS 79556, U.S.A.

Bench Test Data For Detector

Detector 43-93 Serial No. PR265991 Order #. 20140302/341995

Customer LOUISIANA ENERGY SERVICES LP

Alpha Input Sensitivity 120 mV

Counter 2224 Serial No. 247506

Beta Input Sensitivity 3.5 mV

Count Time 1Minute

Beta Window 30 mV

Other

Distance Source to Detector Surface

High Voltage	Background Alpha	Background Beta	Isotope Pu239 Size 25081 dpm Alpha	Isotope Pu239 Size 25081 dpm Beta	Isotope Tc 99 Size 93200 dpm Alpha	Isotope Tc 99 Size 93200 dpm Beta	Isotope Sr/Y90 Size 55367 dpm Alpha	Isotope Sr/Y90 Size 55367 dpm Beta
700	0	97	4414	323	34	10192	1	8476
725	1	132	4998	371	21	14513	2	11518
750	0	230	5324	459	27	17823	4	13142
S.F. ~~800~~ 775	0	282	5559	525	36	21192	2	14970

☐ Gas Proportional detector count rate decreased ≤ 10% after 15 hour static test using 39" cable.

☐ Gas proportional detector count rate decreased ≤ 10% after 5 hour static test using 39" cable and alpha/beta counter

Signature Jason Flores

Date 8-Sept-09

Calibration Accuracy Check List

Serial Number	N36U_2
	1001-662-1MQ1
Model number	Dwyer 641-6
M&TE	Shortridge Instruments airdata
Model #	ADM-870C Serial # MO4395
Date	12/9/2009
Cal Due Date	4/8/2010

M&TE	Flow		4-20mA	Acceptable Range (Flow)	Acceptable Result
0	0	cfm	4	0	yes
135	133	cfm	7.6	116 - 150	yes
237	242	cfm	10.6	225 - 259	yes
363	370	cfm	14.1	353 - 387	yes
491	494	cfm	17.4	477 - 511	yes

Test Performed By: John Berstler LES Engineering and Rick Quinonez Kirk Air Co.

1001-662-1MQ1 12/9/09

SCFM	Current (mA)	% Input
0	4	0.00%
133	7.6	22.50%
242	10.6	41.25%
370	14.1	63.13%
494	17.4	83.75%

"StkFlow" algorithm parameters:

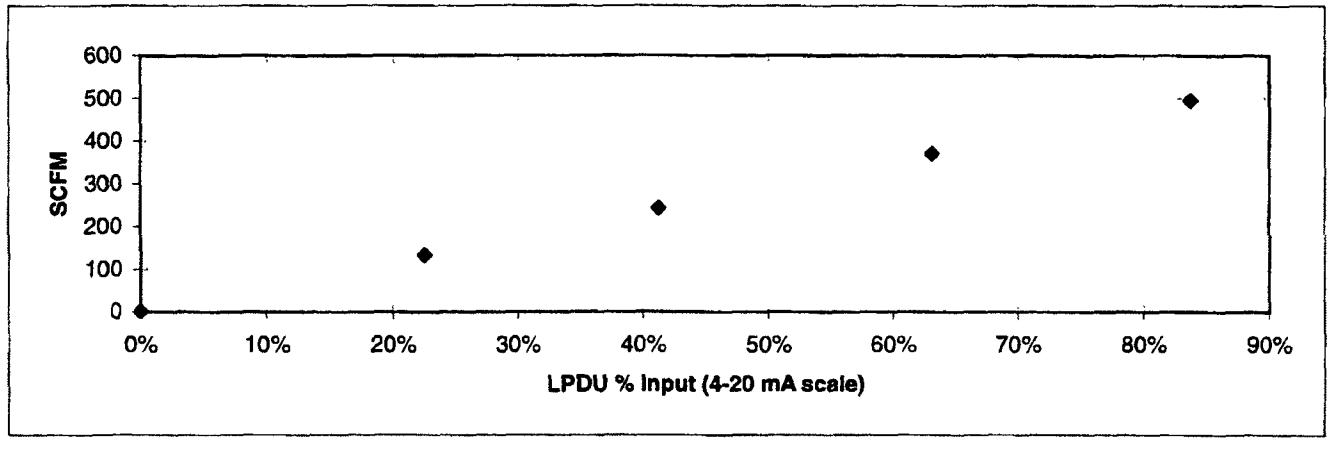
	%		SCFM
X1	0	Y1	0
X2	23	Y2	133
X3	41	Y3	242
X4	63	Y4	370
X5	75	Y5	440
X6	84	Y6	494
X7	100	Y7	586

Flow rate	Est. % input
200	34%
300	51%
400	68%

Suggested "Target" algorithm parameters:

	%		l/min
X1	0	Y1	40
X2	22	Y2	40
X3	34	Y3	40
X4	51	Y4	50
X5	68	Y5	60
X6	75	Y6	60
X7	100	Y7	60

The "Target" configuration assumes the maximum flow rate is 400 SCFM, even though the meter can go to 600 SCFM



Appendix D: Test Logs for ABPM201S S/N 090501-04

This appendix contains the completed test logs from the post production and factory acceptance tests. The following is included:

1. Completed FAT log, from test procedure 12-00124.
2. Completed post production test log, from procedure 12-00098.
3. Manufacturer data sheets for the electronics package and detector
4. Spectra collected during monitor testing

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LES ABPM201S

Factory Acceptance Test Log

Test Procedure:	12-00124	**Revision:**	1
Post-Production Test Procedure:	12-00098	**Revision:**	2
Date Test Started:	5/27/2009 9:00		
Date Test Ended:	5/28/09 1200		
Performed By:	Silas Shook (Print Name)	(Signature)	5/28/09 (Date)
Witnessed By:	Holly Hulver (Print Name)	(Signature)	5-28-09 (Date)
Reviewed By:	David Jarrow (Print Name)	(Signature)	5-29-09 (Date)
Approved By:	Mike Edelman (Print Name)	Dr. Zeev Feldman (Signature)	6-1-2009 (Date)

S/N 090501-04

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1. Introduction

Not applicable

2. Related Documentation

Not applicable

3. Glossary of terms

Not applicable

4. Notes

Not applicable

5. Devices to be Tested

Not applicable

6. Test Tools & Conditions

6.1 Prerequisites

Test Results: ☑ Satisfactory ☐ Unsatisfactory (describe) ☐ Conditionally satisfactory (describe)

Performed by: S. Stark Date: 5/27/2009

Notes/Comments:

ABPM201S Test Data Sheet reference number:	14-00098-090501-04

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6.2 Required Tools

Test Results: ☑ Satisfactory ☐ Unsatisfactory (describe) ☐ Conditionally satisfactory (describe)

Performed by: S. Stark Date: 5/27/09

Notes/Comments:

MASS Version:	1.7.0
SAMS Version:	H

Tool	Model No.	Serial No.	Calibration Due Date
Digital thermometer (0.1 °C resolution)	Omega HH 314	070800353	4/22/10
Hygrometer (1% RH resolution)	Omega HH 314	070800353	4/22/09
Digital multimeter (0.1 mA resolution)	Fluke 87	91580342	11/17/09
Dose rate meter (0.1mR/hr resolution)	Ram Ion	20292-10	11/24/10
Mass flow meter (0.5 l/min resolution)	Omega FMA 1843	205587-2	5/12/10
Pressure gauge (0.2psi resolution)	N/A	N/A	N/A

6.3 Test Conditions

Test Results: ☑ Satisfactory ☐ Unsatisfactory (describe) ☐ Conditionally satisfactory (describe)

Performed by: S. Stark Date: 5/27/09 - 5/28/09

Notes/Comments:

	5/27/09	5/28/09
Temperature	74°F	74°F
Humidity	58%	55%
Gamma Background	<0.1 mR/hr	<0.1 mR/hr
Line voltage	118.3 V	118.7 V
Line Frequency	55.58 Hz	60.02 Hz

MGP QC

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7. Inspection & Test Setup

7.1 Visual Inspection

Test Results: ☑ Satisfactory ☐ Unsatisfactory (describe) ☐ Conditionally satisfactory (describe)

Performed by: S. Stark Date: 5/27/09

Notes/Comments:

Serialized electronics:

Monitor	Device	Part Number	Serial Number
ABPM201S	Assembly (skid)	02-00384	090501-04
	LPDU/PIPS	131839	090503
	PIPS Detector	45445	081997
	Particulate flow meter	12014	091774
	PIS flow meter	12012	080693
	Filter cassette	43775	081190
	Flow control valve	700055	29225
System	RDU	134142	080654

7.2 Test Setup

Test Results: ☑ Satisfactory ☐ Unsatisfactory (describe) ☐ Conditionally satisfactory (describe)

Performed by: S. Stark Date: 5/27/09

Notes/Comments:

Step 7.2.4: all switches down (typo on procedure)
(ECN 681 opened)

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8. Software Configuration

8.1 Objective

Not applicable

8.2 LPDU/SAS/PIPS (ABPM201S)

Test Results: ☑ Satisfactory ☐ Unsatisfactory (describe) ☐ Conditionally satisfactory (describe)

Performed by: S. Stark Date: 5/27/09

Notes/Comments:

Configuration changes:

	Number	Expected		As Found	
		Index	Version	Index	Version
Base software	735	E or later	1	E	1
Application software	774	R or later	2	R	2
Parameters set	827			C	103

8.3 RDU

Test Results: ☑ Satisfactory ☐ Unsatisfactory (describe) ☐ Conditionally satisfactory (describe)

Performed by: S. Stark Date: 5/27/09

Notes/Comments:

MGP QC 0

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Configuration changes:

	Number	Expected		As Found	
		Index	Version	Index	Version
Base software	1030	B or later	1	B	1
Application software	1079	A or later	1	A	1
Parameters set	603			D	1

9. Isokinetic Flow Control Test

Test Results: ☑ Satisfactory ☐ Unsatisfactory (describe) ☐ Conditionally satisfactory (describe)

Performed by: S. Stark Date: 5/27/09

Notes/Comments:

Change monomer and initial correction to 25%
Acceptance criteria is ± 25% of expected flow rate.

Test	Stack flow rate (m3/hr)	Expected sample flow rate (l/min)	Measured sample flow rate (l/min)
1	0 (current generator off)	40	40.9
2	2500	40	41.2
3	5000	40	41.2
4	7500	50	48.9
5	10000	60	58.1

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04

10. RDU Test

10.1. Initial Conditions

Test Results: ☑ Satisfactory ☐ Unsatisfactory (describe) ☐ Conditionally satisfactory (describe)

Performed by: S. Stark Date: 5/27/2009

Notes/Comments:

10.2. Relay & Alarm Test

Test Results: ☑ Satisfactory ☐ Unsatisfactory (describe) ☐ Conditionally satisfactory (describe)

Performed by: S. Stark Date: 5/27/2009

Notes/Comments:

*Error on procedure: in Bypass, H/H does not remain latched (ECN 681)

Status w/ no alarms:

Relay	Expected Status	Observed Status
Operate	On	on
Test	Off	off
Alert	Off	off
High	Off	off
High/High	Off	off

Relay test results:

Scenario	Monitor Status (display or MASS2)	Relay Status (read from MASS2)					Buzzer Status
		OP	TST	AL	H	H/H	
Alert alarm	Alert	on	off	on	off	off	slow
High alarm	High	on	off	on	on	off	medium
H/H alarm	H/H	on	off	on	on	on	fast
Fault	Fault (internal)	off	off	off	off	on	continuous
RDU in bypass	Bypass	on	on	off	off	off*	N/A

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11. Creation of Parameter Sets

Test Results: ☑ Satisfactory ☐ Unsatisfactory (describe) ☐ Conditionally satisfactory (describe)

Performed by: S. Stark Date: 5/28/09

Notes/Comments:

Parameter file information:

		Parameter Set			
Device	**Name**	**Number**	**Index**	**Version**	**Filename**
LPDU/SAS	ABPM201S	827	A	104	Rms Sas Pips_104A
~~LDU (RI-1) RDU~~	~~LDU RDU~~	603	A	4	Rms Du_4A

12. Review and Restoration

Test Results: ☑ Satisfactory ☐ Unsatisfactory (describe) ☐ Conditionally satisfactory (describe)

Performed by: S. Stark Date: 5/28/09

Notes/Comments:

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Additional/supplemental test results

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Note: for electronic archival, save the completed datasheet with the filename "14-00098-######" where ###### is the serial number of the monitor

Post Production Test Data Sheet

System: ***ABPM201S Alpha Beta Particulate Monitor***
Part Number including option codes: 02-00384
Serial Number: 090501-04
(Note: append serial number to the document number of the data sheet)
Test Date(s): 5/15/09, 5/18/09, 5/19/09
Tested By: S. Stark Yonatan Tadesse
Witnessed by:
MGP References: SO# 89860
Client References: PO# 302151

Suite 150
5000 Highlands Parkway
Smyrna, GA 30082

Rev.	Date	Prepared By	Reviewed By	Origin and Description of the Changes
0	02/21/2008	Silas Stark		Original issue based on MGP SA document 123210
1	07/15/2008	Silas Stark		Refer to ECN 641

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MGPI QC 0

Tested by:	S. Stark / Y. Tadesse	Date:	5/15/2009
Notes/Comments:	S/N 090501 - 04		

§3.2 Calibrated Instruments

Item	Model No.	Serial No.	Cal. Due	Comments
Digital Multimeter	Fluke 87	91580342	4/17/2009	
Temperature Sensor	Omega HH 314	070 [illegible] 353	4/22/10	
Pressure/vacuum gauge	Ashcroft	Q-4832	4/20/10	
Mass flow meter	Omega FMA-1843	205587-2	5/12/10	
Hi-Pot tester	Biddle	18791	4/17/10	
Mega-ohmmeter	Megger 210200	950400-1471-0485	4/17/10	

§3.3. Radioactive Sources

Source	Serial No.	Activity (A_0)	Date	Comments
Beta Isotope: N/A				
Alpha Isotope: Am-241	FS-246	2311 Bq	11/1/2008	MGP Source
Other: Am-241	F8-940	3295 Bq	4/1/2009	LES Source
Other: N/A	N/A	N/A	N/A	N/A

§4 Test Conditions

Description	Unit	Req. Value	Measured Value		Comments
			MGP	Other	
Temperature	°F	60 - 90	70°F		
Humidity	%	<99	56%		
Pressure	-	Ambient	Ambient		
Line power	VAC	108 - 132	118 VAC		
Frequency	Hz	57 - 63	60.00		

§5 Visual Inspection

Description	Req. Value	Measured Value		Reference (Document & Revision)
		MGP	Other	
Component layout, routing, overall condition	Correct	Correct		10-0297 Rev. 0
Frame mounting hole dimensions	Describe: F/B 19.75 Sides 18.75	F/B 19.75 Sides 18.75		10-0297 Rev 0
Other interface dimensions (describe):	Describe: Height 51.5"	251.6"		10-0297 Rev 0
Labels, nameplates, placards, etc.	Correct	Correct		6-00386 Rev 2
Point-to-point wiring	Correct	Correct		6-00385 Rev 3
Wire sizing, markers, fuses, etc.	Correct	Correct		6-00385 Rev 3
Other (describe): N/A	Describe:			

Serialized equipment

Description	Part No.	Serial No.	Condition	Comments
LP(D)U/SAS/PIPS	131839A	090503	☑ Sat. ☐ Unsat.	Kit S/N 090503
PIPS Detector	45446A	081997	☑ Sat. ☐ Unsat.	
Particulate flow meter	120114K	091774	☑ Sat. ☐ Unsat.	
PIS flow meter	120112F	080693	☑ Sat. ☐ Unsat.	
Check source			☐ Sat. ☐ Unsat.	

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Tested by:	S. Shark / Y. Tadesse	Date: 5/15/2009
Notes/Comments:	S/N 090501-04	

Description	Unit	Req. Value	Measured Value		Comments
			MGP	Other	
§6: Dielectric & Continuity					
6.1 Dielectric test	mA	<10	<10		
6.2 Isolation test	MΩ	>100	>999		
6.3 Continuity test	Ω	<0.1	<0.1		
§7: Relief valve test	"Hg	20.5 - 24.5	21" Hg		
§8: Option verification					
8.1 Grab sampler	-	Correct / N/A	Correct		
8.2 PIS	-	Correct / N/A	Correct		
8.3 Check source	-	Correct / N/A	N/A		
8.4 Sample pump	-	Correct / N/A	Correct		
Other	-		N/A		
§9: Leak Test	"Hg	<0.6	<0.5		
§10: Test configuration	-	Correct	Correct		
Relay adjustment	A	(from motor)	6.6A		
§11: Flow meter test*					
11.1 Particulate flow:					
Measure 1	l/min	0 to 2	0		
Measure 2	l/min	17 to 23	20.1		
Measure 3	l/min	27 to 33	29.8		
Measure 4	l/min	42 to 48	43		
11.2 PIS Flow:					
Measure 1	l/min	0 to 2	0		
Measure 2	l/min	17 to 23	20.5		
Measure 3	l/min	27 to 33	29.3		
Measure 4	l/min	42 to 48	44.9		
§12: Detector fault test	-	Correct	Correct		
§13: Monitor test					
13.1 Automation test	-				
13.1.1 Normal Operation	-	Correct	Correct		
13.1.2 Electrical Test	-	Correct	Correct		
13.1.3 ΔPmin Test	-	Correct	Correct		d = 2 3/16
13.1.4 ΔPmax Test	-	Correct	Correct		
13.1.5 Minimum flow test	-	Correct	Correct		
13.1.6 Flow fault test	-	Correct	Correct		
13.2 Analog output test	-	Correct	Correct		
13.3 Relay & light test	-	Correct	Correct		
13.4 Serial link test	-	Correct	Correct		

*Note: fill in this section after the flowmeter has been calibrated, if necessary

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Tested by:	S. Stark	Date: 5/18/09 - 5/19/09
Notes/Comments:	S/N 090501-04; * values in "other" column are from LES source	

Description	Unit	Req. Value	Measured Value		Comments
			MGP	Other*	
§14: Calibration					
14.1 Nuclear check					
Measured temperature	°C	-	21.1		
Indicated temperature	°C	$T_{meas} \pm 2$	19.8		
Temperature offset	°C	-	N/A		As found: 3.7°C
Alpha-beta-gamma gain	-	0.7 - 1.3	0.96		Am-241: ch. 421
Gamma gain	-	0.7 - 1.3	0.91		
Channel/keV slope	-	-	9.5699		
Channel/keV offset	-	-	0.429363		
Channel/keV quadratic	-	-	0.002359		
Background:					
AlphaCPS	cps	< 0.005	0.003		
Po218CPS	cps	-	0.004		
Po214CPS	cps	-	0.013		
Po212CPS	cps	-	0.005		
BetaCPS	cps	<0.5 <0.2	— 0.1490		With check source Without check source
GammaCPS	cps	<0.5 <0.2	— 0.1333		With check source Without check source
Alpha source counting					
AlphaCPS	cps	-	83.6	118.7	
Po218CPS	cps	-	0.037	0.063	
Po214CPS	cps	-	0.010	0.017	
Po212CPS	cps	-	0.007	0.017	
BetaCPS	cps	-	0.460	0.548	
GammaCPS	cps	-	0.1	0.1	
Beta source counting					
AlphaCPS	cps	-			
Po218CPS	cps	-			
Po214CPS	cps	-	N/A		
Po212CPS	cps	-			
BetaCPS	cps	-			
GammaCPS	cps	-			
Alpha efficiency	cps / α/s	0.0333 - 0.0407	0.0362	0.0360	
Beta Efficiency	cps / β/s	0.05 - 0.08			
14.2 Check source test					
AlphaCPS	cps	-			
Po218CPS	cps	-			
Po214CPS	cps	-	N/A		
Po212CPS	cps	-			
BetaCPS	cps	>3			
GammaCPS	cps	>0.5			
§15: Final check	-	Correct	Correct		

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Tested by:	S. Stark	Date: 5/15/09
Notes/Comments:	S/N 050501-04	

Flow meter calibration data (if applicable)

Flow Meter	Measurement	Indicated Flow (before correction)	Measured Flow (calibrated meter)	Relative analog input (%)
Particulate (Flowmeter + DP switches)	1		Y1 = 0	X1 = 20
	2		Y2 = 15 (18.5)	X2 = 45
	3		Y3 = 20 (24.7)	X3 = 52
	4	N/A	Y4 = 30 (37)	X4 = 63
	5	(Not previously	Y5 = 40 (49.4)	X5 = 71
	6	calibrated)	Y6 = 45 (54.3)	X6 = 74
	7		Y7* = 80 (100)	X7 = 100%
PIS (if applicable)	1		Y1 = 0	X1 = 0
	2		Y2 = 15 (18.5)	X2 = 41
	3	N/A	Y3 = 25 (30.9)	X3 = 69
	4	(Not previously	Y4 = 30 (37)	X4 = 79
	5	calibrated)	Y5 = 35 (43.2)	X5 = 86
	6		Y6 = 40 (49.4)	X6 = 89
	7		Y7* = 50 (60.5)	X7 = 100%

*Note: the final measurement is the extrapolated flow rate at 100% relative analog input

Correction Factor

Actual Flow	Indicated Flow	Ratio	
25	21.7	1.16	Avg. = 1.23
35	28.2	1.24	
45	34.7	1.30	

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MGP INSTRUMENTS
SynOdys Group

FICHE DE MESURES / DATA SHEET

MATERIEL / Apparatus : **ABPM 201 KIT**

(1) N° IDENTIFICATION
(1) Identification n°

Nomenclature	Indice	Ordre	Invariant	Option
143867	A	090503		

REFERENCES CLIENT / Customer's reference :

NOS REFERENCES / MGP Instruments Reference : 27136

DATE DES MESURES / Date of records : 20/03/09

OBSERVATIONS / Comments :

NOM : RADOUANI / HICHRI

(1) à mentionner dans toute correspondance / Refer to in all correspondance

Visa et/ou tampon

MESURES A EFFECTUER SUIVANT PROGRAMME N° : Measurement to be made according to procedure n° 137716 /C	UNITES Units	VALEUR A OBTENIR Value to be obtained	VALEUR MESUREE Recorded value	OBSERVATION Comments
			MGP / RECETTE	
TEST EQUIPMENT IDENTIFICATION				
- Reference mass flow meter (Ref and N°)	1078-3			
- Thermometer (Ref and N°)	1127-1			
- Beta source of Tl-204 (N°)	10356-A			
- Alpha source of Pu-238 (N°)	50328			
MASS 2 software ref. 995 (version)	1.7.0			
SAMS software ref. 709 (version)	H			
Application software LPDU/SAS/PIPS ref. 774V2 (index)	R			
Set of parameters ref. 827 (N° and index)	102-B			
4. TEST CONDITIONS	-	Correct	Correct	
5. VISUAL CHECK	-	Correct	Correct	
LP(D)U (Ref and N°) 131839/A	090503			
ABPM 201 detection sub-assembly (Ref and N°) 121386/E		080963		
Detector PIPS (Ref and N°) 45445/D	08.1997			
Flow meter unit (Ref and N°) 120.114/K	091776			

This document includes 4 pages. Project n° 301841

Ind. Rev.	DATE Date	NOM - N° ET DESIGNATION DE LA MODIFICATION Name – N° and designation of modification	MF	REDACT. Prepared	VERIFIE ET APPROUVE Checked and approved
B	02/2009	DEVN 16810		P. TIROCCO	F. PERANI
A	09/2007	Originale edition		D. MARCHAL	F. PERANI

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FICHE DE MESURES / DATA SHEET

MATERIEL / Apparatus : **ABPM 201 KIT**

(1) N° IDENTIFICATION
(1) Identification n°

143867	A	09	05	03							

Nomenclature | Indice | Ordre | Invariant | Option

REFERENCES CLIENT / Customer's reference :
NOS REFERENCES / MG Reference : 27136
page : 2
DATE DES MESURES / Date of records : 20/03/09

OBSERVATIONS / Comments :

NOM : PADOVANI / HICHRI

(1) à mentionner dans toute correspondance / To indicate in any correspondance

Visa et/ou tampon : Padovani

MESURES A EFFECTUER SUIVANT PROGRAMME N° : Measurement to be made to procedure n° 137716 Ic	UNITES Units	VALEUR A OBTENIR Value to be obtained	VALEUR MESUREE Recorded value		OBSERVATION Comments
			MGP	RECETTE	
6. SEQUENTIAL FILTER CHECK	-	Correct	Correct		
7. TIGHTNESS CHECK	mbar	< 20	11		Kit S
	%	< 5	N. A		Kit L / M
8. SETTING UP THE TEST CONFIGURATION	-	Performed	Performed		
9. FLOW RATE CHECK					
Measure 1	l/min	0 < < 2	0		
Measure 2	l/min	27 < < 33	30,2		
Measure 3	l/min	37 < < 43	39,9		
10. PUMP MANAGEMENT CHECK	-	Correct	Correct		
11. DETECTOR FAULT MANAGEMENT CHECK	-	Correct	correct		
12. CHANNEL CHECK					
12.1. Automatisms test					
12.1.1. Normal operation test	-	Correct	Correct		
12.1.2. Electrical test	-	Correct	Correct		
12.1.3. ΔP min and AVF mechanism test					
ΔP min	-	Correct	correct		
AVF mechanisme	mm	48 < < 56	53		
12.1.4. ΔP max test	-	Correct	Correct		
12.1.5. Minimum flow rate test	-	Correct	correct		
12.2. Test of analog outputs	-	Correct	Correct		
12.3. Test of indicator lamp and relay status	-	Correct	correct		
12.4. Test of serial links	-	Correct	correct		

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MATERIEL / Apparatus : **ABPM 201 KIT**

(1) N° IDENTIFICATION
(1) Identification n°

143876	A	090503		
Nomenclature	Indice	Ordre	Invariant	Option

REFERENCES CLIENT / Customer's reference :
NOS REFERENCES / MG Reference : 27136
page : 3
DATE DES MESURES / Date of records : 20/03/09

OBSERVATIONS / Comments :

NOM : PADOVANI / HICHRI

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Visa et/ou tampon

MESURES A EFFECTUER SUIVANT PROGRAMME N° : Measurement to be made to procedure n° 137716 1C	UNITES Units	VALEUR A OBTENIR Value to be obtained	VALEUR MESUREE Recorded value		OBSERVATION Comments
			MGP	RECETTE	
13. NUCLEAR CHECK					
NUCLEAR CALIBRATION					
Alpha-beta Gain	-	0,7 < G1 < 1.3	0,96		
Calibration : Offset	-		0,42		
Slope	-		9,57		
Quadratic	-		$0,7e^{-3}$		
Gamma Gain	-	0,7 < G1 < 1.3	0,91		
Electrical test	-	Correct	correct		
Temperature offset	°C		3,7		
Background **AlphaCps**	cps	< 0,005	0		
Background **Po218Cps**	cps		0		
Background **Po214Cps**	cps		0		
Background **Po212Cps**	cps		0		
Background **Beta_Cps**	cps	< 0,2	0,135		
Background **GammaCps**	cps	< 0,2	0,1		
Counting of the *Alpha* source **AlphaCps**	cps		100,1		
Counting of the *Alpha* source **Po218Cps**	cps		0		
Counting of the *Alpha* source **Po214Cps**	cps		0,016		
Counting of the *Alpha* source **Po212Cps**	cps		0		
Counting of the *Alpha* source **Beta_Cps**	cps		0,202		
Counting of the *Alpha* source **GammaCps**	cps		0,106		

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FICHE DE MESURES / DATA SHEET

MATERIEL / Apparatus : **ABPM 201 KIT**

(1) N° IDENTIFICATION
(1) Identification n°

143 867	A	0	9	0	5	0	3							
Nomenclature		Indice		Ordre				Invariant						Option

REFERENCES CLIENT / Customer's reference :	page : 4
NOS REFERENCES / MG Reference : 27136	**DATE DES MESURES** / Date of records : 20/03/09
OBSERVATIONS / Comments :	NOM : PADOVANI / HICHRI
(1) à mentionner dans toute correspondance / To indicate in any correspondance	Visa et/ou tampon

MESURES A EFFECTUER SUIVANT PROGRAMME N° : Measurement to be made to procedure n° 137716 IC	UNITES Units	VALEUR A OBTENIR Value to be obtained	VALEUR MESUREE Recorded value		OBSERVATION Comments
			MGP	RECETTE	
Counting of the *Beta* source **AlphaCps**	cps		0		
Counting of the *Beta* source **Po218Cps**	cps		0		
Counting of the *Beta* source **Po214Cps**	cps		0		
Counting of the *Beta* source **Po212Cps**	cps		0		
Counting of the *Beta* source **Beta_Cps**	cps		77,25		
Counting of the *Beta* source **GammaCps**	cps		0,116		
Current activity of the *Alpha* source on 4 π	α/s		2795,2		Isotope Pu-238
Current activity of the *Beta* source on 4 π	β/s		1398,5		Isotope Tl-204
Detection efficiency for the *Alpha* source	cps per α/s	33,3 e^{-3} < < 40,7 e^{-3}	35,8 e^{-3}		Isotope Pu-238
Detection efficiency for the *Beta* source	cps per β/s	50 e^{-3} < < 80 e^{-3}	55,1 e^{-3}		Isotope Tl-204
14. FINAL CHECK	-	Performed	Performed		

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FICHE DE MESURES / DATA SHEET

MATERIEL / Apparatus : **Détecteur PIPS**

(1) N° IDENTIFICATION
(1) Identification n°

Nomenclature	Indice	Ordre	Invariant	Option
45445	08	1		000000

REFERENCES CLIENT / Customer's reference :

NOS REFERENCES / MG Reference : 26704

DATE DES MESURES / Date of records : 01/10/08

OBSERVATIONS / Comments : Diode N°: 0525B
: Diode N°: 0526B

NOM : DASILVA

(1) à mentionner dans toute correspondance / To indicate in any correspondance

Visa et/ou tampon

MESURES A EFFECTUER SUIVANT PROGRAMME N° : Measurement to be made to procedure n° 48853/J	UNITES Units	VALEUR A OBTENIR Value to be obtained	VALEUR MESUREE Recorded value	OBSERVATION Comments
			MGP / RECETTE	
IDENTIFICATION DES MOYENS DE CONTROLE				
- Multimètre	77809			
- Oscilloscope	910.168			
- Thermomètre				
- Source Pu 238	50328			
- Source SC31	358/480			
- Source Tl204 } pour détecteur 45445 option G00 000	Sans objet			pour matériel SR et pièces de rechange
- Source Co60 } pour détecteur 45445 option 800 000	"			
7. CONSOMMATIONS				
+12 Volts	mA	20 < I < 30	24,6	
-12 Volts	mA	12 < I < 22	17,4	
9. GAINS				
Détecteur "Alpha-béta"		0,7 < G1 < 1,3	1,007	
Tête « 7mm » : G1x1.12				
Détecteur « gamma »		0,7 < G2 < 1,3	0,96	
Tête « 7mm » : G2x1.12				
Rapport G2/G1			0,953	
10. Bruit de fond				
Détecteur « Alpha-béta »	mV	< 50	20	
Détecteur « gamma »	mV	< 50	15	
12. Signal test électrique				
Gain test « Alpha-béta »		0,5 < G < 1,5	1,12	
Gain test « gamma »		0,5 < G < 1,5	1.1	

Ce document comporte 2 folios

Commission n° 622809

Ind. Rev.	DATE Date	NOM - N° ET DESIGNATION DE LA MODIFICATION Name - N° and designation of modification	MF	REDACT. Prepared	VERIFIE ET APPROUVE Checked and approved
G	04/03/05	REV N°6883		E.Mas	N.Jeanjacquot
F	10/10/03	REV n°6752		Fab. Brault	A. Pommier
E	10/10/03	DEVS n° 13514		N.Jeanjacquot	Fab. Brault
D	21/5/96	DEVS n°8790	MF	B. Clavel	A. Pommier
C	29/11/95	DEV n°4639	MF	L. Graville	B. Clavel
B	02/12/94	DEVS N°4435	MF	V. Fabre	B. Clavel
A	17/5/94	Edition originale	MF	V. Fabre	B. Clavel

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MGP INSTRUMENTS

FICHE DE MESURES / DATA SHEET

MATERIEL / Apparatus : **Détecteur PIPS**

(1) N° IDENTIFICATION
(1) Identification n°

Nomenclature	Indice	Ordre	Invariant	Option
45445	09/1997		600000	

REFERENCES CLIENT / Customer's reference :

NOS REFERENCES / MG Reference : 26704

DATE DES MESURES / Date of records : 01/10/08

OBSERVATIONS / Comments : Diode α N°0525B
Diode δ N°0526B

NOM : DA SILVA

(1) à mentionner dans toute correspondance / To indicate in any correspondance

Visa et/ou tampon

	MESURES A EFFECTUER SUIVANT PROGRAMME N° : Measurement to be made to procedure n° 46853 1J	UNITES Units	VALEUR A OBTENIR Value to be obtained	VALEUR MESUREE Recorded value MGP	RECETTE	OBSERVATION Comments
	13. Test nucléaire supplémentaire					pour matériel SR et pièces de rechange
	45445 Option G00 000 :					
	Bruit béta	c/s	< 0,4			
	Bruit gamma	c/s	< 0,4			
	Taux de comptage avec source	c/s				
G	Rendement	%	5 < R < 8			
	45445 Option 800 000 :			Sans objet		
	Bruit béta	c/s	< 0,4			
G	Bruit gamma	c/s	< 0,4			
	Taux de comptage avec source	c/s				
	Rendement	%	0,9 < R < 1,1			

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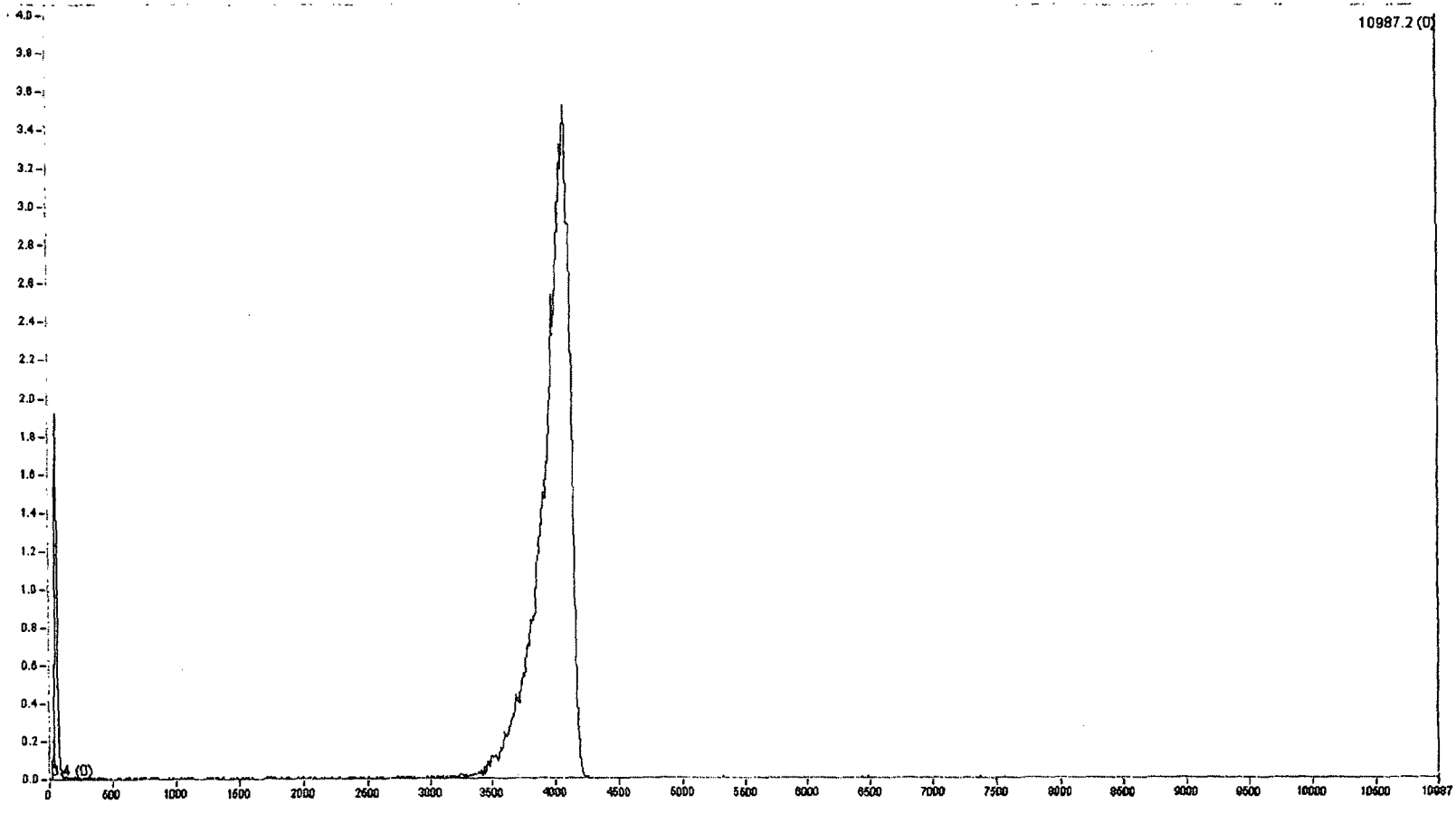
N° 27985 F

4 6 6 5 4



Spectrum from Am-241 source S/N F5-246; *x-axis is energy in keV, y-axis is count rate in cps (linear scaling)*

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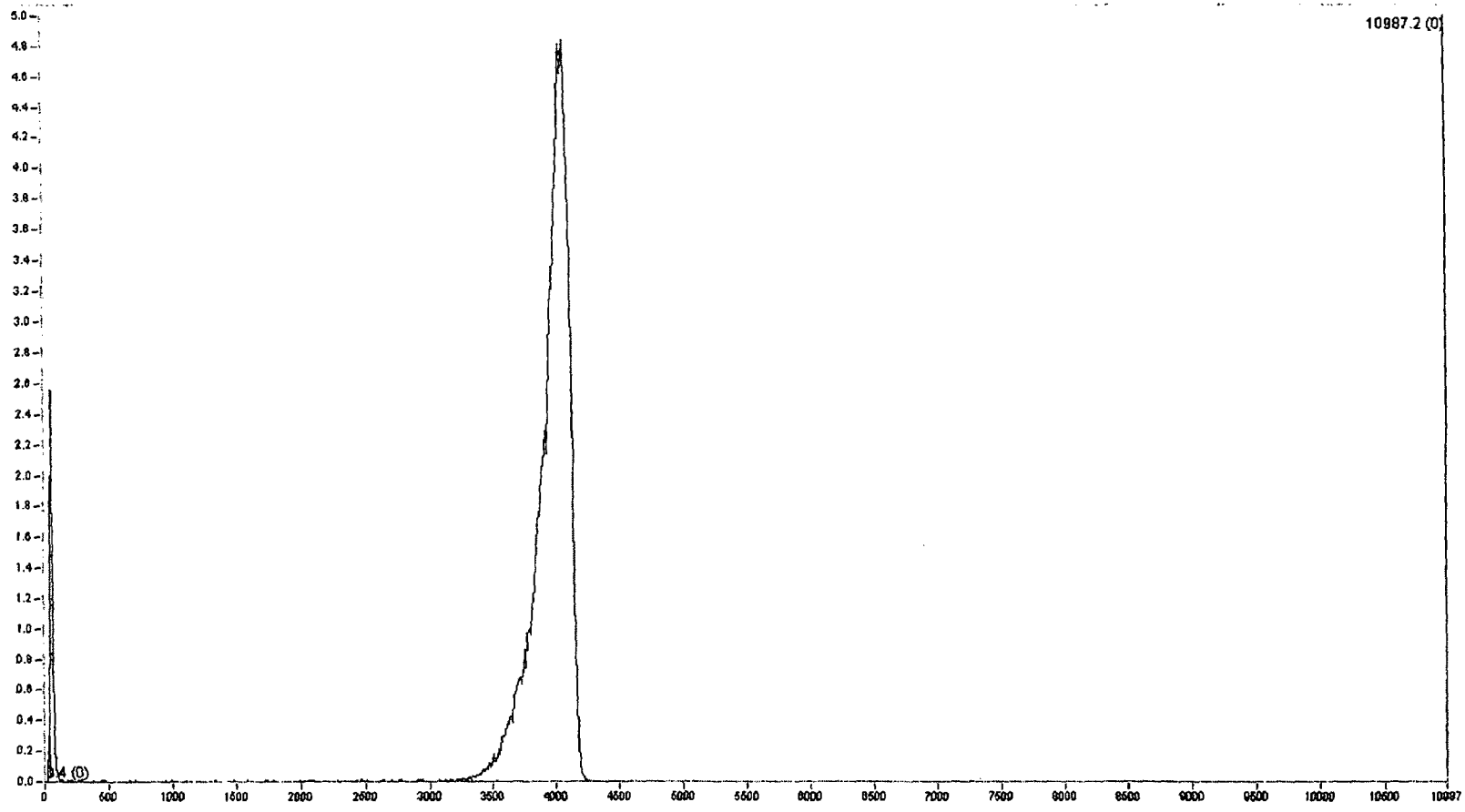

Spectrum from Am-241 source S/N F8-940; *x-axis is energy in keV, y-axis is count rate in cps (linear scaling)*

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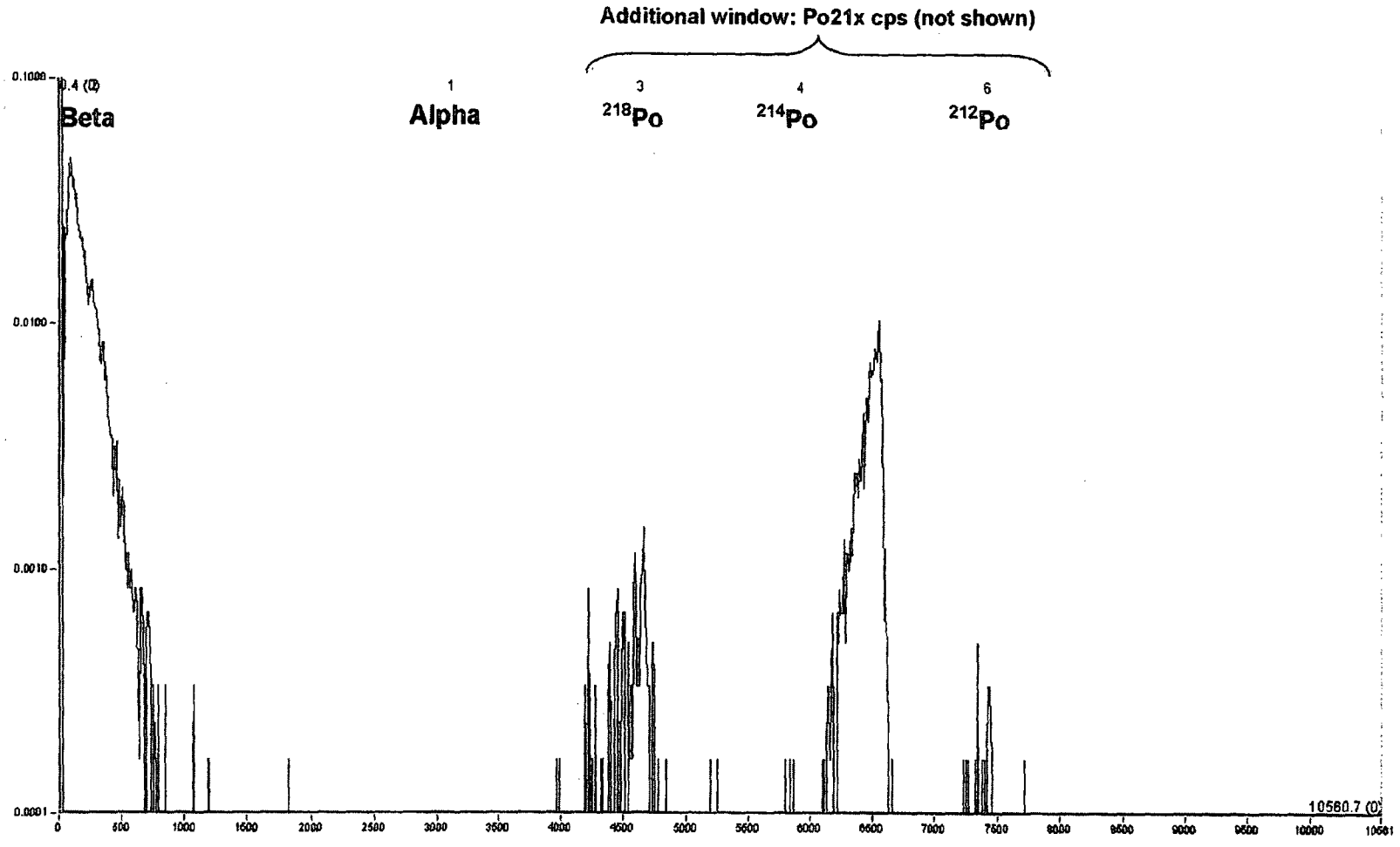

Spectrum showing alpha and beta activity due to Radon daughters; *x-axis is energy in keV, y-axis is count rate in cps and is log-scaled. The spectrum was over approximately 2 hours during post-production testing of the monitor. The regions of interest (ROI) are labeled according to their use.*

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eti
Conformity Services

Albuquerque Area Office
8336 Washington Place, N.E.
Albuquerque NM 87113
(505) 822-0237
(505) 822-0217

December 15, 2009

Louisiana Energy Services, Inc.
PO Box 1789
Eunice, NM 88231-1789

Attention: Ms. Debra Edwards, Chemistry Supervisor

Subject: Equipment Labeling Evaluation, Final Report
MGP Alpha Monitor
Reference No.: 3103669F

Dear Ms. Edwards:

Enclosed is the subject report, as prepared by eti Conformity Services Compliance Engineer, Ross Bender.

The equipment evaluated in this report has been inspected and tested for general compliance with applicable codes and standards and with regard to general electrical safety. Details of this evaluation are provided in this report.

All discrepancies noted on the units inspected have been verified as corrected. Please contact Ross Bender if you have any questions about the technical contents of this report.

Please contact us if you have any questions or if we can be of further service on this or other projects.

Sincerely,
eti Conformity Services

Randy Allen
Service Center Manager

cc: Ronnie Killgore, Electrical Inspector, NM Construction Industries Division
Marty Hall, P.E., Bridgers & Paxton Consulting Engineers

Albuquerque Area Office
8336 Washington Place, N.E.
Albuquerque NM 87113
(505) 822-0237
(505) 822-0217

EQUIPMENT FIELD EVALUATION
FINAL REPORT

Alpha Particle Monitor

for

The National Enrichment Facility
EUNICE, NM

CLIENT
Ms. Debra Edwards, Chemistry Supervisor
Louisiana Energy Services, Inc.
Andrews Road
Eunice, NM

INSPECTION AUTHORITY

NM Construction Industries Division
Ronnie Killgore, Electrical Inspector
5200 Oakland Ave. NE
Albuquerque, NM 87113

Reference No.: 3103669F

Submitted By: Ross Bender
Sr. Compliance Engineer

Date: September 2, 2009

Reviewed By: _____
Randy Allen
Service Center Manager

Table of Contents

1.0 PURPOSE

The purpose of these inspections and tests is to provide assurance that custom or non-certified equipment meets the requirements of the appropriate codes, safety orders and industry standards. These inspections and tests are normally required by the local building inspection authority having jurisdiction (AHJ) when equipment has not been certified by a Nationally Recognized Testing Laboratory (NRTL) or other recognized testing agency. These inspections address only the electrical systems on the equipment listed in Section 5.0 of this report.

2.0 SUMMARY

This project was initiated at the request of Ms. Debra Edwards, Chemistry Supervisor with Louisina Energy Services. Inspections and testing of the equipment referenced in Section 5.0 was performed at the National Enrichment Facility in Eunice, NM eti Conformity Services Compliance Engineer Ross Bender on August 21, 2009. The Equipment is installed at National Enrichment Facility in Eunice, NM where the final inspection and testing have been completed.

The electrical discrepancies observed during the inspection and testing of the equipment were as described in Section 7.0 and have been corrected. The electrical discrepancies have been verified as corrected and the ETI *EVALUATED* label has been affixed to the equipment. Note that final approval is under the jurisdiction of the New Mexico Construction Industries Division.

3.0 GENERAL CONDITIONS OF ACCEPTANCE

In the event of modifications resulting in a change in the materials, manufacturing methods, loading, or environment that would affect the use of the accepted equipment under the provisions of the noted electrical standards, this acceptance will be considered automatically cancelled. The applicant will be required to request re-examination of this equipment to determine acceptability of the modifications.

By acceptance of the equipment referenced in Section 5.0, eti Conformity Services does not assume or discharge the responsibility of the equipment manufacturer, installer, or other relevant parties. Equipment evaluation is based upon adherence to sound engineering practices, and upon compliance with the specific sections quoted from the electrical standards referenced in Section 4.0 of this report.

Assessment of required interrupting rating and arc-flash labeling of the equipment being evaluated is beyond the scope of this field evaluation. Determining the adequacy of interrupting rating and arc-flash labeling are the responsibility of the end-user as described in subsection 6.5 of this report.

This acceptance applies to the electrical circuits and components only, as referenced in this report. Unless noted otherwise, it specifically excludes examination for suitability of use for equipment involving toxic or corrosive gases, steam, and locations defined as hazardous by the National Electrical Code (NEC®).

4.0 REFERENCED ELECTRICAL STANDARDS

4.1 ANSI/NFPA 79, Electrical Standard for Industrial Machinery
4.2 ANSI/NFPA 70, National Electrical Code (NEC)
4.3 UL 61010-1, Electrical Equipment for Measurement, Control and Laboratory Use, Part 1: General Requirements

5.0 EQUIPMENT INSPECTED

5.1 Six (6) Alpha Monitors

Two (2) LDU (Local Display Units) final installation.

Manufacturer Name: MGP Instruments
Model No.: ABPM201S
Serial No.: 080925
Ratings: 120 Volts AC, 60 Hz, 8.6 Amps, 1-Phase
Label Nos.: **0115480 through 0115485**

6.0 INSPECTION PROCEDURES

6.1 Component Listing

The following major power components are inspected for listing marks by an independent testing laboratory acceptable to the authority having jurisdiction (AHJ), or are evaluated to the appropriate nationally recognized consensus standard. Any discrepancies observed during the evaluation process are noted in Section 7.0.

- Circuit breakers
- Fuses and fuseholders
- Disconnect switches
- Terminal blocks
- Pushbuttons and switches
- Relays and contactors
- Transformers
- Motors and drives
- Motor overload units
- Wire ducts
- Receptacles
- Cables and wiring

6.2 Visual Inspection

The equipment is visually inspected with particular attention to the following areas:

- Manufacturer nameplates
- Use of "approved" components
- Proper overcurrent protection
- Wiring ampacity
- Ground bonding
- Electrical ratings
- Wiring methods
- Guarding of live parts
- Damaged components
- General engineering practices

6.3 Ground Bonding

Exposed non-current carrying parts of the equipment are inspected for effective grounding in accordance with the applicable provisions of the standards referenced in Section 4.0 and the National Electrical Code (NEC®) Article 250. 6.4 Guarding of Live Parts All internal components are inspected for installation in a suitable enclosure and effective guarding in accordance with the standards referenced in Section 4.0 and the National Electrical Code (NEC®) Section 110.27.

6.5 Overcurrent Protection

Overcurrent protection installed in this equipment is evaluated for compliance with the applicable codes and standards referenced in Section 4.0. Protective devices are verified to be properly identified, and of a type suitable for the circuit applications as installed.

Please note: Determining the adequacy of interrupting rating and arc-flash labeling are the responsibility of the end-user and are therefore outside the scope of this field evaluation project. The customer is hereby advised of NFPA 70-2005, Articles 110.9 & 110.16 which state:

110.9 Interrupting Rating.

"Equipment intended to interrupt current at fault levels shall have an interrupting rating sufficient for the nominal circuit voltage and the current that is available at the line terminals to the equipment.

"Equipment intended to interrupt current at other than fault levels shall have an interrupting rating at nominal circuit voltage sufficient for the current that must be interrupted.

110.16 Flash Protection.

"Switchboards, panelboards, industrial control panels, meter socket enclosures, and motor control centers that are in other than dwelling occupancies and are likely to require examination, adjustment, servicing, or maintenance while energized shall be field marked to warn qualified persons of potential electric arc flash hazards. The marking shall be located so as to be clearly visible to qualified persons before examination, adjustment, servicing, or maintenance of the equipment."

6.6 Internal Wiring

Internal wiring and wiring methods are evaluated for compliance with the applicable codes and standards referenced in Section 4.0. Wiring is verified to be properly sized and rated, with a temperature rating suitable for the installed application.

6.7 Safety Interlocks and Operator Controls

The equipment safety interlocks, emergency stops, operator controls and human machine interfaces (HMI) are verified to be properly identified. The safety features and emergency machine off (EMO) switches are tested for proper operation.

6.8 Field Testing

Field testing is performed on the equipment, to meet the field testing requirements of the standards referenced in Section 4.0, unless production test results have been provided by the equipment manufacturer and accepted by eti Conformity Services. If no production tests are submitted, then testing is performed to verify the equipment to be operating within normally expected parameters as detailed in Section 8.0.

7.0 EQUIPMENT EVALUATION

7.1 Alpha Monitor

7.1.1 System Description

The equipment inspected consists of Alpha Monitor manufactured by MGP Instruments. The equipment is rated at 120 Volts AC, 60 Hz, 8.6 Amps, 1-Phase. The alpha monitor draws air samples from various exhaust ducting, runs the air through a very sensitive particulate filtering device, thus detecting any alpha particles contained in the sampled air. The equipment is installed indoors in an ordinary (non-hazardous) location, and has been evaluated for use in this location only.

7.1.2 Grounding

Exposed non-current carrying parts of the equipment were verified to be effectively grounded in accordance with the applicable provisions of NEC®, Article 250. A discrepancy was noted and will require correction as detailed in item 7.1.6 below.

7.1.3 Guarding of Live Parts

All internal components are enclosed in a grounded, screw closed, metal enclosure, and are effectively guarded per NEC®, Section 110.27. A discrepancy was noted and will require correction as detailed in item 7.1.6 below.

7.1.4 Overcurrent Protection

Overcurrent protection was provided by a 120 Volt AC, 20 Amp branch circuit.

7.1.5 Wiring

All wiring was found to be UL listed or recognized type MTW/THHN or equivalent.

7.1.6 Equipment Discrepancies

The discrepancies observed during the evaluation of the equipment listed in Section 5.0 were as described below. These items have been verified as corrected and the equipment is considered acceptable and suitable for continued service.

.01 Equipment Nameplate (NFPA 79)

This equipment was not provided with the required nameplate.

Action: A permanent nameplate shall be installed where plainly visible on this equipment. The nameplate shall contain the following information as a minimum:

a) Manufacturer's name or trademark.
b) Equipment catalog or serial number.
c) Electrical diagram numbers.
d) The following electrical ratings:
    1. Supply voltage.
    2. Number of phases.
    3. Rated frequency.
    4. Full load current.

Where more than one incoming supply circuit is provided, the nameplate shall state the above information for each supply circuit.

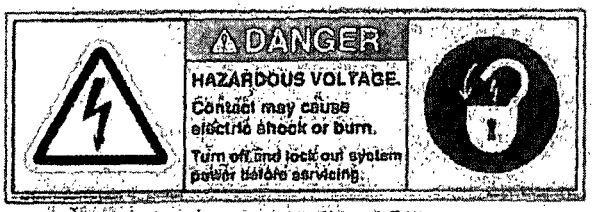
Reference: NFPA 79, Subclause 16.4

Verified as corrected on December 15, 2009

.02 Warning - Disconnect Power

This enclosure was not provided with a cautionary marking warning of the hazardous voltages contained within.

Action: A cautionary marking shall be installed in a plainly visible location on the outside of the enclosure stating the following or equivalent:



No. H6010/6011-B1DHP (Available Sizes: S,T,U)

Reference: NFPA 79, 16.2.1
NEC®, Section 110.3(a)(8)

Verified as corrected on August 21, 2009

8.0 TESTING RESULTS AND INSTRUMENTS

8.1 Field Testing

The following field-testing was completed with the summary results as indicated. Please refer to the Product Evaluation Data Sheet in Appendix B in this report for complete details on the specific tests completed.

8.1.1 Current and Voltage Measurements

Current and voltage measurements were taken at the input to each piece of equipment listed in Section 5.0 under normal operating conditions. The measurements obtained were verified to be within the voltage and current ratings of the devices installed.

8.1.2 Temperature Rise Test

A temperature rise test was performed on all components within each piece of equipment listed in Section 5.0 under normal operating conditions. The test was performed using an infrared (I.R.) thermometer to verify the temperature rise for each component did not exceed those specified in UL 508. Temperatures obtained were verified to be sufficiently low enough not to constitute risk of fire or to adversely affect any material employed in the equipment. The temperature rise obtained for each component is a result of test conditions only, and is not necessarily indicative of the possible temperatures generated in the operating environment.

8.1.3 Insulation Resistance Test

An insulation resistance test was performed on the equipment listed in Section 5.0 to verify the dielectric integrity of the insulating medium. Voltage was applied phase to ground at 1000 Volts DC for one minute on the incoming supply conductors of each piece of equipment tested. There were no indications of insulation breakdown as evidenced by arcing or sparks and therefore the test results indicate satisfactory results.

8.1.4 Bonding Test

The equipment bonding was verified as being properly installed. The resistance was measured from the main equipment grounding terminal to all applicable exposed metal structures or surfaces and installed equipment ground points. The maximum resistance permitted is 0.1 Ohm. The test results indicated satisfactory bonding with all resistance measures below 0.1 Ohm.

8.1.5 Leakage Current Test

With the equipment energized, the surface leakage current was tested by inserting an impedance network into the grounding path. The test points were the applicable exposed metal structures or surfaces that might be contacted by an operator. The maximum leakage current permitted is 3.5 mA. The test results found the maximum leakage current recorded to be less than the maximum allowed.

8.2 Test Equipment

All equipment has been calibrated to NIST reference standards. Certificates of calibration are available upon request.

Test Equipment	Model	eti Asset No.	Calibration Date
Fluke, True RMS Multimeter	87 IV	N/A	12//2008
Fluke AC Current Probe	80i-600A	N/A	Not Required
AVO Megger Digital Low Resistance Ohmmeter	DLRO 10	24-1113	03/2008
Micron Infrared Camera	7200B	24-01119	01/2008
Biddle Insulation Resistance Test Set	BM400/2	10-00786	03/2008
eti Conformity Services Leakage Current Tester	LCT-1	N/A	Not Required

Appendices

APPENDIX A

Summary of Project Contacts

eti Conformity Services:

Reference No.	3103669F
Name:	Albuquerque Area Service Center
Address:	8336 Washington Place, N.E.
City, State, Zip:	Albuquerque NM 87113
Phone:	(505) 822-0237
Fax:	(505) 822-0217
Compliance Engineer:	Ross Bender

Client Information:

Company Name:	Louisiana Energy Services, LLC
Street Address:	275 Andrews Highway
City, State, Zip:	Eunice, New Mexico 88231
Phone:	(575) 394-6532
Contact:	Ms. Debra Edwards
Purchase Order No:	LES-GSA-3069, REV 1

Site Information / Intended Installation Location:

Site Name:	National Enrichment Facility
Street Address:	275 Andrews Highway
City And State:	Eunice NM 88231

Jurisdiction Information:

Inspector's Name:	Ronnie Killgore, Electrical Inspector
Jurisdiction:	NM Construction Industries Division

Manufacturer's Information:

Alpha Monitor

Manufacturer Name: MG P Instruments
Model No.: ABPM201S
Serial No.: 080925
eti Label No.: 0115770
Phone: 770-432-2744
Email: www.mirion-hp.com

APPENDIX B

Test Data Sheet

eti
Conformity Services

PRODUCT EVALUATION TEST DATA

CLIENT: Louisiana Energy Services		etiCS JOB NUMBER: 3103669	etiCS LABEL NUMBER: 115480 through 485
LOCATION: NEF (Eunice, NM)	ENGINEER: Ross Bender	DATE: August 21, 2009	
EQUIPMENT: Six (6) Alpha Monitors + two (2) LDU	MODEL: ABPM201S	SERIAL NO: 090501-01 through -06	
Manufacturer: MGE	RATINGS: 120 VOLTS / 15.0 AMPS / 60 HZ	☑ 1 PHASE 2+ GND WIRE ☐ 3 PHASE 3+ GND WIRE	

INSULATION RESISTANCE TEST DATA (MEG-OHMS)

DATE:	TEST VOLTAGE:	TEST EQUIP ASSET #:	CALIBRATION DATE:
August 21, 2009	500 VDC	10-00786	3-2009

	PHASE TO GROUND			PHASE TO PHASE		
CIRCUIT IDENTIFICATION	A	B	C	A-B	B-C	C-A
Mains (All 6)	>999Meg					

VOLTAGE AND CURRENT MEASUREMENTS

VOLTAGE MEASUREMENTS						CURRENT MEASUREMENTS				
PHASE A-G	PHASE B-G	PHASE C-G	PHASE A-B	PHASE B-C	PHASE C-A	PHASE A	PHASE B	PHASE C	NEUTRAL	GROUND
121.5						4.8			4.8	0

REMARKS: All fed from same source

COMPONENT TEMPERATURE RISE DATA

DATE:	AMBIENT TEMP:	TEST EQUIP ASSET #:	CALIBRATION DATE:
August 21, 2009	64 °F	24-01063	3-2009

COMPONENT IDENTIFICATION	COMPONENT TEMP.	TEMPERATURE RISE	TEST METHOD
All components either UL listed or UR recognized			
Main pump motor	99°F	35°F	Thermocouple

GROUND RESISTANCE TEST DATA

DATE:	AMBIENT TEMP:	TEST EQUIP ASSET #:	CALIBRATION DATE:
August 21, 2009	64 °F	24-01113	3-2009

	Resistance	Result:	Resistance	Result:
AC Power to skid	0.09 Ohm	A		
Control Panl to skid	0.04 Ohm	A		
Control Panl to Pump	0.05 Ohm	A		

EMO AND INTERLOCK TESTS

EMO FUNCTION TESTS		INTERLOCK FUNCTIONAL TESTS			
DATE:		DATE:			
LOCATION	RESULT	INTERLOCK DESCRIPTION	RESULT	INTERLOCK DESCRIPTION	RESULT
Main C.P	A	N/A			

LEAKAGE CURRENT AND RESISTANCE

Location	Resistance (Ohms)	Voltage (mV)	Leakage Current (mA)
Note 2			
Main Power Cord	0.09	0.25	0.0002 mA

GENERAL NOTES

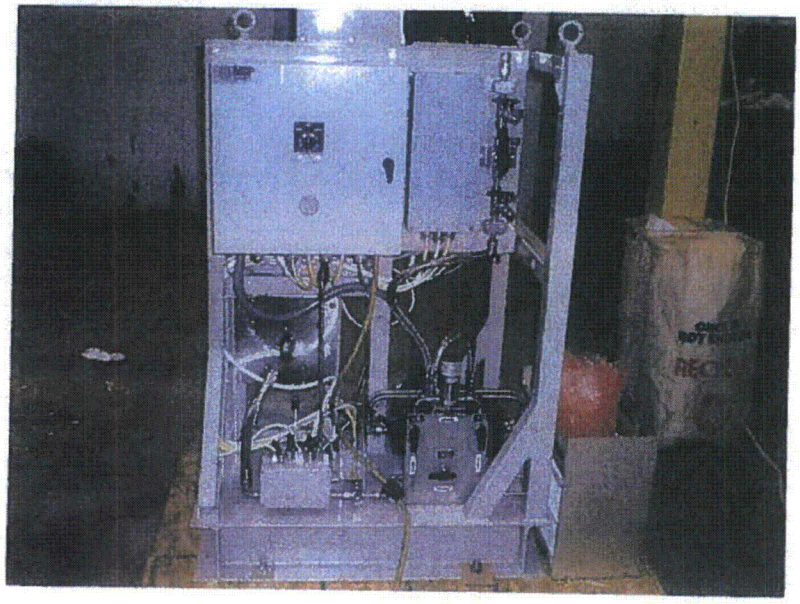
© eti 2008 AC/0001 rev. 4/00

A = Acceptable, N/A = Not Applicable, C = Corrected, R = Needs Repair

APPENDIX C

Photos

Figure 1 is the front view of the Alpha monitor. Main power control is on top left.



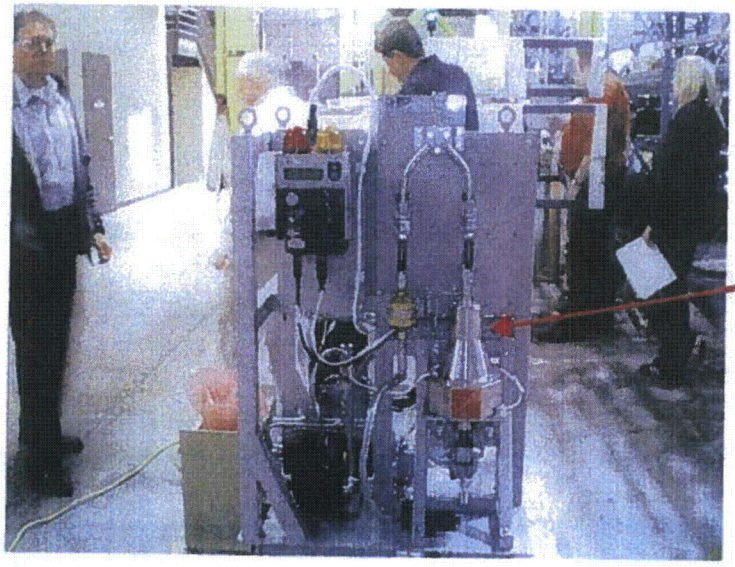


Figure 2 is rear view of machine showing air pump on left, filter and detector piping in foreground on chassis.

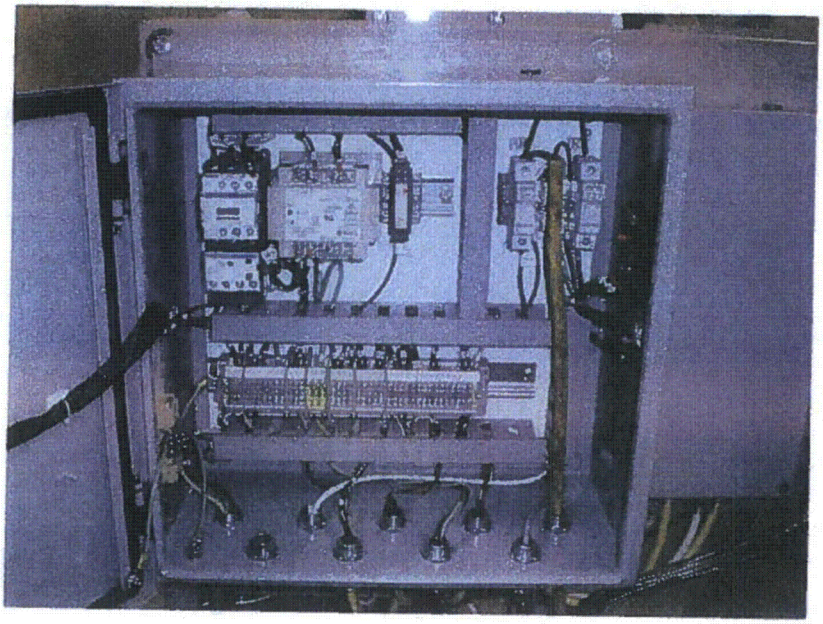


Figure 3 is a view of the interior of the power and control enclosure.

Functional Location 1001-562-1MA1

Fan Speed (%) (1001-662-2U1)	Target Stack Flow (or mA) (LDU mA input)	Measured Stack Flow from Process Flow Meter (Blackwatch Panel Meter Reading) (scfm) (m3/hr)	Measured Alpha Monitor Process Flow Rate (LPDU Stack Flow) (scfm)	Target Alpha Monitor Sample Flow Rate (LPDU Target Flow Rate)	Actual Alpha Monitor Sample Flow Rate (LPDU Skid Flow Rate)	Within Tolerance?
0	4.1	5 2.945	3.7	40	45.8	Yes
25	8.27	268 158	154	40	46.1	Yes
50	10.77	432 254	250	49.6	57	Yes
75	13.06	580 342	334	59.1	57.7	Yes
99	14.838	689 405	400	60	58.2	Yes

Verified by Initials/Date/Time DH 13-26-10 16:40

Verified by Initials/Date/Time HMH 13-26-10 1640

Procedure Title: **Alpha Monitor (ABPM 201 S) Operation**	
CH-3-4000-01-F-1 **Source Calibration Data Sheet**	CH-3-4000-01 Rev.5 Level 2 Reference Use Page 1 of 2

Monitor Functional Location	1001-S62-1MA2
Date/Time	4-27-10 / 1500

Test Conditions		
	Required Value	**Measured Value**
Temperature	15 - 35°C	
Relative Humidity	90%	
Energy Calibration Complete? (Circle one)		**Yes / No**

Gain Verification			
Description	**Acceptance Criteria**	**As Found**	**As Left**
Peak Channel	399 - 439 channel		
Alpha-Beta gain	0.7 - 1.3 cps		
Gamma gain	0.7 - 1.3 cps		①

① Gamma Gain As Left = $\frac{(\text{Alpha} - \text{Beta Gain As Left})\,(\text{Gamma Gain As Found})}{(\text{Alpha} - \text{Beta Gain As Found})}$

N/A

Detection Efficiency Check				
Background	**Acceptance Criteria**	**Measured Values**	**Average**	**Comments**
Alpha_cps	< 0.005 cps			
Po21x_cps	< 0.005 cps			

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Measurement with Alpha Source			
	Measured Values (cps)	**Average**	**Comments**
Alpha_cps		②	

Measurement with Alpha Source			
	Measured Values (cps)	**Average**	**Comments**
Po21x_cps			

Source Activity (circle source used)			
Source Material	**Source Type**	**M&TE/Serial Number**	**③A (Bq)**
^{241}Am	Alpha	F5-247	2980 (A)
^{241}Am	Alpha	F8-940	3295 (A)

Source Detection Efficiency Calculation			
Alpha Efficiency (Eff)	**Acceptance Criteria**	**Measured Value**	**Comments**
	0.0333 to 0.0407 cps/Bq	④	
④ Alpha Efficiency (cps/Bq) = **S/A** = ②/③ = Average Alpha_cps/Source Activity in Bq			

Alarm Verification						
Scenario	**Monitor Status**	**Relay Status (read from MASS2)**				**Acceptable? (Yes / No)**
		OP	**TST**	**H**	**H/H**	
High alarm	H alarm	On	On	On	Off	
H/H alarm	H/H alarm	On	On	On	On	
Fault	Slave fault	Off	On	Off	Off	

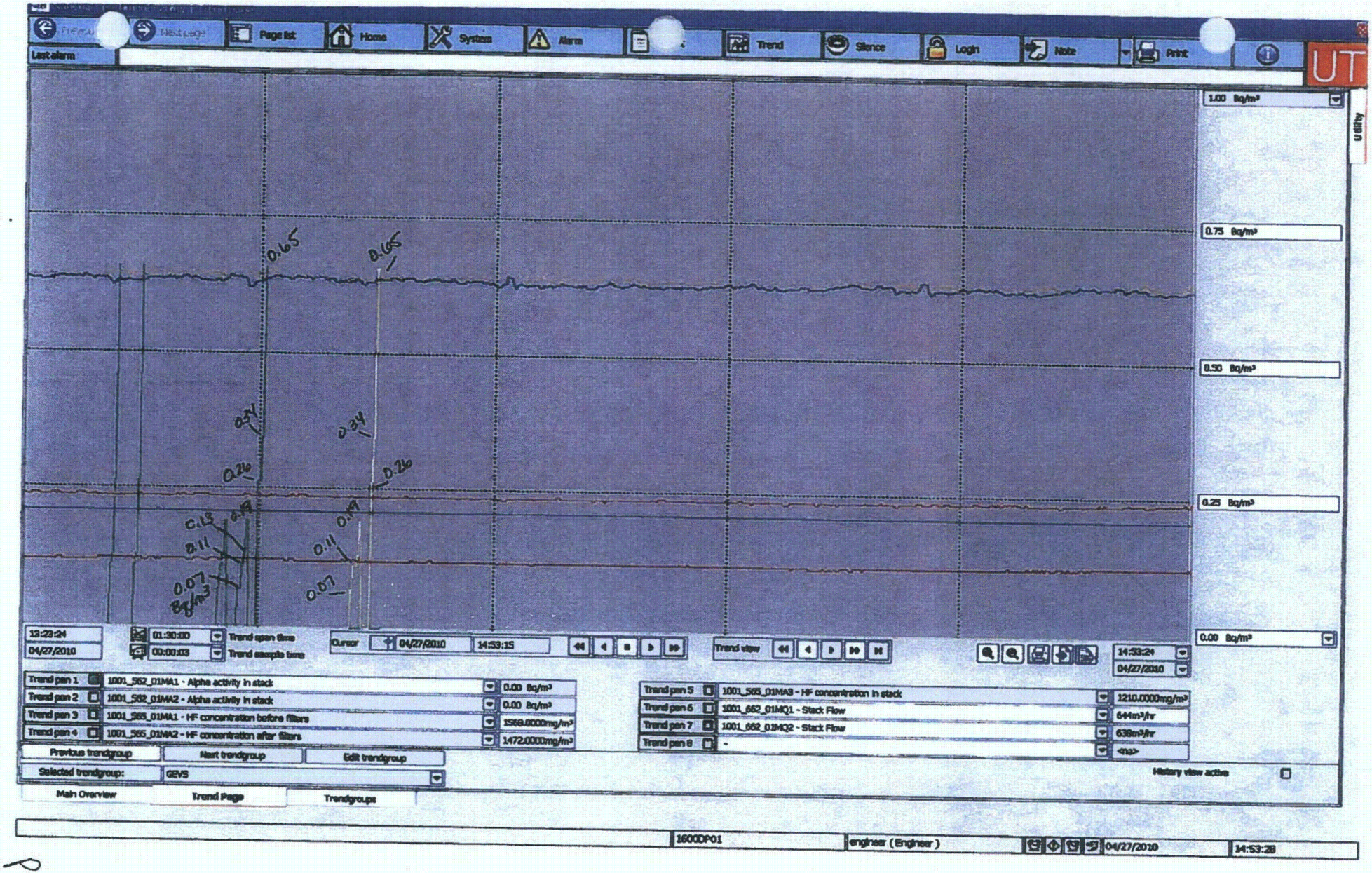
Remarks: See attached

Performed By: Holly Huber / [signature] / 4-27-10
Print / Signature / Date

Reviewed By: Debra Edwards / [signature] / 4-27-10
Print / Signature / Date

This package is to provide a means of documenting a more detailed post CAT-CH-ABPM-201S test for the SBM effluent alpha monitors. The alarm test was conducted to compare monitor values with values read from the Plant Control System (PCS) in further detail from the test that was performed during the CAT. The following pages include data from this test. In the next procedure revision of CH-3-4000-01 it is planned to include this test with the annual source calibration.

1001-562-1MA2		
Read out at monitor (Bq/m3)	**Output at monitor (mA)**	**Readout on PCS (Bq/m3)**
0.08	5.122	0.07
0.12	5.787	0.11
0.14	6.100	0.13
0.20	7.077	0.19
0.27	8.211	0.26
0.35	9.501	0.34
0.65	14.350	0.65
1.00	20.000	offscale



all the readings were Bq/m³ .. if you need anything further, lemme know!

5 of 5 page

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LES

Alpha Monitor Site Acceptance Test Plan

CAT-CH-ABPM-201S

Revision 0

ABPM Monitor System Number: 1001-562-1MA2

Approved: _____ 10/14/09

Signature/Date

Revision Summary

Change	Reason for Change
New test plan.	

TABLE OF CONTENTS

1. PURPOSE

1.1 The purpose of this procedure is to confirm functionality for the start-up and acceptance of the ABPM 201-S Alpha Particulate Monitor. It will include verification of the following aspects of operation:

1.1.1 The proper startup and operation of the Alpha Particulate Monitor.

1.1.2 Verification of correct measurement of activity levels and functioning of instrument fault conditions and alarms.

2. SCOPE

2.1 This procedure governs the start-up and testing of the ABPM 201-S Alpha Particulate Monitor and its supporting components.

3. TERMS, DEFINITIONS, ABBREVIATIONS, AND ACRONYMS

3.1	CAT	Commissioning and Acceptance Test
3.2	FAT	Factory Acceptance Test
3.3	LDU	Local Display Unit
3.4	LPDU	Local Processing and Display Unit
3.5	MASS	Maintenance and Setup Software
3.6	PDCU	Power Distribution and Control Unit (provides power to the pump and LPDU)
3.7	PFCV	Proportional Flow Control Valve (regulates flow through PIS proportionally to the stack flow
3.8	PIS	Particulate Iodine Sampler (for collecting particulate samples)
3.9	SAM	Spectrum Acquisition and Manipulation Software.
3.10	SAT	Site Acceptance Test

4. PRECAUTIONS AND LIMITATIONS

4.1 Ensure that appropriate electrical safety practices are utilized during this test in accordance with MA-3-1000-06, Electrical Safety.

5. EQUIPMENT, MATERIAL AND PARTS

5.1 Basic Tools and Software:

5.1.1 Laptop or workstation PC

5.1.2 Mass2 software

5.1.3 SAS/PIPS Application Software

5.1.4 RS232 serial link cable with DB9 connectors or equivalent

5.1.5 Vacuum/pressure pump

5.1.6 Level

5.1.7 Tape Measure

5.2 Calibrated Instruments

5.2.1 Digital multi-meter

5.2.2 Thermometer or temperature sensor for the DMM (0.1°C resolution)

5.2.3 Pressure/vacuum gauge (0.2 psig resolution, 20 psig max full scale)

5.2.4 Mass flow meter or equivalent

5.2.5 Dose rate meter (0.1 mR/hr resolution)

5.2.6 Loop calibrator, as required (input the 4 to 20 mA signal for isokinetic test)

5.3 Radioactive Sources

5.3.1 ^{241}Am, ~1500 alpha/s nominal activity

5.3.2 Source holder, MGP reference number 69553

6. ACCEPTANCE CRITERIA

6.1 Proper operation and calibration of the ABPM 201S monitor as verified by positive checks using the Checklist provided in Attachment 1.

6.2 Proper operation of the alarms and faults.

6.3 Proper operation of the monitor.

7. PREREQUISITES

7.1 Power available for the monitor.

8. DATA REQUIRED

8.1 Other than the information recorded on the checklist and the data sheets from CH-3-4000-01, Alpha/Beta Monitor (ABPM201S) Operation, there is no additional data required for this test.

8.2 Calibration Data

NOTE:

1. Record all observations and data on the ABPM 201S Datasheet & Log unless otherwise directed.
2. Steps may be performed in a sequence other than specified in the test plan if approved by the person leading the testing.
3. If any parameter cannot be achieved, document the actual results and list the exceptions in the log.
4. Make any necessary corrections and repeat as necessary for out of specification parameters.
5. Use 12-00098, Post Production Test Procedure for ABPM201S Alpha Beta Particulate Monitor and 12-00124, Factory Acceptance Test Procedure for LES ABPM201S as needed for reference in performing this test.

9. MAIN BODY

9.1 Physical Inspection

9.1.1 Verify Alpha Monitor Identification and Condition:

a. Serial numbers of components match serial numbers on FAT data sheet.

b. No visible damage.

c. Adequate clearances have been provided for servicing.

d. Name plate affixed to Instrument showing model number, contract number, date of manufacture, UL listing.

e. Calibration data sheet available for flow meter.

f. Monitor skid is level and properly bolted to the building.

g. All packing material and debris have been removed from the equipment, inside and exterior of all components are clean and dust-free.

9.1.2 Check that pipe connections from the sampling nozzle in the stack are compliant with the following:

a. Sample inlet line 1 inch OD seamless stainless steel.

b. Sample outlet line ½ inch OD seamless stainless steel.

c. No internal diameter change along line after union to nozzle.

d. Minimal horizontal runs, no upward flowing sections between sampling nozzle and instrument inlet.

e. Horizontal distance between nozzle and instrument $\leq$ 15 feet.

f. Radius of bends at least 3 times pipe outside diameter.

g. Pipe connections made with Swagelok fittings.

h. Verify sample inlet/sample return manual isolation valves are operable.

i. Ensure components of system (line between nozzle and monitor, and monitor) have been leak checked. To leak check the monitor, open all internal valves, close inlet and exit valves, and connect a pressure gauge and manual hand pump to the inlet manifold. Draw a vacuum of approximately 6 inches mercury in the system and hold for 10 minutes. The vacuum shall not decrease by more than 10%.

NOTE:

UPS is not tested as part of this test plan.

9.2 Electrical Inspection

9.2.1 Power supply and instrument voltages are compatible.

9.2.2 LDU is connected to LPDU (RS485 link between the LDU and the LPDU).

9.2.3 The LDU used for isokinetic flow has the following connections:

a. 120 V AC 60 Hz instrument quality power line

b. Analog input from the stack flow transmitter

9.2.4 Using a DMM or milli-ohmmeter, check the resistance between the building ground and the skid ground bus (welded threaded stud at lower left side of the skid). Resistance shall be less than 0.1 ohm.

9.3 Start-up

9.3.1 Filter paper and cartridge

a. Check that a filter paper roll has been placed in the filter cassette.

b. Check that a filter paper is installed in the PIS.

9.3.2 Monitor Power On

a. In the Power Distribution and Control Unit (PDCU), check that fuses are installed in the fuse holders, and close the fuse holders.

b. Check that the filter cassette elevator is closed (up).

c. Verify the LPDU power supply circuit breaker on the distribution unit is "ON".

d. Power on the LPDU by turning the front panel key switch to "ON". The buzzer should sound for approximately one second, the orange light illuminate for one second, and the red light briefly flash.

9.4 LPDU Software Check

9.4.1 Connect a PC to the LPDU (RS232 port on front of unit) and perform network setup as required.

9.4.2 Scan with MASS2 and verify that the LPDU is found.

9.4.3 Verify that the LPDU base software (Ref.735 index 1) is revision E or later,

9.4.4 Verify that the LPDU/SAS/PIPS application (Ref.774 index 2) is revision P or later.

9.4.5 Record the index and revision levels of the base and application software, and the parameter set.

9.4.6 Update LPDU time and date, if necessary.

9.4.7 Verify the LPDU serial number.

9.4.8 Backup any changes required, clear histories and events, and reset the unit.

9.4.9 Test the communication by reading the event summary of the unit using MASS2.

9.4.10 Perform a configuration verification and document.

9.5 LDU Software Check

9.5.1 Connect a PC to the LDU (RS232 port on front of unit) and perform network setup as required.

9.5.2 Scan with MASS2, and verify that the LDU is found.

9.5.3 Perform a configuration verification and document.

9.6 Flow Rate Verification

9.6.1 Place a calibrated flowmeter on the inlet or outlet manifold.

9.6.2 Bypass the isokinetic PFCV (Proportional Flow Control Valve).

9.6.3 Place the pump manual switch to "MAN" (operates the pump in manual mode).

9.6.4 Provide sample flow to the monitor and adjust the flow regulating valve to obtain the approximate flow rates listed below and verify the value indicated for the flow channel against the reading from the calibrated flowmeter. Record the actual flow rate achieved.

Measurement Test #	Reference flow rate in L/min (CFM)
1	30 (1.1)
2	45 (1.6)
3	60 (2.1)

9.6.5 The measurements shall match the gauge reading within ± 10%.

NOTE:

A 4-20 mA signal may be used to test the proportional valve response in place of changing the stack flow rate.

9.7 Isokinetic Flow Control Test

The purpose of this test is to verify that the sample flow rate is maintained at a value which is proportional to the process flow rate, above a certain sample flow threshold. The stack flow scaling and the target sample flow rate may be modified and calibrated during this test.

9.7.1 With the PC connected to the LPDU and/or LDU, scan with MASS 2.

9.7.2 Ensure the monitor components (LPDU and LDU) are configured to accept stack flow data.

9.7.3 Record the stack flow as indicated on the Remote Electronic Enclosure for the flow element used by the LDU which is located in the Local Control panel.

9.7.4 Record the stack flow rate indicated on the LPDU display or by MASS2.

9.7.5 Record the sample flow rate to the Alpha monitor, as indicated by the total flow rate channel (SkidFlow).

9.7.6 Verify sample flow rate is within acceptable tolerance for the stack flow rate (± 25% of the expected value).

9.7.7 Adjust the Fan Speed on the Ventilation System to achieve the Target Stack Flow Values for this test.

9.7.8 If the scaling data must be updated, only the stack flow rate (StkFlow) and target sample flow rate (Target) channels need to be modified. See Section 10 in the User's Manual for ABPM 201-S, Appendix 2: Isokinetic Flow Control. Update information in the StkFlow and Target sample flow rate channels, If required.

9.7.9 If changes to the calibration are required, repeat steps until acceptable sample flow rates are obtained.

9.7.10 Record final results.

9.8 Detector Fault Test

9.8.1 With the monitor in normal operating condition, turn off power to the LPDU and the sampling pump and disconnect the detector cable at the LPDU side.

9.8.2 Restore power to the LPDU and check that the events list is similar to the following list:

Date	Time	Event
06/07/00	15:05:21	Stop unit
06/07/00	15:05:37	Start unit
06/07/00	15:05:44	Unit in normal operation mode ON
06/07/00	15:05:48	Detector probe not present ON
06/07/00	15:05:54	Electrical test counting : : 0
06/07/00	15:05:54	Electrical test fault ON
06/07/00	15:05:57	Internal fault ON
06/07/00	15:05:57	Temperature fault ON

9.8.3 Turn off power to the LPDU and reconnect the detector cable.

9.8.4 Restore power to the pump and the LPDU and check that the events list is similar to the following list:

Date	Time	Event
06/07/00	15:05:21	Stop unit
06/07/00	15:05:37	Start unit
06/07/00	15:05:44	Unit in normal operation mode ON
06/07/00	15:05:44	Filter advance ON
06/07/00	15:05:54	Filter advance OFF

9.9 Energy Calibration, Source Calibration, Relay Test, Alarm Test and Setpoint Verification,

Perform this section IAW CH-3-4000-01 and the source comparison data from the Factory Acceptance Test. Record the data on CH-3-4000-01-F-1, Source Calibration Data Sheet and CH-3-4000-01F-3, Energy Calibration Data Sheet and attach to the test plan.

9.10 Temperature calibration verification

9.10.1 Using the MASS software, and a calibrated temperature sensor, measure the temperature near the PIPS detector, and record the measured value as $T_{Measured}$ in °C.

9.10.2 Read the "Temp" channel in °C on the MASS main screen, and record as T_{LPDU}

9.10.3 Calculate the offset (difference) between measured and read, $T_{LPDU} - T_{Measured}$.

9.10.4 If the offset is within ± 2 °C , the temperature measurement calibration is acceptable.

9.11 Restoration and final check

9.11.1 If applicable, restore any parameters modified for the test to the normal operating values.

9.11.2 Put the LPDU into maintenance mode.

9.11.3 Back up parameters into flash memory, and onto a diskette or CD, if required.

9.11.4 Reset the LPDU and run the pump for 24 hours.

9.11.5 Check that there are no unusual events in the event summaries and that there is no activity in the historical trends which cannot be accounted for.

9.11.6 Review the test procedure and verify that all tests have been completed.

9.11.7 Review the test log and verify that all required entries are complete.

9.11.8 Repeat any steps if required.

9.11.9 Sign the test log .

10. DOCUMENTATION AND RECORDS

10.1 Retain this procedure, the Installer's Checklist, and a record of any calibration performed, with required initials, in accordance with RM-3-2000-01, Records Management program.

11. LICENSE COMMITMENTS AND REQUIREMENTS

11.1 SAR 4.1

11.2 SAR 4.7

11.3 SAR, Section 9.2.21

12. REFERENCES

12.1 CH-3-4000-01, Alpha/Beta Monitor (ABPM 201S) Operation

12.2 MA-3-1000-06, Electrical Safety

12.3 RM-3-2000-01, Records Management Program

12.4 SU-3-1000-01, Release for Operation

12.5 User's Manual, ABPM 201-S Alpha Beta Particulate Monitor, 15-00068 Rev. 0, dated 10-10-2008, MGP Instruments

12.6 Post Production Test Procedure for ABPM201S Alpha Beta Particulate Monitor, Document 12-00098, MGP Instruments

12.7 Factory Acceptance Test Procedure for LES ABPM201S, Document 12-00124, MGP Instruments

12.8 Post Production Test Data Sheet, ABPM201S Alpha Beta Particulate Monitor, Document 14-00098, MGP Instruments

12.9 LES ABPM201S Factory Acceptance Test Log, MGP Instruments

12.10 MASS Software User's Manual

12.11 LPDU User's Manual

12.12 ANSI/HPS N13.1-1999 Sampling and Monitoring Releases of Airborne Radioactive Substances From the Stacks and Ducts of Nuclear Facilities

ABPM 201S Monitor System Number: 1001-562-1MA2
Part Number: ABPM201S
Serial Number: 090501-02
Test Date(s) 11-5-09 to 3-26-10

Calibrated Instruments and Standards

Item	Model Number	Serial Number	Calibration Due	Comments
Digital Multimeter	Fluke 87 V	94910331	22Jul2010	Certificate attached (Pg 34 to 40)
Temperature Sensor	Fluke 87 V	94910331	22Jul2010	↓
Pressure/Vacuum Gauge and hand vacuum pump	Mity VacXNXT	81161094	N/A	① Hand pump purchased from Cole Parmer to perform test. Vendor recommended different setup
Mass Flow Meter	FMA 1843	230235-3	01 Apr 2010	Certification attached (Pg 31 to 33)
scaler/ratemeter ~~**Dose Rate Meter**~~	2224	247506	08 Sept 2010	Certification attached (Pg 41 to 42)

DATE 11/10/09

① See comments on Page 21.

ABPM201S System and Component Numbers

Item	FAT Log Part Number	FAT Log Serial Number	Installed Part Number	Installed Serial Number	Comments
Skid	02-00384	090501-02	02-00384	090501-02	UL cert# 0115481
LPDU/PIPS	131839	090501	131839	090501	
Particulate Flow Meter	120114	091772	120114	091772	
PIS flow Meter	120112	080691	120112	080691	
Filter Cassette	43775	081193	43775	081193	
Flow Control Valve	700055	29236	700055	29236	
LDU	N/A	N/A	134475	090630	UL cert# 0115486

Physical Inspection	Yes	No	Verified By Initials	Verified By Date/Time	Verified By Initials	Verified By Date/Time	Comments
Serial Numbers match FAT Data Sheet	✓		DAE	11/5/09 @08:50	HMH	11-5-09 0850	FAT paperwork attached (Pg 45 to 68)
No visible damage	✓		DAE	11/5/09 @08:50	HMH	11-5-09 0850	
Adequate clearance	✓		DAE	11/5/09 @08:50	HMH	11-5-09 0850	
Label affixed	✓		DAE	11/5/09 @08:50	HMH	11-5-09 0850	
Calibration data sheet for flow meter	✓		HMH	1-8-10 @1130	DAE	1-8-10 @ 11:30	② See comments on Pg 21
Monitor skid level	✓		HMH	11-10-09 0831	JRB	11-10-09 0831	
Monitor is bolted down	✓		DAE	11/5/09 @08:50	HMH	11-5-09 0850	

Physical Inspection	Yes	No	Verified By		Verified By		Comments
			Initials	Date/Time	Initials	Date/Time	
Packing material removed and interior/exterior clean	✓		AHS	3/16/10 0820	N/R	N/A	
Inlet pipe 1 inch OD seamless stainless steel	✓		JRB	12/18/09 1430			
Return pipe diameter ½ inch OD seamless stainless steel	✓		JRB	12/18/09 1430			
No diameter change along inlet line after union with nozzle	✓		JRB	12/18/09 1430			
Minimal horizontal runs, no upward flowing sections between sampling nozzle and instrument inlet	✓		JRB	12/18/09 1430			
Horizontal distance between nozzle and monitor is <15'	✓		JRB	12/18/09 1430			
Radius of bends at least 3X OD	✓		JRB	12/18/09 1430			
Pipe connections made with Swagelok fittings	✓		JRB	12/18/09 1430			
Manual isolation valves operable	✓		JRB	12/18/09 1430			
Initial vacuum: 13.5			N/R	N/R			
Decrease in vacuum after 10 minutes: 13.5 (no change)							
Decrease in vacuum < 10%	✓		HMH	11-16-08 1100			

Electrical Inspection	Yes	No	Verified By		Verified By		Comments
			Initials	Date/Time	Initials	Date/Time	
Correct Voltage	✓		HMH	11-12-09 1036	RSB	11-12-2009 1040	118.6 volts
LDU in communication with LPDU	✓		HMH	11-18-09 1245	SOS	11-18-09 1245	
LDU has input from flow element	✓		HMH	3-16-10 0815	NR	NR	
Skid grounded – Resistance < 0.1 ohms	✓		HMH	11-12-09 1036	RSB	11-12-2009 1040	
UL equivalency Report	✓		DTE	12-15-09 1200	NR	NR	Attached Report (Pg 69 to 84)

Start up	Yes	No	Verified By		Verified By		Comments
			Initials	Date/Time	Initials	Date/Time	
Filter paper roll in cassette	✓		N/R	N/R	HMH	11-5-09 0851	
Filter paper in PIS	✓				HMH	11-5-09 0851	
Fuses checked	✓				HMH	11-5-09 0852	
Elevator up	✓				HMH	11-5-09 0853	
LPDU powered up	✓				HMH	11-5-09 0854	
LPDU display on	✓				HMH	11-5-09 0854	
LPDU found by MASS2	✓				HMH	11-5-09 0855	

LPDU Software Check	Yes	No	Verified By Initials	Verified By Date/Time	Verified By Initials	Verified By Date/Time	Comments
LPDU: • Base Software number: 735 • Base Software revision: 1E • Application Software number: 774 • Application Software revision: 2R • Parameter Set number: 827 • Parameter Set revision: 102A • Acquisition board number: 57894 • Acquisition board revision: 253 184 152	✓		HMH	11-18-09 1246	NR	NR	
Time and date set	✓		HMH	11-18-09 1246			
LPDU serial number: 090501	✓		HMH	11-18-09 1247			
Any changes backed up , unit reset?	✓		HMH	3-16-10 0815			
Event summary correct?	✓		HMH	3-16-10 0815			
Configuration verified and documented	✓		HMH	11-18-09 1247			

LDU Software Check	Yes	No	Verified By		Verified By		Comments
			Initials	Date/Time	Initials	Date/Time	
LDU is receiving information?	✓		HMH	11-18-09 1250	SOS	11/18/09 1250	
Configuration verified and documented	✓		HMH	11-18-09 1250	SOS	11/18/09 1250	

Flow Rate Verification	Yes	No	Verified By		Verified By		Comments
			Initials	Date/Time	Initials	Date/Time	
Monitor Flow Rate (Skidflow) acceptable?	✓		HMH	11-16-09 1100	NR	NR	

Calibrated Flowmeter (Lpm)	Monitor Reading (Lpm)	Reading within ±10%
61	55.3	yes
45	41	yes
30	27.4	yes

Isokinetic Flow Control Test	Yes	No	Verified By Initials	Verified By Date/Time	Verified By Initials	Verified By Date/Time	Comments
Test complete and satisfactory?	✓		DAE	3/26/10 1620	NR	NR	Test results on Pg 85

Target Stack Flow (or mA) (LDU mA)	Measured Stack Flow from Process Flow Meter	Measured Alpha Monitor Process Flow Rate	Portable Flow Meter Stack Measurement	Target Alpha Monitor Sample Flow Rate	Actual Alpha Monitor Sample Flow Rate	Within Tolerance?
~~3.5 SCFM~~ 4.066 ~~mA~~ 4.047 mA	~~10 scfm~~ (3)	DAE 11/19/09 ~~39.9~~ 3.5	0.5	11/19/09 DAE ~~39.9~~ 40	39.9	
	114 scfm					

(3) See comments (Pg 21)

Detector Fault Test	Yes	No	Verified By Initials	Verified By Date/Time	Verified By Initials	Verified By Date/Time	Comments
Event log for detector unplugged and pump off correct?	✓		HMH	11-18-09 1330	SDS	11-18-09 1330	
Event log for detector plugged in and pump on correct?	✓		HMH	11-18-09 1330	SDS	11-18-09 1330	

CH-3-4000-01	Yes	No	Verified By		Verified By		Comments
			Initials	Date/Time	Initials	Date/Time	
Energy Calibration complete and passed?	✓		HMH	11-17-09 1000	NR	NR	Pg 24 to 25
Setpoint Verification complete and passed?	✓		HMH	1-8-10 1000	↓	↓	Pg 29 to 29
Source Calibration complete and passed?	✓		HMH	11-17-09 1200	↓	↓	Pg 26 to 28
Relay Test complete and passed?	✓		HMH	11-18-09 1400	SDS	11-18-09 1400	Pg 27
Alarm Test complete and passed?	✓		HMH	11-18-09 1400	SDS	11-18-09 1400	Pg 27

Temperature Calibration	Yes	No	Verified By		Verified By		Comments
			Initials	Date/Time	Initials	Date/Time	
Reference Temperature: 21.2			HMH	11-18-09 1343	NR	NR	
Monitor Temperature: 20.3			HMH	11-18-09 1343	↓	↓	
Reading within ± 2°C?	✓		HMH	11-18-09 1343	SDS	11-18-09 1343	

Restoration and Final Check	Yes	No	Verified By		Verified By		Comments
			Initials	Date/Time	Initials	Date/Time	
Parameters restored	✓		HMH	3-16-10 0820	N/A	N/A	
LPDU in maintenance mode	✓		HMH	3-16-10 0820			
Reset LPDU	✓		HMH	3-16-10 0820			
Pump run for 24 hours	✓		HMH	3-16-10 0820			
All tests complete	✓		[illegible]	3-26-10 1700			
Entries complete	✓		[illegible]	3-26-10 1700			
Test log signed	✓		[illegible]	3-26-10 1700			

Observation/Comments: Turned pump on @09:00

Note: Vendor attended CAT and stated that use of dose rate meters are unnecessary for our application. Procedure revision to make corrections based on vendor comments.

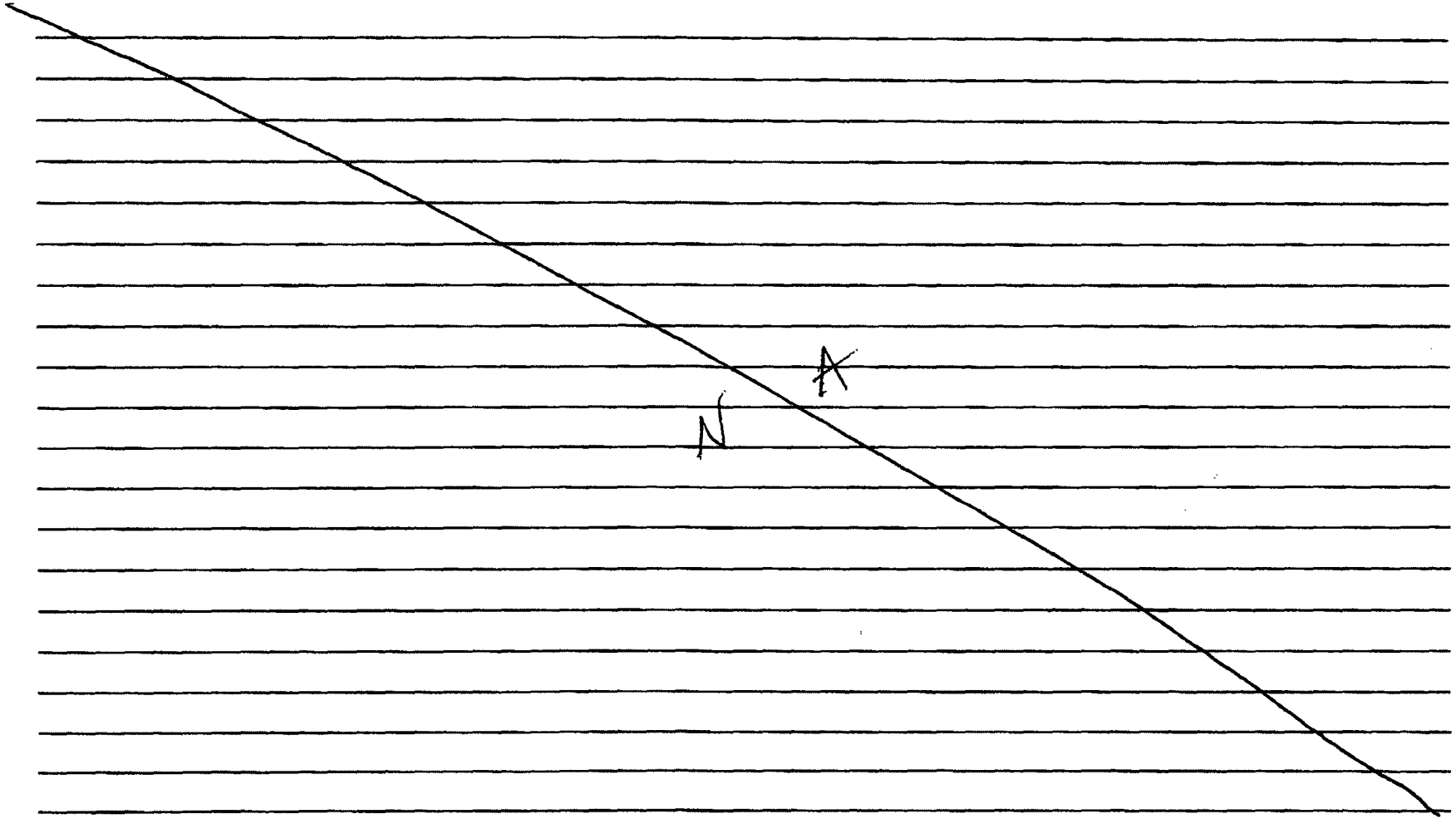
① Pressure/Vacuum gauge and hand purchased for test does not have traceable calibration. Vendor recommended using Swagelok quick connects and a different setup. Leak test provided FAT results. Leak test will be performed again when parts arrive. (AIT 2010-969)

② The flow meter was replaced during the testing interval. EPI meter was replaced by Dwyer 641-6 Serial# N36U-2 and calibrated on 2/3/10. Only final calibration data included in this package on Pg 43 to 44.

③ Problems with flowmeter referenced in comment ② resulted in test being performed at later time. Data to support Isokinetic flow rate can be found on Pg 85.

④ Voltage reading performed by ETI during UL equivalency testing. Cal certificate attached. (Fluke 87V, S# 96260173 Cal due date 2/13/10) Pg 30.
UL equivalency documentation attached Pg 69 to 84.

Observation/Comments:



Initials/Name (Print/Signature HMH/ Holly Huber / Holly Huber

Initials/Name (Print/Signature SOS / Silas Stark / Holly Huber for Silas Stark

Initials/Name (Print/Signature RSB / Ross Bender / RSB for Ross Bender

Initials/Name (Print/Signature JRB / John Berstler / JRB for John Berstler

Initials/Name (Print/Signature DAE / Debra Edwards / D Edwards

Initials/Name (Print/Signature ____ / _____ / _____

The ABPM 201S Alpha monitor is acceptable for use: Chad L Cates 3/15/2010

Signature Date

The ABPM 201S Alpha monitor is acceptable for use: D Edwards 3/15/10

Signature Date

The ABPM 201S Alpha monitor is acceptable for use: _____

Signature Date

Name of Person Performing Calibration	Holly Haber
Monitor Functional Location	1001-562-IMA2
Date/Time	11-17-09 / 0921

Calibration Values:			
	Last Approved	**As Found**	**As Left**
Alpha Max ^{218}Po①	(2)	4869.5	4743
Alpha Max ^{214}Po①		6650.2	6595
Offset		0.7363	1.5140
Slope		9.2623	8.4836
Quadratic		0.00133	0.00239

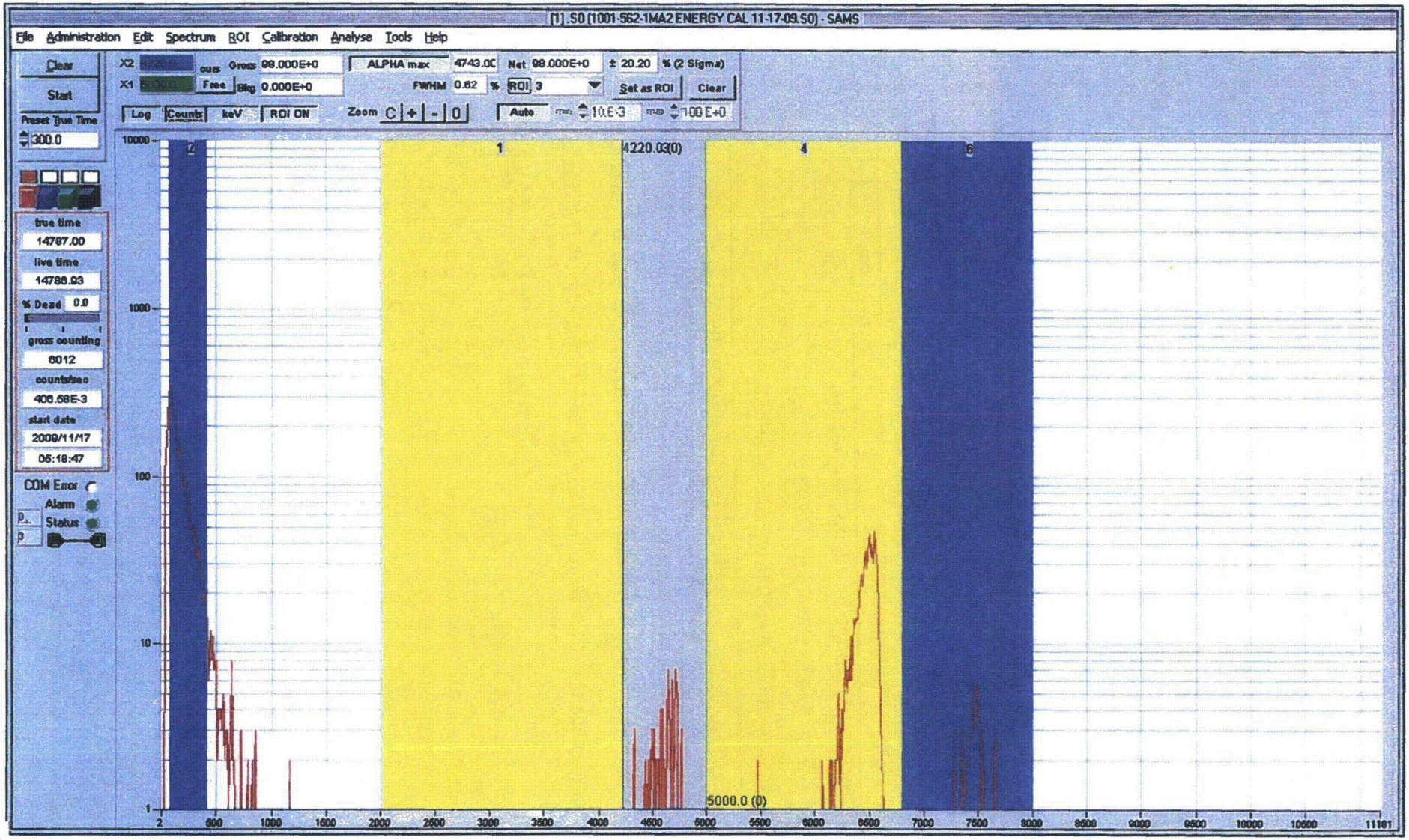
①Acceptable Range for Alpha Max values:

- ^{218}Po: 4743 keV±40keV [4703 to 4783]
- ^{214}Po: 6595 kev±50keV [6545 to 6645]

Setpoints for Alpha Activity:				
	Last Approved	**As Found**	**As Left**	
Hi Setpoint	3.7E-12 µCi/ml	N/A	N/A	✱
Hi Hi Setpoint	7.3 E-12 µCi/ml			

Remarks: ✱ Setpoints N/A because of CAT, Final verification performed on Pg 29
(2) Initial site test. No last approved values.
(3) Spectrum attached on Pg 25.

Reviewed By: Debra Edwards / D Edwards / 11-17-09
Print / Signature / Date


[1].S0 (1001-562-1MA2 ENERGY CAL 11-17-09.S0) - SAMS
File Administration Edit Spectrum ROI Calibration Analyse Tools Help
Clear
Start
Preset True Time
300.0
true time
14787.00
live time
14786.93
% Dead 0.0
gross counting
6012
counts/sec
406.68E-3
start date
2009/11/17
05:19:47
COM Error
Alarm
Status
Gross 98.000E+0
Bkg 0.000E+0
ALPHA max 4743.0C
FWHM 0.62 %
Net 98.000E+0
± 20.20 % (2 Sigma)
ROI 3
Set as ROI
Clear
Log Counts keV ROI ON
Zoom C + - 0
Auto
4220.03(0)
5000.0 (0)

Procedure Title: **Alpha/Beta Monitor (ABPM 201 S) Operation**	
CH-3-4000-01-F-1 **Source Calibration Data Sheet**	CH-3-4000-01 Rev.3 Level 2 - Reference Use Page 1 of 2

Technician Performing Calibration	Holly Hiser
Monitor Functional Location	100L 562-1MA2
Date/Time	11-7-09/ 0948

Test Conditions		
	Required Value	**Measured Value**
Temperature	15 - 35°C	19.6
Relative Humidity	25 - 75%	26
General Area Radiation	< 0.1 mR/hr (<100µR/hr)	114 cpm (βγ, βα)
Energy Calibration complete? (Circle)		**Yes / No**

Source Activity			
	Source Type	**Serial No.**	**A (Bq)**
~~^{241}Am~~	~~Alpha~~	~~F5-247~~	~~2980 (A)~~
Am-241	alpha	F8-940	3295 Bq

2/2 11/17

Gain Verification			
Description	**Acceptance Criteria**	**As Found**	**As Left**
Peak Channel	399 - 439 channel	432 **	NA **
Alpha-Beta gain	0.7 - 1.3 cps	0.9100	NA
Gamma gain	0.7 - 1.3 cps	0.9280	① NA

① Gamma Gain As Left = $\frac{(\text{Alpha} - \text{Beta Gain As Left})\,(\text{Gamma Gain As Found})}{(\text{Alpha} - \text{Beta Gain As Found})}$

Detection Efficiency Check				
Background	**Acceptance Criteria**	**Measured Values**	**Average**	**Comments**
Alpha_cps	< 0.005 cps	0 0 0 0 0	0	None
Po21x_cps	< 0.005 cps	0 0 0 0 0	0	None

Measurement with the Alpha Source			
	Measured Values (cps)	**Average**	**Comments**
Alpha_cps	122.46 122.06 121.79 121.85 122.62	~~122.26~~ HH 11/17/09 122.156	None
Po21x_cps	~~0.0486~~ HH 11/17/09 0.0456 0.0431 0.0352 0.0319 0.0373	0.03922	None

Detection Efficiency Calculation for Source			
	Acceptance Criteria	**Measured Value**	**Comments**
Alpha Efficiency (Eff)	0.0326 to 0.0398 cps/Bq	② 0.03707	None
	1206.2 to 1472.6 cps/µCi	③ 1371.71	↓

② Alpha Efficiency (cps/Bq) = **S/A** = Alpha_cps/2980 Bq

③ Alpha Efficiency (cps/µ Ci) = ② x 37000

Alarm Verification						
Scenario	**Monitor Status**	**Relay Status (read from MASS2)**				**Acceptable? (Yes/No)**
		OP	**TST**	**H**	**H/H**	
High alarm (modify LPDU threshold)	H alarm	On	Off	On	Off	yes
H/H alarm (modify LPDU threshold)	H/H alarm	On	Off	(Off)* On	On	yes
Fault (turn off the sample pump)	Slave fault	Off	Off	Off	Off	yes
Test (place LPDU in Bypass mode)	Bypass	On	On	Off	Off	yes

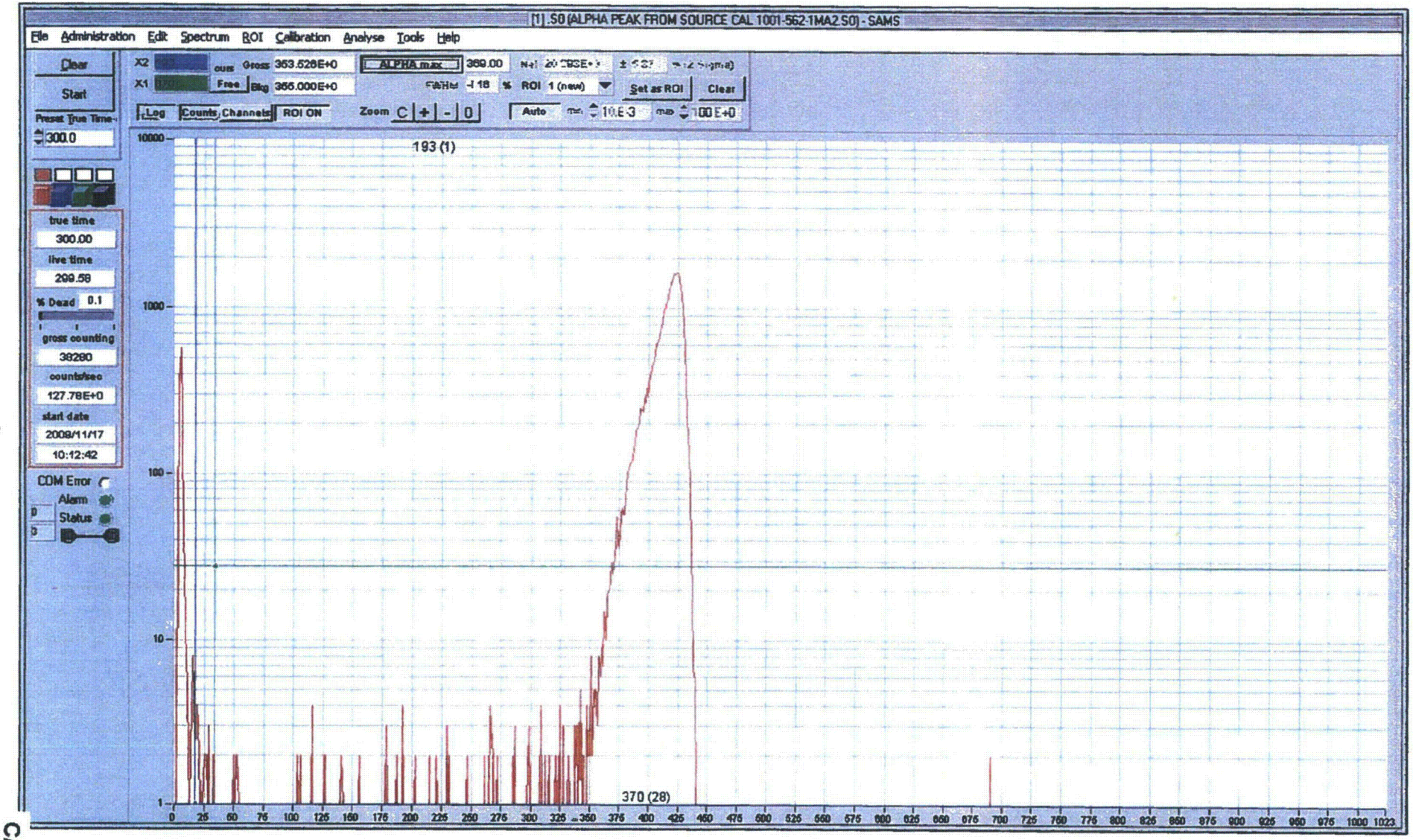
Remarks: post production test value for alpha efficiency. 0.0370 cps/Bq

* high alarm is on during H/H alarm

** Spectrum attached. No change required. "As found" is the same "As left".

Reviewed By: Debra Edwards / Debra Edwards / 11/17/09

Print Signature Date


[1].S0 (ALPHA PEAK FROM SOURCE CAL 1001-562-1MA2.S0) - SAMS
File Administration Edit Spectrum ROI Calibration Analyse Tools Help
Clear
Start
Preset True Time
300.0
true time
300.00
live time
299.58
% Dead 0.1
gross counting
39280
counts/sec
127.78E+0
start date
2009/11/17
10:12:42
COM Error
Alarm
Status
Gross 363.528E+0
Bkg 355.000E+0
ALPHA max
369.00
ROI 1 (new)
Set as ROI
Clear
Log
Counts
Channels
ROI ON
Zoom
Auto
193 (1)
370 (28)

Procedure Title: **Alpha Monitor (ABPM 201 S) Operation**	
CH-3-4000-01-F-3 **Energy Calibration Data Sheet**	CH-3-4000-01 Rev.4 Level 2 Reference Use Page 1 of 1

Name of Person Performing Calibration	Holly Huber
Monitor Functional Location	1001-562-1MA2
Date/Time	1-27-10 / 1048

Calibration Values:			
	Last Approved	**As Found**	**As Left**
Alpha Max ^{218}Po①			
Alpha Max ^{214}Po①		NA	
Offset			
Slope			
Quadratic			

①Acceptable Range for Alpha Max Values	
^{218}Po: 4743 keV±40keV [4703 to 4783]	^{214}Po: 6595 kev±50keV [6545 to 6645]

Setpoints for Alpha Activity:			
	Last Approved	**As Found**	**As Left**
Hi Setpoint	3.7E-12 µ Ci/ml	3.7e-12 µCi/ml	0.14 Bq/m^3
Hi Hi Setpoint	7.3 E-12 µ Ci/ml	7.3e-12 µCi/ml	0.27 Bq/m^3

RamSys backup performed? (Check one):	**Yes** ☒	**No** ☐

Comments: Datasheet used to document setting of final setpoints.
Setpoint units changed to agree with POD dtd 1/27/10
Editorial revision to procedure will be effective prior to next verification
3.7E-12 uCi/ml = 0.14 Bq/m^3
7.3 E-12 uCi/ml = ~~0.28~~ 0.27 Bq/m^3 per 1/25/10
Revision 5 effective 3/17/10 with setpoints in both uCi/ml & Bq/m^3.

Performed by:	Holly Huber		1-27-10
	Printed Name	**Signature**	**Date**
Verified by:	William Haverkorn		1-27-10
	Printed Name	**Signature**	**Date**
Reviewed by:	Debra Edwards	D Edwards	1-27-10
	Printed Name	**Signature**	**Date**

CERTIFICATE OF CALIBRATION

EMERSON.
Process Management

San Francisco-Los Angeles-San Diego-Seattle-Denver-Portland-Albuquerque-Kansas City-Las Vegas-Reno-Phoenix-Salt Lake City-El Paso

NOMENCLATURE	Fluke 87 V Digital Multimeter
	True RMS Multimeter

INSTRUMENT DATA			
INVENTORY NUMBER Ross Bender Div. 093		PROCEDURE etl/Mfr	
MANUFACTURER Fluke		DATE OF LAST CALIBRATION OR TEST 2/2008	
MODEL NUMBER 87 V		RESUBMISSION DATE 2/13/2010	
SERIAL NUMBER 96260273		WERE ADJUSTMENTS OR PARTS REQUIRED? YES NO X	

TEST DATA			
TEST ENGINEER Juan Escobar		JOB NUMBER 3094874	
TEST DATE 02/13/2009		PURCHASE ORDER NA	
AMBIENT TEMPERATURE 70 oF		TEST LOCATION Albuquerque, New Mexico	
RELATIVE HUMIDITY 50%			

TEST EQUIPMENT							
MFG.	MODEL NO.	ASSET NO.	DUE DATE	MFG.	MODEL NO.	ASSET NO.	DUE DATE
Fluke	5500A	20-01200	03/14/2009				

DETAILS

COPY

ETI certifies that this instrument was calibrated / tested in accordance with and traceable to the National Institute of Standards and Technology (N.I.S.T.) or acceptable natural physical standard as per MIL-STD-45662A.

2001 ETI

Procedure Title: Receipt Inspection	
QA-3-3000-18-F-1 QC Receipt Inspection Plan Report	QA-3-3000-18 Rev. 1 Level 3 - Information Use Page 1 of 3

PO No.	RIP No.	Date	Time	Quality Level
1853-10	2009-074	01-June-2009	11:50 am	Maintenance M&TE QL-1

Shipment General Description:
Calibration of Maintenance Instrument ID: FM-2; Model #:FMA1843; Serial #: 230235-3
Davis Certificate of Calibration #: 3232029
Davis Technician: Outside Vendor (Dick Munns Company)

Sampling Method (if applicable)	N/A

Shelf life expiration date (if applicable)	01-Apr-2010

Suspect/Counterfeit Check	☒ NA	☐ SAT ☐ UNSAT

Inspection Acceptable?	☒ Yes	☐ No

Inspector Comments:

M&TE Description	ID No.	Calibration Due Date
N/A	N/A	N/A
N/A	N/A	N/A

Performed By	Matthew Graves, [signature]	6/1/09	11:50 am
	Print/Sign	Date	Time
Reviewed By	RL Whitford [signature]	6/1/09	1235
	Print/Sign	Date	Time

Davis Calibration

Certificate of Calibration

3232029

Instrument Identification

Company ID: 88636
LOUISIANA ENERGY SERVICES, L.P.
QUALITY ASSURANCE
LES
275 ANDREWS HWY 176
EUNICE, NM 88231

PO Number: 1853-10

Instrument ID: FM-2
Manufacturer: OMEGA
Description: MASS FLOW METER

Model Number: FMA1843
Serial Number: 230235-3

Certificate Information

Reason For Service: CALIBRATION
Type of Cal: NORMAL
As Found Condition: IN TOLERANCE
As Left Condition: LEFT AS FOUND
Procedure: VENDORS PROCEDURE REFER TO ATTACHED CERT.

Technician: OUTSIDE VENDOR
Cal Date 01Apr2009
Cal Due Date: 01Apr2010
Interval: 12 MONTHS
Temperature: 70.0 F
Humidity: 50.0 %

Remarks: *Unit calibrated by Dick Munns Co.*

The instrument(s) listed on this certificate has been calibrated by a vendor evaluated and approved in accordance with the Davis Calibration quality system.

All calibrations are traceable to the National Institute of Standards and Technology (NIST), derived from ratio type measurements, or compared to nationally or internationally recognized consensus standards.

A calibration uncertainty ratio of 4:1 [K=2, 95% Confidence Level, calculated using the expanded measurement uncertainty] was maintained unless otherwise stated.

Davis Calibration Laboratory is certified to ISO 9001:2000, and meets the requirements of ANSI/NCSL Z540-1-1994 and ISO 10012:2003.

When noted in Type of Cal an ISO/IEC 17025-2005 accredited calibration has been accomplished.

All results contained within this certification relate only to item(s) calibrated. Any number of factors may cause the calibration item to drift out of calibration before the instrument's calibration interval has expired.

This certificate shall not be reproduced except in full, without written consent of Davis Calibration Laboratory.

Approved By: MARK GOODMAN
Service Representative

DICK MUNNS COMPANY
Liquid and Gas - Flowmeter Calibration Service
10572 Calle Lee - 138 • Los Alamitos, California 90720
Telephone (714) 827-1215 • Telefax (714) 827-0823

CERTIFICATE OF CALIBRATION

Client Name:	DAVIS CALIBRATION	Calibration Date:	04-01-2009
Reference Number:	PO# 4040680	Calibration Due:	04-01-2010
Instrument Manufacturer:	OMEGA	Calibration Fluid:	GN2 @ 70F
Instrument Description:	MASS FLOWMETER	Standard(s) Used:	A4,A312 DUE 01-2011
Model Number:	FMA1843	NIST Traceability Per:	MS131414,MS13431
Serial Number:	230235-3	Ambient Conditions:	759 mmHGA 50% RH 70F
Rated Uncertainty:	+/- 1.5% F.S.	Procedure Number:	NAVAIR-17-20MG-02
Uncertainty Given:	AS RECEIVED WITHIN SPECS.	Certificate/File Number:	433347

REFERENCE CONDITIONS ARE: 760 mmHGA 70F. (A/N: FM-2)

INDICATED UUT SLPM	ACTUAL DM.STD. SLPM
0	0.000
5	5.031
15	15.064
50	50.120
100	100.241
150	150.361
200	200.482

All instruments used in the performance of the above calibration have direct traceability to the National Institute of Standards and Technology (NIST). The accuracy ratio between the calibration standards used and the unit under test is a minimum of 4:1, unless otherwise noted. Calibration has been performed per the above listed procedure number, in accordance with ISO 10012-1,17025, ANSI/NCSL-Z-540-1, and/or MIL-STD-45662A.

Calibration Performed By:

DICK MUNNS COMPANY

Approved By:

R.L.MUNNS

Procedure Title: Receipt Inspection	
QA-3-3000-18-F-1 QC Receipt Inspection Plan Report	QA-3-3000-18 Rev. 2 Level 3 Information Use Page 1 of 7

PO No.	RIPR No.	Date	Time	Quality Level
1853-10	2009-229	20-Aug-2009	1:44 pm	Maintenance M&TE QL-1

Shipment General Description:
Calibration of Maintenance Instrument ID: M87-2; Model #: 87 V; Serial #: 94910331
Davis Certificate of Calibration #: 3380524
Davis Calibration Technician: Steve Galla

Sampling Method (if applicable)	N/A
Shelf life expiration date (if applicable)	22-Jul-2010

Suspect/Counterfeit Check	☒ NA	☐ SAT ☐ UNSAT
Safe-By-Design Verification	☒ NA	☐ SAT ☐ UNSAT
Inspection Acceptable?	☒ Yes	☐ No

Quality Records Validation
Validated by
Printed Name: R. Schumacher
Date of Validation: 8/26/09

Inspector Comments: Fluke, True RMS Multimeter; Model No. 87 V; Serial No. 94910331

M&TE Description	ID No.	Calibration Due Date
N/A	N/A	N/A
N/A	N/A	N/A

Performed By	Matthew Graves, Print/Sign	8/20/09 Date	1:46 pm Time
Reviewed By	RL Whitford Print/Sign	8/25/09 Date	1202 Time

Davis Calibration

ACLASS Accredited CALIBRATION

Certificate of Calibration

3380524

Instrument Identification

Company ID: 88636
LOUISIANA ENERGY SERVICES, L.P.
QUALITY ASSURANCE
LES
275 ANDREWS HWY 176
EUNICE, NM 88231

PO Number: 1853

Instrument ID: M87-2
Manufacturer: FLUKE
Description: TRUE RMS MULTIMETER

Model Number: 87 V
Serial Number: 94910331

Accuracy: Mfr. Specifications

Certificate Information

Reason For Service: CALIBRATION
Type of Cal: ACCREDITED 17025 WITH UNCERTAINTIES
As Found Condition: IN TOLERANCE
As Left Condition: LEFT AS FOUND
Procedure: FLUKE , 80 SERIES V MANUFACTURERS MANUAL

Technician: STEVE GALLA
Cal Date 22Jul2009
Cal Due Date: 22Jul2010
Interval: 12 MONTHS
Temperature: 21.0 C
Humidity: 32.0 %

Remarks:

The instrument on this certification has been calibrated against standards traceable to the National Institute of Standards and Technology (NIST) or other recognized national metrology institutes, derived from ratio type measurements, or compared to nationally or internationally recognized consensus standards.

A test uncertainty ratio (T.U.R.) of 4:1 [K=2, approx. 95% Confidence Level] was maintained unless otherwise stated.

Davis Calibration Laboratory is certified to ISO 9001:2000 by Eagle Registrations (certificate # 3046). Lab Operations meet the requirements of ANSI/NCSL Z540-1-1994, ISO 10012:2003, 10CFR50 AppxB, and 10CFR21.

ISO/IEC 17025-2005 accredited calibrations are per ACLASS certificate # AC-1139 within the scope for which the lab is accredited. All results contained within this certification relate only to item(s) calibrated. Any number of factors may cause the calibration item to drift out of calibration before the instrument's calibration interval has expired.

This certificate shall not be reproduced except in full, without written consent of Davis Calibration Laboratory.

Approved By: STEVE GALLA
Service Representative

Calibration Standards

NIST Traceable#	Inst. ID#	Description	Model	Cal Date	Date Due
2927994	04-0453	CALIBRATOR	5520A W/SC1100	14Jan2009	14Jan2010

Davis Calibration • 1421 Champion Drive, Suite 304 • Carrollton, TX 75006 • Phone: 800-698-2033 • Fax: 972-234-1079

Calibration Data

✓ In Tolerance ✗ Out of Tolerance

Range	Nominal	As Found		As Left		Min	Max
AC VOLTS							
mV / 60 Hz	330.0	329.6	✓	329.6	✓	327.3	332.7
mV / 13 kHz	600.0	606.0	✓	606.0	✓	586.0	614.0
V / 60 Hz	3.300	3.297	✓	3.297	✓	3.275	3.325
V / 20 kHz	3.300	3.290	✓	3.290	✓	3.214	3.386
V / 60 Hz	33.00	32.97	✓	32.97	✓	32.75	33.25
V / 20 kHz	33.00	32.93	✓	32.93	✓	32.14	33.86
V / 60 Hz	330.0	329.8	✓	329.8	✓	327.5	332.5
V / 2.5 kHz	330.0	330.2	✓	330.2	✓	323.0	337.0
V / 60 Hz	500.0	499.8	✓	499.8	✓	494.0	506.0
V / 1 kHz	1000	1002	✓	1002	✓	986	1014
AC VOLTS FREQUENCY							
150 mV @ 99.95 kHz	99.95	99.95	✓	99.95	✓	99.93	99.97
150 mV @ 199.50 kHz	199.50	199.50	✓	199.50	✓	199.48	199.52
FREQUENCY SENSITIVITY							
V @ 99.95 kHz	99.95	99.96	✓	99.96	✓	99.93	99.97
@ 99.95 kHz	99.95	99.95	✓	99.95	✓	99.93	99.97
DCV Hz TRIGGER LEVEL							
3.4 V,1 kHz SQ Wave	1000.0	1000.0	✓	1000.0	✓	999.8	1000.2
DCV Hz DUTY CYCLE							
5 V,1 kHz DC offset 2.5V SQ.W	50.0	49.9	✓	49.9	✓	49.7	50.3
DC VOLTS							
V	3.300	3.300	✓	3.300	✓	3.297	3.303
V	33.00	33.00	✓	33.00	✓	32.97	33.03
V	330.0	330.0	✓	330.0	✓	329.7	330.3
V	1000	1000	✓	1000	✓	998	1002
mV DC							
mV	33.0	33.0	✓	33.0	✓	32.9	33.1
mV	330.0	330.0	✓	330.0	✓	329.6	330.4
RESISTANCE TEST							
Ohms	330.0	330.1	✓	330.1	✓	329.1	330.9
kOhms	3.300	3.300	✓	3.300	✓	3.292	3.308
s	33.00	33.00	✓	33.00	✓	32.92	33.08
kOhms	330.0	330.1	✓	330.1	✓	327.9	332.1

Davis Calibration

ACLASS ACCREDITED CALIBRATION

Certificate of Calibration

3380524

Calibration Data

✓ In Tolerance ✗ Out of Tolerance

Range	Nominal	As Found		As Left		Min	Max
RESISTANCE TEST							
MOhms	3.300	3.301	✓	3.301	✓	3.279	3.321
MOhms	30.00	30.01	✓	30.01	✓	29.67	30.33
nS CONDUCTANCE							
Open Input	0.00	0.01	✓	0.01	✓	-0.30	0.30
100 MOhms	10.00	10.01	✓	10.01	✓	9.60	10.40
DIODE							
3 V DC	3.000	3.000	✓	3.000	✓	2.939	3.061
AC AMPS							
A / 60 Hz	3.000	3.000	✓	3.000	✓	2.968	3.032
DC AMPS							
A	3.000	3.001	✓	3.001	✓	2.990	3.010
AC MILLIAMPS							
/ 60 Hz	33.00	32.99	✓	32.99	✓	32.65	33.35
mA / 60 Hz	330.0	330.0	✓	330.0	✓	326.5	333.5
DC MILLIAMPS							
mA	33.00	33.00	✓	33.00	✓	32.89	33.11
mA	330.0	330.0	✓	330.0	✓	329.1	330.9
AC MICROAMPS							
µA / 60 Hz	330.0	329.9	✓	329.9	✓	326.5	333.5
µA / 60 Hz	3300	3300	✓	3300	✓	3265	3335
DC MICROAMPS							
µA	330.0	330.0	✓	330.0	✓	328.9	331.1
µA	3300	3300	✓	3300	✓	3291	3309
CAPACITANCE							
Open Input	0.26	0.26	✓	0.26	✓	0.21	0.31
5 nF	5.00	4.97	✓	4.97	✓	4.70	5.30
9.5 uF	9.50	9.52	✓	9.52	✓	9.20	9.80
ACV LOW PASS FILTER							
applied 400 V / 400 Hz	400.0	390.7	✓	390.7	✓	376.0	408.0
1400 V / 800 Hz	283.0	282.1	✓	282.1	✓	226.0	340.0
TEMPERATURE in °C							

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Davis Calibration

ACLASS Accredited CALIBRATION

Certificate of Calibration

3380524

Calibration Data

✓ In Tolerance ✗ Out of Tolerance

Range	Nominal	As Found		As Left		Min	Max
TEMPERATURE in °C							
0 ° C	0.0	-0.7	✓	-0.7	✓	-1.0	1.0
100 ° C	100.0	98.8	✓	98.8	✓	98.0	102.0
BACKLIGHT TESTS							
Backlight on	Check	Pass	✓	Pass	✓	Pass/Fail	Pass/Fail
Intensifies	Check	Pass	✓	Pass	✓	Pass/Fail	Pass/Fail
Backlight off	Check	Pass	✓	Pass	✓	Pass/Fail	Pass/Fail

End of Datasheet

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Davis Calibration Laboratory

Measurement Uncertainty Report

Certificate #	3380524
Date	7/22/2009
Description	**True RMS Multimeter**
Mfr.	**Fluke**
Model	**87V**
Standards	04-0453

[k=2, approx. 95% Confidence Level]

Function	Range	Nominal	Uncertainty
AC Volts	mV / 60 Hz	330.00	5.77E-02
AC Volts	mV / 13kHz	600.00	5.77E-02
AC Volts	V / 60 Hz	3.300	7.51E-05
AC Volts	V / 20 kHz	3.300	5.92E-04
AC Volts	V / 60 Hz	33.00	8.78E-03
AC Volts	V / 20 kHz	33.00	5.93E-03
AC Volts	V / 60 Hz	330.0	5.91E-02
AC Volts	V / 2.5 kHz	330.0	5.89E-03
AC Volts	V / 60 Hz	500.0	5.91E-02
AC Volts	V / 1k Hz	1000	1.20E-02
AC Volts Frequency	150 mV @ 99.95 kHz	99.95	8.23E-03
AC Volts Frequency	150 mV @ 199.95 kHz	199.50	8.23E-03
Frequency Sensitivity	0.7 v @ 99.95 kHz	99.95	8.23E-03
Frequency Sensitivity	7 v @ 99.95 kHz	99.95	8.23E-03
DCV Hz Trigger Leval	3.4V, 1kHz SQ Wave	1000.0	5.79E-02
DCV Hz Duty Cycle	5v, 1kHz DC Offset 2.5V SQ wave	50.0	5.79E-02
DC Volt	Volt	3.300	5.77E-04
DC Volt	Volt	33.00	1.20E-03
DC Volt	Volt	330.0	5.78E-02
DC Volt	Volt	1000	1.07E-03
mV Dc	mV	33.0	5.77E-02
mV Dc	mV	330.0	5.77E-02
Resistance	Ohms	330.0	5.78E-02
Resistance	kOhms	3.300	9.68E-02
Resistance	kOhms	33.00	2.30E-01
Resistance	kOhms	330.0	2.90E+00
Resistance	Mohms	3.300	8.88E-02
Resistance	Mohms	30.00	5.77E-02
nS Conductance	Open Input	0.00	N/A
nS Conductance	100 Mohms	10.00	5.82E-03
Diode	3VDc	3.000	5.77E-04
AC Amps	A / 60Hz	3.000	5.77E-02
DC Amps	A	3.000	5.77E-02
AC Milliamps	mA / 60Hz	33.00	5.77E-02
AC Milliamps	mA / 60Hz	330.0	5.77E-02
DC Milliamps	mA	33.00	5.77E-02
DC Milliamps	mA	330.0	5.77E-02
Microamps	µA / 60Hz	330.0	5.77E-02

LED REF: 2009-229

7 7

AC Microamps	µA / 60Hz	3300	5.77E-02
DC Microamps	µA	330.0	5.77E-02
DC Microamps	µA	3300	5.77E-02
Capacitance	Open Input	0.00	N/A
Capacitance	5.00	5.00	2.70E-02
Capacitance	9.50	9.500	3.50E-01
ACV Low Pass Filter	Applied 400V / 400Hz	400	N/A
ACV Low Pass Filter	Applied 400V / 800Hz	283	N/A
Temperature in °C	0.0	0.0	2.99E-01
Temperature in °C	100.0	100.0	2.99E-01

Davis Calibration utilizes the Root Sum Squared method of estimating measurement uncertainty as described in Appendix A of NIST technical note 1297, 1994 edition, and ANSI/NCSL Z540-2-1997 "American National Standard for Expressing Uncertainty – U.S. Guide to the Expression of Uncertainty in Measurement".
A coverage factor (k) of 2 is applied to all calculations to insure a Confidence Level of approx. 95%.

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 325-235-5494
501 OAK STREET FAX NO. 325-235-467
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER LOUISIANA ENERGY SERVICES LP ORDER NO. 20140302/341995

Mfg. Ludlum Measurements, Inc. Model 2224 Serial No. 247506

Mfg. Ludlum Measurements, Inc. Model 43-93 Serial No. PR 268991

Cal. Date 8-Sep-09 Cal Due Date 8-Sep-10 Cal. Interval 1 Year Meterface 202-783

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T 73 °F RH 38 % Alt 699.8 mm Hg

☐ New Instrument Instrument Received ☑ Within Toler +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair ☐ Other-See comments

☑ Mechanical ck. ☑ Meter Zeroed ☐ Background Subtract ☐ Input Sens. Linearity
☐ F/S Resp. ck ☑ Reset ck. ☐ Window Operation ☐ Geotropism
☑ Audio ck. ☐ Alarm Setting ck. ☑ Batt. ck. (Min. Volt) 2.2 VDC
☑ Calibrated in accordance with LMI SOP 14.8 rev 12/05/89. ☐ Calibrated in accordance with LMI SOP 14.9 rev 02/07/97.

Instrument Volt Set 725 V Input Sens. Comment mV Det. Oper. 725 V at Comment mV Threshold Dial Ratio ____ = ____ m

☑ HV Readout (2 points) Ref./Inst. 500 / 498 V Ref./Inst. 1500 / 1501 V

COMMENTS:

Alpha threshold = 120mv
Beta threshold = 3.5mv
Beta window = 30mv
Overload set to simulated light leak.
High voltage set with detector not connected.
Firmware: 390063

Gamma Calibration: GM detectors positioned perpendicular to source except for M 44-9 in which the front of probe faces source.

RANGE/MULTIPLIER	REFERENCE CAL. POINT	INSTRUMENT REC'D "AS FOUND READING"	INSTRUMENT METER READING*
x1000	400kcpm	400	400
x1000	100kcpm	100	100
x100	40kcpm	400	400
x100	10kcpm	100	100
x10	4kcpm	400	400
x10	1kcpm	100	100
x1	400cpm	400	400
x1	100cpm	100	100

*Uncertainty within ± 10% C.F. within ± 20% ALL Range(s) Calibrated Electronically

	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
Digital Readout	400kcpm	399613	399613
	40kcpm	39958	39958
	4kcpm	3996	3996
	400cpm	399	399
	40cpm	40	40
Log Scale			

Ludlum Measurements, Inc. certifies that the above instrument has been calibrated by standards traceable to the National Institute of Standards and Technology, or to the calibration facilities of other International Standards Organization members, or have been derived from accepted values of natural physical constants or have been derived by the ratio type of calibration techniques. The calibration system conforms to the requirements of ANSI/NCSL Z540-1-1994 and ANSI N323-1978 State of Texas Calibration License No. LO-1963

Reference Instruments and/or Sources: ☐ S-394/1122 ☐ 1131 ☐ 781 ☐ 059 ☐ 280 ☐ 60646
Cs-137 Gamma S/N ☐ 1162 ☐ G112 ☐ M565 ☐ 5105 ☐ T1008 ☐ T879 ☐ E552 ☐ E551 720 ☐ 734 ☐ 1616 ☐ Neutron Am-241 Be S/N T-304

☑ Alpha S/N Pu239 SN:2928 25081dpm ☑ Beta S/N Tc99 SN:5280 93200dpm ☑ Other SrY90 SN:4016 55367dpm

m 500 S/N 190566 Oscilloscope S/N ☑ Multimeter S/N 86250390

Calibrated By: Jason Flores Date 8-Sept-09

Reviewed By: Rhonda Hanna Date 9 Sep 09

This certificate shall not be reproduced except in full, without the written approval of Ludlum Measurements, Inc.
FORM C22A 10/15/2008

AC Inst. Only ☐ Passed Dielectric (Hi-Pot) and Continuity Test Failed:

Designer and Manufacturer
of
Scientific and Industrial
Instruments

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 325-235-5494
501 OAK STREET FAX NO. 325-235-467
SWEETWATER, TEXAS 79556, U.S.A.

Bench Test Data For Detector

Detector 43-93 Serial No. PR268991 Order #. 20140302/341995

Customer LOUISIANA ENERGY SERVICES LP Alpha Input Sensitivity 120 mV

Counter 2224 Serial No. 247506 Beta Input Sensitivity 3.5 mV

Count Time 1 Minute Beta Window 30 mV

Other _____ Distance Source to Detector Surface

High Voltage	Background		Isotope Pu239 Size 25081 dpm		Isotope Tc 99 Size 93200 dpm		Isotope Sr/Y 90 Size 55367 dpm	
	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta
700	0	97	4414	323	34	10192	1	8476
725	1	132	4998	371	21	14513	2	11518
750	0	230	5324	439	27	17823	4	13142
J.F. ~~500~~ 775	0	282	5559	525	36	21192	2	14970

☐ Gas Proportional detector count rate decreased ≤ 10% after 15 hour static test using 39" cable.

☐ Gas proportional detector count rate decreased ≤ 10% after 5 hour static test using 39" cable and alpha/beta counter

Signature Jason Flor Date 8-SEPT-09

Calibration Accuracy Check List

Serial Number	N36U_2

1001-662-1MQ2

Model number	Dwyer 641-6

M&TE	Shortridge Instruments airdata		
Model #	ADM-870C	Serial #	MO4395
Cal Due Date	4/8/2010		

Date	2/3/2010

M&TE	Flow	Units **	4-20mA	Acceptable Range (Flow)	Acceptable Result
0	5	m3hr	4	0 - 30	yes
230	210	m3hr	7.6	200 - 260	yes
400	385	m3hr	10.6	370 - 430	yes
650	660	m3hr	14.1	620 - 680	yes
835	845	m3hr	17.4	805 - 865	yes

Test Performed By: John Berstler LES Engineering and Gene Franke Black Watch Systems

** GEVS Programming was changed to metric output for flow

1001-662-1MQ2 tested on 2/3/10

m3/hr	SCFM	Current (mA)	% Input
5	2.945	4	0.00%
210	123.69	7.6	22.50%
385	226.765	10.6	41.25%
660	388.74	14.1	63.13%
845	497.705	17.4	83.75%

"StkFlow" algorithm parameters:

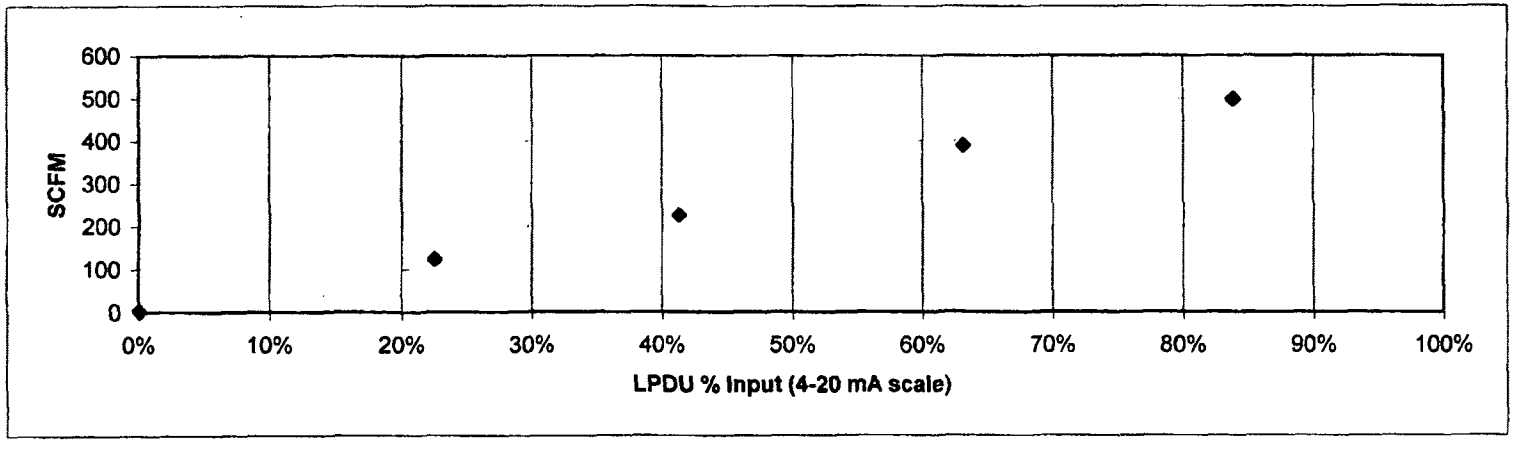
	%		SCFM
X1	0	Y1	3
X2	23	Y2	124
X3	41	Y3	227
X4	63	Y4	389
X5	75	Y5	446
X6	84	Y6	498
X7	100	Y7	594

Suggested "Target" algorithm parameters:

	%		l/min
X1	0	Y1	40
X2	23	Y2	40
X3	34	Y3	40
X4	51	Y4	50
X5	67	Y5	60
X6	75	Y6	60
X7	100	Y7	60

Flow rate	Est. % input
200	34%
300	51%
400	67%

The "Target" configuration assumes the maximum flow rate is 400 SCFM, even though the meter can go to 600 SCFM



Appendix B: Test Logs for ABPM201S S/N 090501-02

This appendix contains the completed test logs from the post production and factory acceptance tests. The following is included:

1. Completed FAT log, from test procedure 12-00124.
2. Completed post production test log, from procedure 12-00098.
3. Manufacturer data sheets for the electronics package and detector
4. Spectra collected during monitor testing

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LES ABPM201S

Factory Acceptance Test Log

Test Procedure:	12-00124	**Revision:**	1
Post-Production Test Procedure:	12-00098	**Revision:**	2

Date Test Started: 5/27/09 9:00

Date Test Ended: 5/28/09 12:00

Performed By:	S. Stark (Print Name)	(Signature)	5/28/09 (Date)
Witnessed By:	Holly Huber (Print Name)	(Signature)	5-28-09 (Date)
Reviewed By:	David Jarrow (Print Name)	(Signature)	5-29-2009 (Date)
Approved By:	Mike Edelman (Print Name)	Dr Zeev Edelman (Signature)	6-1-2009 (Date)

S/N 090501-02

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1. Introduction

Not applicable

2. Related Documentation

Not applicable

3. Glossary of terms

Not applicable

4. Notes

Not applicable

5. Devices to be Tested

Not applicable

6. Test Tools & Conditions

6.1 Prerequisites

Test Results: ☑ Satisfactory ☐ Unsatisfactory (describe) ☐ Conditionally satisfactory (describe)

Performed by: S. Stark Date: 5/27/09

Notes/Comments:

ABPM201S Test Data Sheet reference number:	14-00058-090501-02

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6.2 Required Tools

Test Results: ☑ Satisfactory ☐ Unsatisfactory (describe) ☐ Conditionally satisfactory (describe)

Performed by: S. Stark Date: 5/27/09

Notes/Comments:

MASS Version:	1.7.0
SAMS Version:	H

Tool	Model No.	Serial No.	Calibration Due Date
Digital thermometer (0.1 °C resolution)	Omega HH314	070800353	4/22/10
Hygrometer (1% RH resolution)	Omega HH314	070800353	4/22/10
Digital multimeter (0.1 mA resolution)	Fluke 87	91580342	11/17/09
Dose rate meter (0.1mR/hr resolution)	Ram Ion	20292-10	11/24/10
Mass flow meter (0.5 l/min resolution)	Omega FMA1843	205587-2	5/12/10
Pressure gauge (0.2psi resolution)	N/A	N/A	N/A

6.3 Test Conditions

Test Results: ☑ Satisfactory ☐ Unsatisfactory (describe) ☐ Conditionally satisfactory (describe)

Performed by: S. Stark Date: 5/27/09 - 5/28/09

Notes/Comments:

	5/27/09	5/28/09
Temperature	74°F	74°F
Humidity	58%	55%
Gamma Background	<0.1 mR/hr	<0.1 mR/hr
Line voltage	118.3V	118.1 V
Line Frequency	59.98 Hz	59.98 Hz

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02

7. Inspection & Test Setup

7.1 Visual Inspection

Test Results: ☑ Satisfactory ☐ Unsatisfactory (describe) ☐ Conditionally satisfactory (describe)

Performed by: S. Stark Date: 5/27/09

Notes/Comments:

Serialized electronics:

Monitor	Device	Part Number	Serial Number
ABPM201S	Assembly (skid)	02-00384	090501-02
	LPDU/PIPS	131839	090501
	PIPS Detector	45445	081998
	Particulate flow meter	120114	091772
	PIS flow meter	120112	080691
	Filter cassette	43775	081193
	Flow control valve	700055	29236
System	RDU	134142	080642

7.2 Test Setup

Test Results: ☑ Satisfactory ☐ Unsatisfactory (describe) ☐ Conditionally satisfactory (describe)

Performed by: S. Stark Date: 5/27/09

Notes/Comments:

Step. 7.2.4: all switches should be down (typo on procedure) (ECN 681 opened)

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8. Software Configuration

8.1 Objective

Not applicable

8.2 LPDU/SAS/PIPS (ABPM201S)

Test Results: ☑ Satisfactory ☐ Unsatisfactory (describe) ☐ Conditionally satisfactory (describe)

Performed by: S Stark Date: 5/27/09

Notes/Comments:

Configuration changes:

	Number	Expected		As Found	
		Index	Version	Index	Version
Base software	735	E or later	1	E	1
Application software	774	R or later	2	R	2
Parameters set	827			C	103

8.3 RDU

Test Results: ☑ Satisfactory ☐ Unsatisfactory (describe) ☐ Conditionally satisfactory (describe)

Performed by: S Stark Date: 5/27/09

Notes/Comments:

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Configuration changes:

	Number	Expected		As Found	
		Index	Version	Index	Version
Base software	1030	B or later	1	B	1
Application software	1079	A or later	1	A	1
Parameters set	603			D	1

9. Isokinetic Flow Control Test

Test Results: ☑ Satisfactory ☐ Unsatisfactory (describe) ☐ Conditionally satisfactory (describe)

Performed by: S. Stark Date: 5/27/09

Notes/Comments:

Values of "minimum correction" and "mitral correction reduced to 33%
Acceptance criteria is ±25% of expected flow rate.

Test	Stack flow rate (m3/hr)	Expected sample flow rate (l/min)	Measured sample flow rate (l/min)
1	0 (current generator off)	40	40.3
2	2500	40	40.3
3	5000	40	40.5
4	7500	50	50.9
5	10000	60	61.6

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10. RDU Test

10.1. Initial Conditions

Test Results: ☑ Satisfactory ☐ Unsatisfactory (describe) ☐ Conditionally satisfactory (describe)

Performed by: S. Stark Date: 5/27/09

Notes/Comments:

10.2. Relay & Alarm Test

Test Results: ☑ Satisfactory ☐ Unsatisfactory (describe) ☐ Conditionally satisfactory (describe)

Performed by: Date: 5/27/2009

Notes/Comments:

*Error in procedure: In Bypass, H/H relay does not remain latched (see ECN 681)

Status w/ no alarms:

Relay	Expected Status	Observed Status
Operate	On	on
Test	Off	off
Alert	Off	off
High	Off	off
High/High	Off	off

Relay test results:

Scenario	Monitor Status (display or MASS2)	Relay Status (read from MASS2)					Buzzer Status
		OP	TST	AL	H	H/H	
Alert alarm	Alert	on	off	on	off	off	Slow
High alarm	High	on	off	on	on	off	medium
H/H alarm	H/H	on	off	on	on	on	fast
Fault	Fault (intend)	off	off	off	off	on	continuous
RDU in bypass		~~off~~ on (SB)	~~off~~ on	~~off~~ on	~~off~~ off	~~off~~ off*	

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11. Creation of Parameter Sets

Test Results: ☑ Satisfactory ☐ Unsatisfactory (describe) ☐ Conditionally satisfactory (describe)

Performed by: S. Stark Date: 5/28/09

Notes/Comments:

Parameter file information:

		Parameter Set			
Device	**Name**	**Number**	**Index**	**Version**	**Filename**
LPDU/SAS	ABPM201S	827	A	102	RmsSas Pips_102A
~~LDU (RI-1)~~ RDU	~~LDU~~ RDU	603	A	2	Rms DU_2A

12. Review and Restoration

Test Results: ☑ Satisfactory ☐ Unsatisfactory (describe) ☐ Conditionally satisfactory (describe)

Performed by: S. Stark Date: 5/28/09

Notes/Comments:

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OZ

Additional/supplemental test results

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Note: for electronic archival, save the completed datasheet with the filename "14-00098-######" where ###### is the serial number of the monitor

Post Production Test Data Sheet

System: ABPM201S Alpha Beta Particulate Monitor
Part Number including option codes: 02-00384
Serial Number: 090501-02
(Note: append serial number to the document number of the data sheet)
Test Date(s): 5/15/09, 5/18/09, 5/19/09
Tested By: S. Stark Yonatan Tadesse
Witnessed by:
MGP References: So # 89860
Client References: Po # 302151

Suite 150
5000 Highlands Parkway
Smyrna, GA 30082

Rev.	Date	Prepared By	Reviewed By	Origin and Description of the Changes
0	02/21/2008	Silas Stark		Original issue based on MGP SA document 123210
1	07/15/2008	Silas Stark		Refer to ECN 641

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MGPI QC 0

Tested by:	S. Stark / Y. Tadysse	Date: 5/15/09
Notes/Comments:	S/N 090501-02	

§3.2 Calibrated Instruments

Item	Model No.	Serial No.	Cal. Due	Comments
Digital Multimeter	Fluke 87	91580342	4/17/2009	
Temperature Sensor	Omega HH 314	070 ~~8~~ 353	4/22/10	
Pressure/vacuum gauge	Ashcroft	Q-4832	4/20/10	
Mass flow meter	Omega FMA-1843	205587-2	5/12/10	
Hi-Pot tester	Biddle	18791	4/17/10	
Mega-ohmmeter	Megger 210200	950400-1471-0485	4/17/10	

§3.3. Radioactive Sources

Source	Serial No.	Activity (A_0)	Date	Comments
Beta isotope: N/A				
Alpha isotope: Am-241	FS-246	2311 Bq	11/1/2008	MGP Source
Other: Am-241	F8-940	3295 Bq	4/1/2009	LES Source
Other: N/A	N/A	N/A	N/A	N/A

§4 Test Conditions

Description	Unit	Req. Value	Measured Value		Comments
			MGP	Other	
Temperature	°F	60 - 90	70°F		
Humidity	%	<99	56%		
Pressure	-	Ambient	Ambient		
Line power	VAC	108 - 132	118 VAC		
Frequency	Hz	57 - 63	60.00		

§5 Visual Inspection

Description	Req. Value	Measured Value		Reference (Document & Revision)
		MGP	Other	
Component layout, routing, overall condition	Correct	Correct		10-0297 Rev. 0
Frame mounting hole dimensions	Describe: F/B 17.75 Sides 12.75	F/B 17.75 Sides 12.75		10-0297 Rev 0
Other interface dimensions (describe):	Describe: Height 61.5"	≈ 61.8		10-0297 Rev 0
Labels, nameplates, placards, etc.	Correct	Correct		6-00386 - Rev 2
Point-to-point wiring	Correct	Correct		6-00385 - Rev 3
Wire sizing, markers, fuses, etc.	Correct	Correct		6-00387 Rev 3
Other (describe): N/A.	Describe:			

Serialized equipment

Description	Part No.	Serial No.	Condition	Comments
LP(D)U/SAS/PIPS	131839A	090501	☑ Sat. ☐ Unsat.	Kit S/N 090501
PIPS Detector	45445A	081998	☑ Sat. ☐ Unsat.	
Particulate flow meter	120114K	091772	☑ Sat. ☐ Unsat.	
PIS flow meter	120112F	080691	☑ Sat. ☐ Unsat.	
Check source	N/A		☐ Sat. ☐ Unsat.	

MGP QC

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Tested by:	S. Stark / Y. Tadesse	Date: 5/15/2009
Notes/Comments:	S/N 090501-02	

Description	Unit	Req. Value	Measured Value		Comments
			MGP	Other	
§6: Dielectric & Continuity					
6.1 Dielectric test	mA	<10	<10		
6.2 Isolation test	MΩ	>100	>999		
6.3 Continuity test	Ω	<0.1	<0.1		
§7: Relief valve test	"Hg	20.5 - 24.5	21 "Hg		
§8: Option verification					
8.1 Grab sampler	-	Correct / N/A	Correct		
8.2 PIS	-	Correct / N/A	Correct		
8.3 Check source	-	Correct / N/A	N/A		
8.4 Sample pump	-	Correct / N/A	Correct		
Other	-		N/A		
§9: Leak Test	"Hg	<0.6	<0.25		
§10: Test configuration	-	Correct	Correct		
Relay adjustment	A	(from motor)	6.6		
§11: Flow meter test*					
11.1 Particulate flow:					
Measure 1	l/min	0 to 2	0		
Measure 2	l/min	17 to 23	19.9		
Measure 3	l/min	27 to 33	29.4		
Measure 4	l/min	42 to 48	45.1		
11.2 PIS Flow:					
Measure 1	l/min	0 to 2	0		
Measure 2	l/min	17 to 23	20.3		
Measure 3	l/min	27 to 33	31.3		
Measure 4	l/min	42 to 48	46.3		
§12: Detector fault test	-	Correct	Correct		
§13: Monitor test					
13.1 Automation test	-				
13.1.1 Normal Operation	-	Correct	Correct		
13.1.2 Electrical Test	-	Correct	Correct		
13.1.3 ΔPmin Test	-	Correct	Correct		d = 2 3/16"
13.1.4 ΔPmax Test	-	Correct	Correct		
13.1.5 Minimum flow test	-	Correct	Correct		
13.1.6 Flow fault test	-	Correct	Correct		
13.2 Analog output test	-	Correct	Correct		
13.3 Relay & light test	-	Correct	Correct		
13.4 Serial link test	-	Correct	Correct		

*Note: fill in this section after the flowmeter has been calibrated, if necessary

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Tested by:	S. Stark	Date: 5/18/09 - 5/19/09
Notes/Comments:	S/N 090501-02 ; * data in "other" column is for LES source	

Description	Unit	Req. Value	Measured Value		Comments
			MGP	Other*	
§14: Calibration					
14.1 Nuclear check					
Measured temperature	°C	-	21.1		
Indicated temperature	°C	$T_{meas} \pm 2$	21.5		
Temperature offset	°C	-	N/A		As found: 4° C
Alpha-beta-gamma gain	-	0.7 - 1.3	0.91		Am-241: ch. 422
Gamma gain	-	0.7 - 1.3	0.928		
Channel/keV slope	-	-	9.26234		
Channel/keV offset	-	-	0.716831		
Channel/keV quadratic	-	-	0.0013319		
Background:					
AlphaCPS	cps	< 0.005	0.0002		
Po218CPS	cps	-	0.0001		
Po214CPS	cps	-	0.0006		
Po212CPS	cps	-	0.0002		
BetaCPS	cps	<0.5 <0.2	— 0.183		With check source Without check source
GammaCPS	cps	<0.5 <0.2	— 0.133		With check source Without check source
Alpha source counting					
AlphaCPS	cps	-	85.6	121.2	
Po218CPS	cps	-	0.008	0.007	
Po214CPS	cps	-	0.017	0.030	
Po212CPS	cps	-	0.007	0.027	
BetaCPS	cps	-	0.19	0.242	
GammaCPS	cps	-	0.1	0.133	
Beta source counting			↑		
AlphaCPS	cps	-			
Po218CPS	cps	-			
Po214CPS	cps	-	N/A		
Po212CPS	cps	-			
BetaCPS	cps	-			
GammaCPS	cps	-	↓		
Alpha efficiency	cps / α/s	0.0333 - 0.0407	0.0370	0.0368	
Beta Efficiency	cps / β/s	0.05 - 0.08	N/A		
14.2 Check source test			↑		
AlphaCPS	cps	-			
Po218CPS	cps	-			
Po214CPS	cps	-	N/A		
Po212CPS	cps	-			
BetaCPS	cps	>3			
GammaCPS	cps	>0.5	↓		
§15: Final check	-	Correct	Correct		

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Tested by:	S. Starke	Date: 5/15/09
Notes/Comments:	S/N 090501-02	

Flow meter calibration data (if applicable)

Flow Meter	Measurement	Indicated Flow (before correction)	Measured Flow (calibrated meter)	Relative analog input (%)
Particulate (Flowmeter + DP switches)	1		Y1 = 0	X1 = 20
	2		Y2 = 15 (18)	X2 = 45
	3	N/A	Y3 = 25 (31)	X3 = 56
	4	(meter not	Y4 = 26 (32.5)	X4 = 61
	5	previously calibrated)	Y5 = 35 (43.8)	X5 = 65
	6		Y6 = 42 (53)	X6 = 69
	7		Y7* = 95 (120)	X7 = 100%
PIS (if applicable)	1		Y1 = 0	X1 = 0
	2		Y2 = 15 (18)	X2 = 41
	3	N/A	Y3 = 19 (24)	X3 = 57
	4	(Not previously	Y4 = 30 (37.5)	X4 = 74
	5	calibrated)	Y5 = 35 (43.8)	X5 = 80
	6		Y6 = 45 (56.3)	X6 = 90
	7		Y7* = 60 (75)	X7 = 100%

*Note: the final measurement is the extrapolated flow rate at 100% relative analog input

Correction Factor:

Actual Flow	Indicated Flow	Ratio
25	21.4	1.17
35	27.2	1.29
45	34.3	1.31

Avg. = 1.26

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MGP INSTRUMENTS
synOdys Group

FICHE DE MESURES / DATA SHEET

MATERIEL / Apparatus : **ABPM 201 KIT**

(1) N° IDENTIFICATION
(1) Identification n°

Nomenclature	Indice	Ordre	Invariant	Option
143867	A	09	0501	

REFERENCES CLIENT / Customer's reference :

NOS REFERENCES / MGP Instruments Reference : 27136

DATE DES MESURES / Date of records : 20/03/09

OBSERVATIONS / Comments :

NOM : RADOUANI / HICHRI

(1) à mentionner dans toute correspondance / Refer to in all correspondance

Visa et/ou tampon

MESURES A EFFECTUER SUIVANT PROGRAMME N° : Measurement to be made according to procedure n° 137716 IC	UNITES Units	VALEUR A OBTENIR Value to be obtained	VALEUR MESUREE Recorded value	OBSERVATION Comments
			MGP / RECETTE	
TEST EQUIPMENT IDENTIFICATION				
- Reference mass flow meter (Ref and N°)	1078-3			
- Thermometer (Ref and N°)	1127-1			
- Beta source of Tl-204 (N°)	10356-A			
- Alpha source of Pu-238 (N°)	50328			
MASS 2 software ref. 995 (version)	1.7.0			
SAMS software ref. 709 (version)	H			
Application software LPDU/SAS/PIPS ref. 774V2 (index)	R			
Set of parameters ref. 827 (N° and index)	102-B			
4. TEST CONDITIONS	-	Correct	Correct	
5. VISUAL CHECK	-	Correct	Correct	
LP(D)U (Ref and N°) 131839/A	090501			
ABPM 201 detection sub-assembly (Ref and N°) 121986/E		080955		
Detector PIPS (Ref and N°) 45445/D	081998			
Flow meter unit (Ref and N°) 120114/K	091172			

This document includes 4 pages. Project n° 301841

Ind. Rev.	DATE Date	NOM ; N° ET DESIGNATION DE LA MODIFICATION Name – N° and designation of modification	MF	REDACT. Prepared	VERIFIE ET APPROUVE Checked and approved
B	02/2009	DEVN 16810		P. DIROCCO	F. PERANI
A	09/2007	Originale edition		D. MARCHAL	F. PERANI

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N° 34292 L

MGP INSTRUMENTS
SynOdys Group

FICHE DE MESURES / DATA SHEET

MATERIEL / Apparatus : **ABPM 201 KIT**

(1) N° IDENTIFICATION
(1) Identification n°

143867	A	090501		
Nomenclature	Indice	Ordre	Invariant	Option

REFERENCES CLIENT / Customer's reference :

NOS REFERENCES / MG Reference : 27136

DATE DES MESURES / Date of records : 20/03/09

OBSERVATIONS / Comments :

NOM : PADOVANI / HICHRI

(1) à mentionner dans toute correspondance / To indicate in any correspondance

Visa et/ou tampon

MESURES A EFFECTUER SUIVANT PROGRAMME N° : Measurement to be made to procedure n° 137716 1C	UNITES Units	VALEUR A OBTENIR Value to be obtained	VALEUR MESUREE Recorded value		OBSERVATION Comments
			MGP	RECETTE	
6. SEQUENTIAL FILTER CHECK	-	Correct	Correct		
7. TIGHTNESS CHECK	mbar	< 20	12		Kit S
	%	< 5	N. A		Kit L / M
8. SETTING UP THE TEST CONFIGURATION	-	Performed	Performed		
9. FLOW RATE CHECK					
Measure 1	l/min	0 < < 2	0		
Measure 2	l/min	27 < < 33	30,9		
Measure 3	l/min	37 < < 43	39,9		
10. PUMP MANAGEMENT CHECK	-	Correct	Correct		
11. DETECTOR FAULT MANAGEMENT CHECK	-	Correct	Correct		
12. CHANNEL CHECK					
12.1. Automatisms test					
12.1.1. Normal operation test	-	Correct	Correct		
12.1.2. Electrical test	-	Correct	Correct		
12.1.3. ΔP min and AVF mechanism test					
ΔP min	-	Correct	Correct		
AVF mechanisme	mm	48 < < 56	54		
12.1.4. ΔP max test	-	Correct	Correct		
12.1.5. Minimum flow rate test	-	Correct			
12.2. Test of analog outputs	-	Correct			
12.3. Test of indicator lamp and relay status	-	Correct			
12.4. Test of serial links	-	Correct			

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FICHE DE MESURES / DATA SHEET

MATERIEL / Apparatus : **ABPM 201 KIT**

(1) N° IDENTIFICATION
(1) Identification n°

143876	A	09	05	01							

Nomenclature | Indice | Ordre | Invariant | Option

REFERENCES CLIENT / Customer's reference :

page : 3

NOS REFERENCES / MG Reference : 27136

DATE DES MESURES / Date of records : 20/03/09

OBSERVATIONS / Comments :

NOM : PADOVANI / HICHRI

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Visa et/ou tampon

MESURES A EFFECTUER SUIVANT PROGRAMME N° : Measurement to be made to procedure n° 137716 1C	UNITES Units	VALEUR A OBTENIR Value to be obtained	VALEUR MESUREE Recorded value		OBSERVATION Comments
			MGP	RECETTE	
13. NUCLEAR CHECK					
NUCLEAR CALIBRATION					
Alpha-beta Gain	-	0,7 < G1 < 1.3	0,91		
Calibration : Offset	-		0,736		
Slope	-		9,26		
Quadratic	-		$1,33e^{-3}$		
Gamma Gain	-	0,7 < G1 < 1.3	0,928		
Electrical test	-	Correct	Correct		
Temperature offset	°C		4		
Background **AlphaCps**	cps	< 0,005	0		
Background **Po218Cps**	cps		0		
Background **Po214Cps**	cps		0		
Background **Po212Cps**	cps		0		
Background **Beta_Cps**	cps	< 0,2	0,09		
Background **GammaCps**	cps	< 0,2	0,101		
Counting of the *Alpha* source **AlphaCps**	cps		102,1		
Counting of the *Alpha* source **Po218Cps**	cps		0		
Counting of the *Alpha* source **Po214Cps**	cps		0		
Counting of the *Alpha* source **Po212Cps**	cps		0		
Counting of the *Alpha* source **Beta_Cps**	cps		0,117		
Counting of the *Alpha* source **GammaCps**	cps		0,107		

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FICHE DE MESURES / DATA SHEET

MATERIEL / Apparatus : **ABPM 201 KIT**

(1) N° IDENTIFICATION
(1) Identification n°

Nomenclature	Indice	Ordre	Invariant	Option
143 867	A	090	501	

REFERENCES CLIENT / Customer's reference :
NOS REFERENCES / MG Reference : 27136
page : 4
DATE DES MESURES / Date of records : 20/03/09.

OBSERVATIONS / Comments :

NOM : PADOVANI / HICHRI

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Visa et/ou tampon

MESURES A EFFECTUER SUIVANT PROGRAMME N° : Measurement to be made to procedure n° 137716 IC	UNITES Units	VALEUR A OBTENIR Value to be obtained	VALEUR MESUREE Recorded value		OBSERVATION Comments
			MGP	RECETTE	
Counting of the *Beta* source **AlphaCps**	cps		0		
Counting of the *Beta* source **Po218Cps**	cps		0		
Counting of the *Beta* source **Po214Cps**	cps		0		
Counting of the *Beta* source **Po212Cps**	cps		0		
Counting of the *Beta* source **Beta_Cps**	cps		77,73		
Counting of the *Beta* source **GammaCps**	cps		0,11		
Current activity of the *Alpha* source on 4 π	α/s		2795,2		Isotope Pu-238
Current activity of the *Beta* source on 4 π	β/s		13938,5		Isotope Tl-204
Detection efficiency for the *Alpha* source	cps per α/s	33,3 e^{-3} < < 40,7 e^{-3}	36,5e^{-3}		Isotope Pu-238
Detection efficiency for the *Beta* source	cps per β/s	50 e^{-3} < < 80 e^{-3}	55,5e^{-3}		Isotope Tl-204
14. FINAL CHECK	-	Performed	Performed		

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MGP INSTRUMENTS

FICHE DE MESURES / DATA SHEET

MATERIEL / Apparatus : **Détecteur PIPS**

(1) N° IDENTIFICATION
(1) Identification n°

Nomenclature	Indice	Ordre	Invariant	Option
45445	A	08/1998		600000

REFERENCES CLIENT / Customer's reference :

page : 1

NOS REFERENCES / MG Reference : 26704

DATE DES MESURES / Date of records : 08/10/08

OBSERVATIONS / Comments : Diode N° 0527B NOM : DASILVA
: Diode N° 0528B

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Visa et/ou tampon

MESURES A EFFECTUER SUIVANT PROGRAMME N° : Measurement to be made to procedure n° 46853 / J	UNITES Units	VALEUR A OBTENIR Value to be obtained	VALEUR MESUREE Recorded value		OBSERVATION Comments
			MGP	RECETTE	
IDENTIFICATION DES MOYENS DE CONTROLE					
- Multimètre	77200S				
- Oscilloscope	910.16B				
- Thermomètre					
- Source Pu 238	60328				
- Source SC31	28a162				
- Source Tl204] pour détecteur 45445 option G00 000	Sans objet				pour matériel SR et pièces de rechange
- Source Co60] pour détecteur 45445 option 800 000	"				
7. CONSOMMATIONS					
+12 Volts	mA	20 < I < 30	24,8		
-12 Volts	mA	12 < I < 22	17,4		
9. GAINS					
Détecteur "Alpha-béta"		0,7 < G1 < 1,3	0,98		
Tête « 7mm » : G1x1.12					
Détecteur « gamma »		0,7 < G2 < 1,3	1		
Tête « 7mm » : G2x1.12			1,02		
Rapport G2/G1					
10. Bruit de fond					
Détecteur « Alpha-béta »	mV	< 50	20		
Détecteur « gamma »	mV	< 50	15		
12. Signal test électrique					
Gain test « Alpha-béta »		0,5 < G < 1,5	1,18		
Gain test « gamma »		0,5 < G < 1,5	1,19		

Ce document comporte 2 folios

Commission n° 622809

Ind. Rev.	DATE Date	NOM - N° ET DESIGNATION DE LA MODIFICATION Name - N° and designation of modification	MF	REDACT. Prepared	VERIFIE ET APPROUVE Checked and approved
G	04/03/05	REV N°6883		E.Mas	N. Jeanjacquot
F	10/10/03	REV n°6752		Fab. Brault	A. Pommier
E	10/10/03	DEVS n° 13514		N.Jeanjacquot	Fab. Brault
D	21/5/98	DEVS n°8790	MF	B. Clavel	A. Pommier
C	29/11/95	DEV n°4639	MF	L. Graville	B. Clavel
B	02/12/94	DEVS N°4435	MF	V. Fabre	B. Clavel
A	17/5/94	Edition originale	MF	V. Fabre	B. Clavel

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MGP INSTRUMENTS

FICHE DE MESURES / DATA SHEET

MATERIEL / Apparatus : **Détecteur PIPS**

(1) N° IDENTIFICATION
(1) Identification n°

Nomenclature	Indice	Ordre	Invariant	Option
45445	A	08/1998		6 0 0 0 0 0

REFERENCES CLIENT / Customer's reference :

NOS REFERENCES / MG Reference : 26704

DATE DES MESURES / Date of records : 08/10/08

OBSERVATIONS / Comments :

NOM : DA SILVA

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Visa et/ou tampon

	MESURES A EFFECTUER SUIVANT PROGRAMME N° : Measurement to be made to procedure n° 48853 17	UNITES Units	VALEUR A OBTENIR Value to be obtained	VALEUR MESUREE Recorded value		OBSERVATION Comments
				MGP	RECETTE	
	13. Test nucléaire supplémentaire				-	pour matériel SR et pièces de rechange
	45445 Option G00 000 :					
	Bruit béta	c/s	< 0,4			
	Bruit gamma	c/s	< 0,4			
	Taux de comptage avec source	c/s				
G	Rendement	%	5 < R < 8			
	45445 Option 800 000 :			Sans objet		
	Bruit béta	c/s	< 0,4			
G	Bruit gamma	c/s	< 0,4			
	Taux de comptage avec source	c/s				
	Rendement	%	0,9 < R < 1,1			

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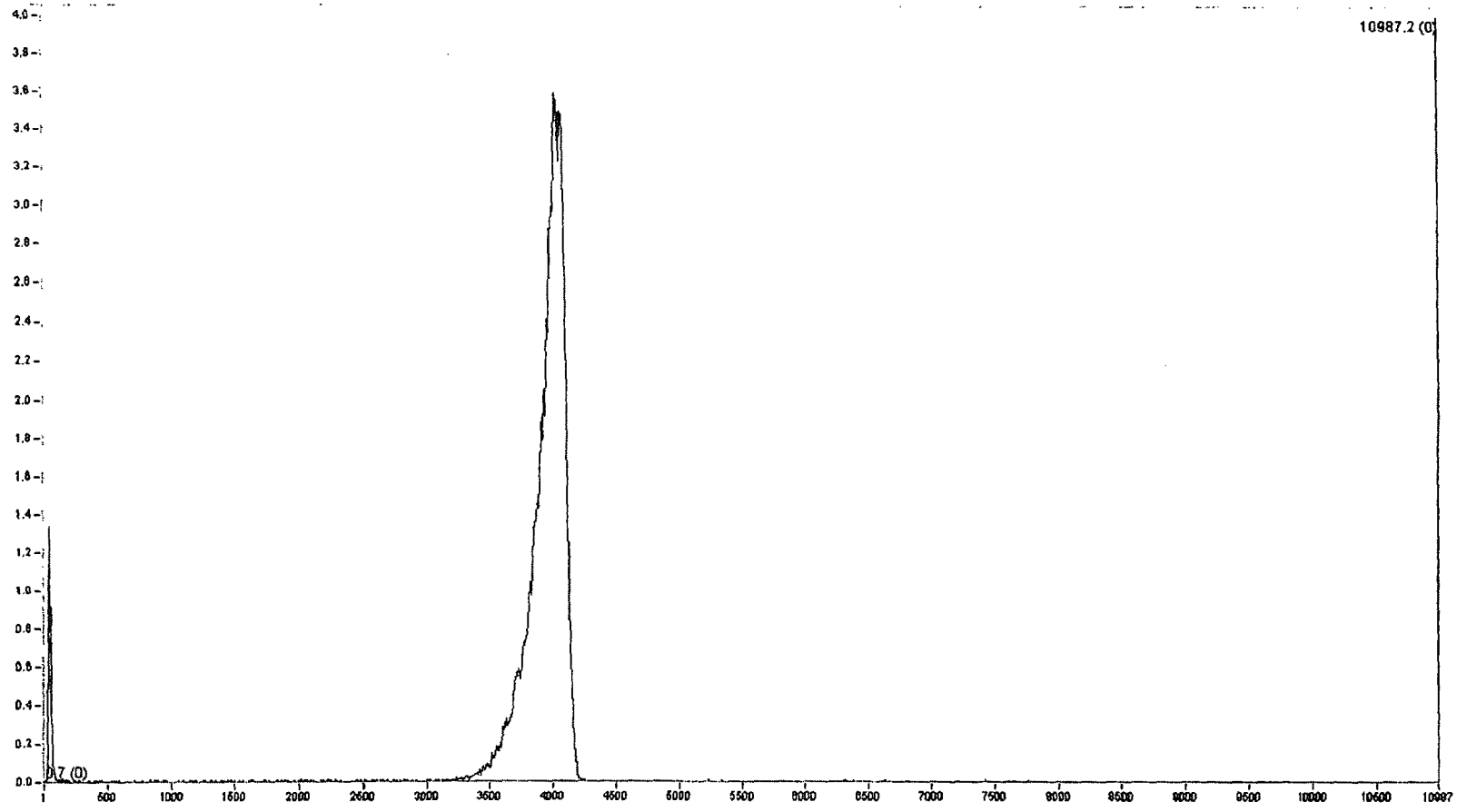
N° 27965 F

4 6 6 5 4



Spectrum from Am-241 source S/N F5-246; *x-axis is energy in keV, y-axis is count rate in cps (linear scaling)*

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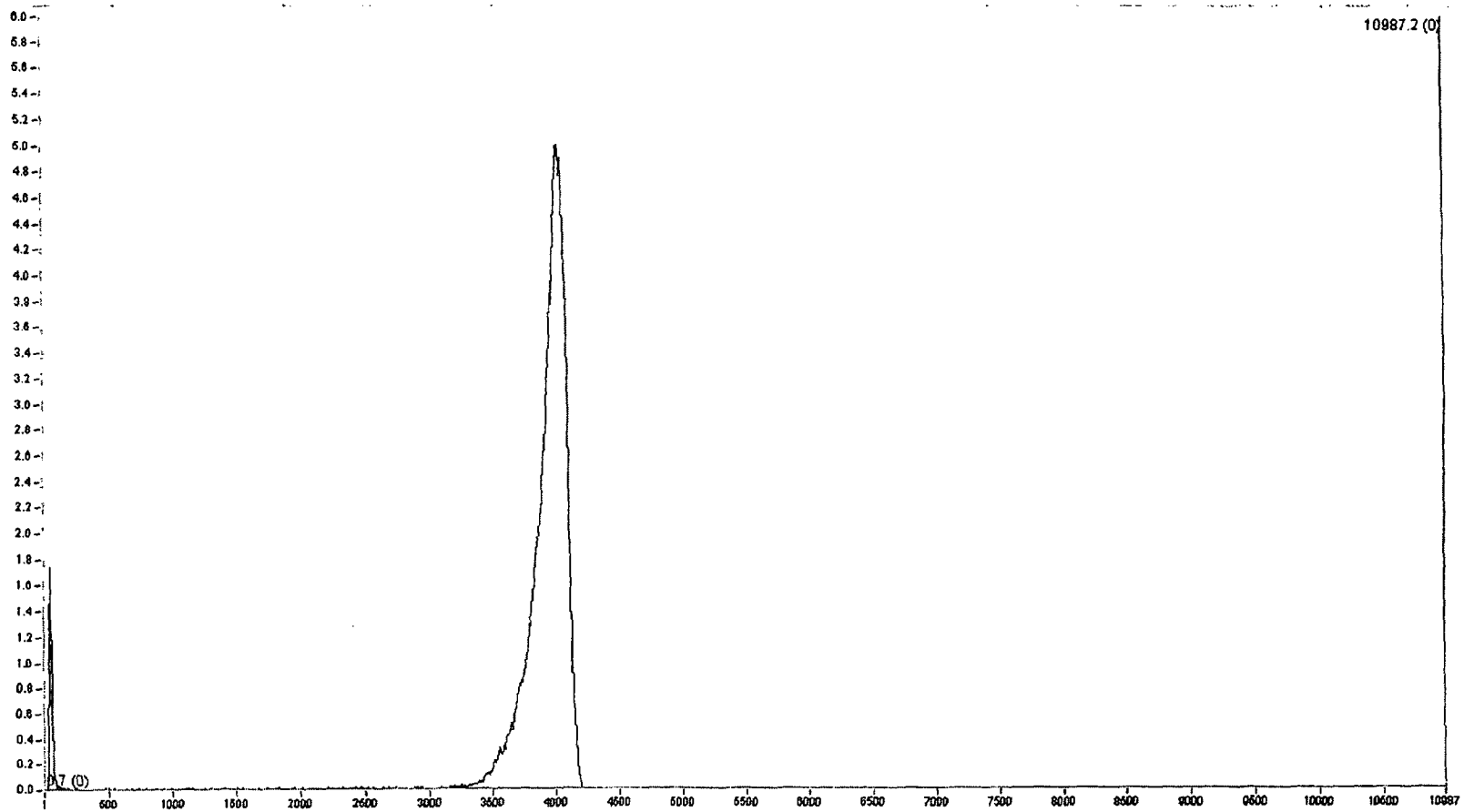

Spectrum from Am-241 source S/N F8-940; *x-axis is energy in keV, y-axis is count rate in cps (linear scaling)*

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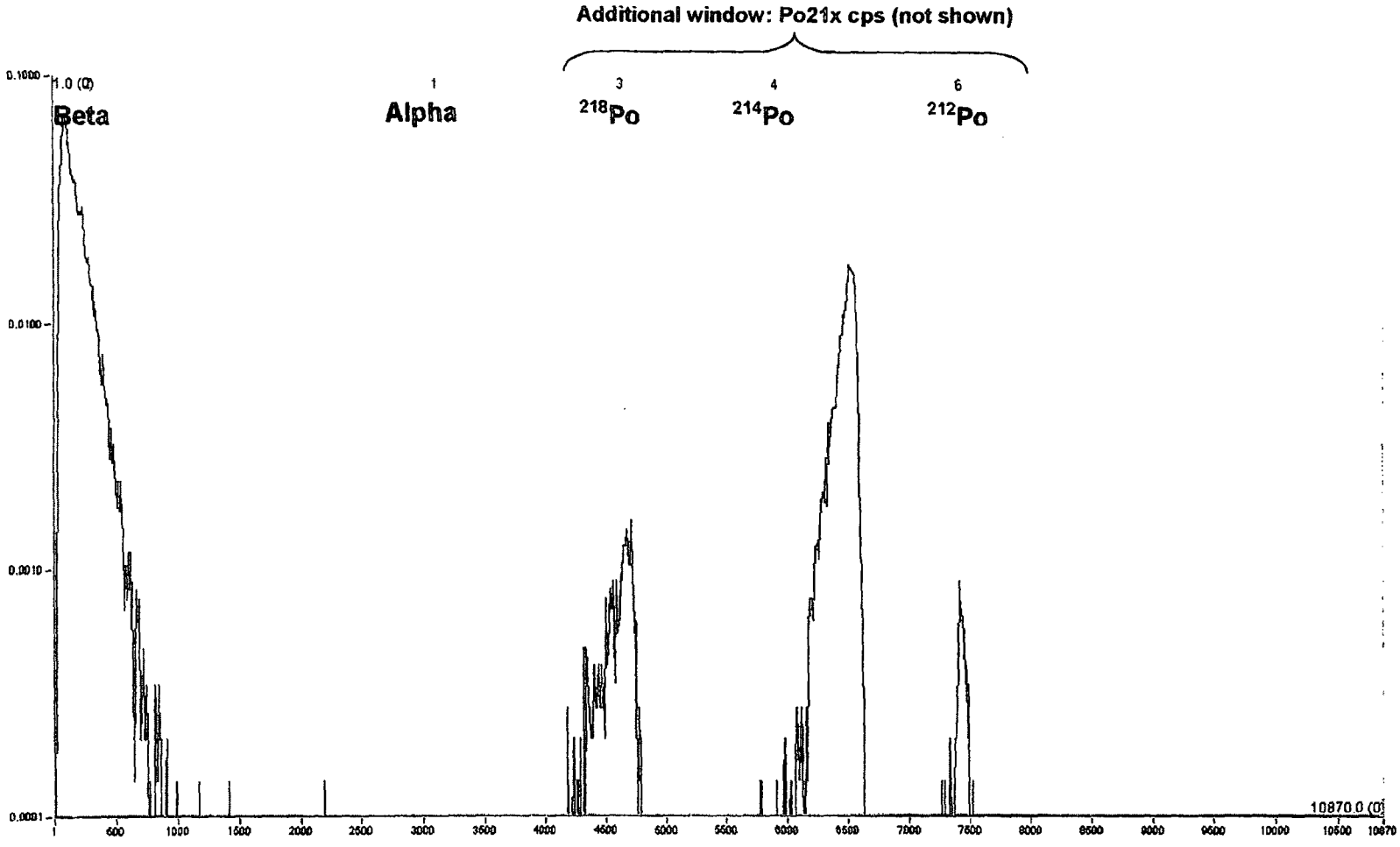

Spectrum showing alpha and beta activity due to Radon daughters; *x-axis is energy in keV, y-axis is count rate in cps and is log-scaled. The spectrum was over approximately 2 hours during post-production testing of the monitor. The regions of interest (ROI) are labeled according to their use.*

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eti
Conformity Services

Albuquerque Area Office
8336 Washington Place, N.E.
Albuquerque NM 87113
(505) 822-0237
(505) 822-0217

December 15, 2009

Louisiana Energy Services, Inc.
PO Box 1789
Eunice, NM 88231-1789

Attention: Ms. Debra Edwards, Chemistry Supervisor

Subject: Equipment Labeling Evaluation, Final Report
MGP Alpha Monitor
Reference No.: 3103669F

Dear Ms. Edwards:

Enclosed is the subject report, as prepared by eti Conformity Services Compliance Engineer, Ross Bender.

The equipment evaluated in this report has been inspected and tested for general compliance with applicable codes and standards and with regard to general electrical safety. Details of this evaluation are provided in this report.

All discrepancies noted on the units inspected have been verified as corrected. Please contact Ross Bender if you have any questions about the technical contents of this report.

Please contact us if you have any questions or if we can be of further service on this or other projects.

Sincerely,
eti Conformity Services

Randy Allen
Service Center Manager

cc: Ronnie Killgore, Electrical Inspector, NM Construction Industries Division
Marty Hall, P.E., Bridgers & Paxton Consulting Engineers

eti
Conformity Services

Albuquerque Area Office
8336 Washington Place, N.E.
Albuquerque NM 87113
(505) 822-0237
(505) 822-0217

EQUIPMENT FIELD EVALUATION
FINAL REPORT

Alpha Particle Monitor

for

The National Enrichment Facility
EUNICE, NM

CLIENT

Ms. Debra Edwards, Chemistry Supervisor
Louisiana Energy Services, Inc.
Andrews Road
Eunice, NM

INSPECTION AUTHORITY

NM Construction Industries Division
Ronnie Killgore, Electrical Inspector
5200 Oakland Ave. NE
Albuquerque, NM 87113

Reference No.: 3103669F

Submitted By: Ross Bender
Sr. Compliance Engineer

Date: September 2, 2009

Reviewed By: _____
Randy Allen
Service Center Manager

Table of Contents

1.0 PURPOSE

The purpose of these inspections and tests is to provide assurance that custom or non-certified equipment meets the requirements of the appropriate codes, safety orders and industry standards. These inspections and tests are normally required by the local building inspection authority having jurisdiction (AHJ) when equipment has not been certified by a Nationally Recognized Testing Laboratory (NRTL) or other recognized testing agency. These inspections address only the electrical systems on the equipment listed in Section 5.0 of this report.

2.0 SUMMARY

This project was initiated at the request of Ms. Debra Edwards, Chemistry Supervisor with Louisina Energy Services. Inspections and testing of the equipment referenced in Section 5.0 was performed at the National Enrichment Facility in Eunice, NM eti Conformity Services Compliance Engineer Ross Bender on August 21, 2009. The Equipment is installed at National Enrichment Facility in Eunice, NM where the final inspection and testing have been completed.

The electrical discrepancies observed during the inspection and testing of the equipment were as described in Section 7.0 and have been corrected. The electrical discrepancies have been verified as corrected and the ETI *EVALUATED* label has been affixed to the equipment. Note that final approval is under the jurisdiction of the New Mexico Construction Industries Division.

3.0 GENERAL CONDITIONS OF ACCEPTANCE

In the event of modifications resulting in a change in the materials, manufacturing methods, loading, or environment that would affect the use of the accepted equipment under the provisions of the noted electrical standards, this acceptance will be considered automatically cancelled. The applicant will be required to request re-examination of this equipment to determine acceptability of the modifications.

By acceptance of the equipment referenced in Section 5.0, eti Conformity Services does not assume or discharge the responsibility of the equipment manufacturer, installer, or other relevant parties. Equipment evaluation is based upon adherence to sound engineering practices, and upon compliance with the specific sections quoted from the electrical standards referenced in Section 4.0 of this report.

Assessment of required interrupting rating and arc-flash labeling of the equipment being evaluated is beyond the scope of this field evaluation. Determining the adequacy of interrupting rating and arc-flash labeling are the responsibility of the end-user as described in subsection 6.5 of this report.

This acceptance applies to the electrical circuits and components only, as referenced in this report. Unless noted otherwise, it specifically excludes examination for suitability of use for equipment involving toxic or corrosive gases, steam, and locations defined as hazardous by the National Electrical Code (NEC®).

4.0 REFERENCED ELECTRICAL STANDARDS

4.1 ANSI/NFPA 79, Electrical Standard for Industrial Machinery
4.2 ANSI/NFPA 70, National Electrical Code (NEC)
4.3 UL 61010-1, Electrical Equipment for Measurement, Control and Laboratory Use, Part 1: General Requirements

5.0 EQUIPMENT INSPECTED

5.1 Six (6) Alpha Monitors

Two (2) LDU (Local Display Units) final installation.

Manufacturer Name: MGP Instruments
Model No.: ABPM201S
Serial No.: 080925
Ratings: 120 Volts AC, 60 Hz, 8.6 Amps, 1-Phase
Label Nos.: **0115480 through 0115485**

6.0 INSPECTION PROCEDURES

6.1 Component Listing

The following major power components are inspected for listing marks by an independent testing laboratory acceptable to the authority having jurisdiction (AHJ), or are evaluated to the appropriate nationally recognized consensus standard. Any discrepancies observed during the evaluation process are noted in Section 7.0.

- Circuit breakers
- Fuses and fuseholders
- Disconnect switches
- Terminal blocks
- Pushbuttons and switches
- Relays and contactors
- Transformers
- Motors and drives
- Motor overload units
- Wire ducts
- Receptacles
- Cables and wiring

6.2 Visual Inspection

The equipment is visually inspected with particular attention to the following areas:

- Manufacturer nameplates
- Use of "approved" components
- Proper overcurrent protection
- Wiring ampacity
- Ground bonding
- Electrical ratings
- Wiring methods
- Guarding of live parts
- Damaged components
- General engineering practices

6.3 Ground Bonding

Exposed non-current carrying parts of the equipment are inspected for effective grounding in accordance with the applicable provisions of the standards referenced in Section 4.0 and the National Electrical Code (NEC®) Article 250. 6.4 Guarding of Live Parts All internal components are inspected for installation in a suitable enclosure and effective guarding in accordance with the standards referenced in Section 4.0 and the National Electrical Code (NEC®) Section 110.27.

6.5 Overcurrent Protection

Overcurrent protection installed in this equipment is evaluated for compliance with the applicable codes and standards referenced in Section 4.0. Protective devices are verified to be properly identified, and of a type suitable for the circuit applications as installed.

Please note: Determining the adequacy of interrupting rating and arc-flash labeling are the responsibility of the end-user and are therefore outside the scope of this field evaluation project. The customer is hereby advised of NFPA 70-2005, Articles 110.9 & 110.16 which state:

110.9 Interrupting Rating.

"Equipment intended to Interrupt current at fault levels shall have an interrupting rating sufficient for the nominal circuit voltage and the current that is available at the line terminals to the equipment."

"Equipment intended to interrupt current at other than fault levels shall have an interrupting rating at nominal circuit voltage sufficient for the current that must be interrupted."

110.16 Flash Protection.

"Switchboards, panelboards, industrial control panels, meter socket enclosures, and motor control centers that are in other than dwelling occupancies and are likely to require examination, adjustment, servicing, or maintenance while energized shall be field marked to warn qualified persons of potential electric arc flash hazards. The marking shall be located so as to be clearly visible to qualified persons before examination, adjustment, servicing, or maintenance of the equipment."

6.6 Internal Wiring

Internal wiring and wiring methods are evaluated for compliance with the applicable codes and standards referenced in Section 4.0. Wiring is verified to be properly sized and rated, with a temperature rating suitable for the installed application.

6.7 Safety Interlocks and Operator Controls

The equipment safety interlocks, emergency stops, operator controls and human machine interfaces (HMI) are verified to be properly identified. The safety features and emergency machine off (EMO) switches are tested for proper operation.

6.8 Field Testing

Field testing is performed on the equipment, to meet the field testing requirements of the standards referenced in Section 4.0, unless production test results have been provided by the equipment manufacturer and accepted by eti Conformity Services. If no production tests are submitted, then testing is performed to verify the equipment to be operating within normally expected parameters as detailed in Section 8.0.

7.0 EQUIPMENT EVALUATION

7.1 Alpha Monitor

7.1.1 System Description

The equipment inspected consists of Alpha Monitor manufactured by MGP Instruments. The equipment is rated at 120 Volts AC, 60 Hz, 8.6 Amps, 1-Phase. The alpha monitor draws air samples from various exhaust ducting, runs the air through a very sensitive particulate filtering device, thus detecting any alpha particles contained in the sampled air. The equipment is installed indoors in an ordinary (non-hazardous) location, and has been evaluated for use in this location only.

7.1.2 Grounding

Exposed non-current carrying parts of the equipment were verified to be effectively grounded in accordance with the applicable provisions of NEC®, Article 250. A discrepancy was noted and will require correction as detailed in item 7.1.6 below.

7.1.3 Guarding of Live Parts

All internal components are enclosed in a grounded, screw closed, metal enclosure, and are effectively guarded per NEC®, Section 110.27. A discrepancy was noted and will require correction as detailed in item 7.1.6 below.

7.1.4 Overcurrent Protection

Overcurrent protection was provided by a 120 Volt AC, 20 Amp branch circuit.

7.1.5 Wiring

All wiring was found to be UL listed or recognized type MTW/THHN or equivalent.

7.1.6 Equipment Discrepancies

The discrepancies observed during the evaluation of the equipment listed in Section 5.0 were as described below. These items have been verified as corrected and the equipment is considered acceptable and suitable for continued service.

.01 Equipment Nameplate (NFPA 79)

This equipment was not provided with the required nameplate.

Action: A permanent nameplate shall be installed where plainly visible on this equipment. The nameplate shall contain the following information as a minimum:

a) Manufacturer's name or trademark.
b) Equipment catalog or serial number.
c) Electrical diagram numbers.
d) The following electrical ratings:
    1. Supply voltage.
    2. Number of phases.
    3. Rated frequency.
    4. Full load current.

Where more than one incoming supply circuit is provided, the nameplate shall state the above information for each supply circuit.

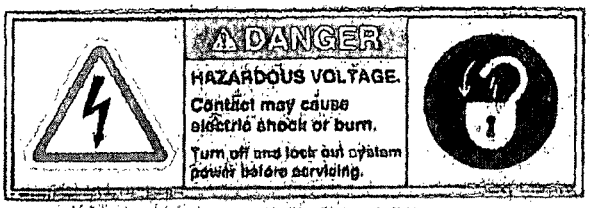
Reference: NFPA 79, Subclause 16.4

Verified as corrected on December 15, 2009

.02 Warning - Disconnect Power

This enclosure was not provided with a cautionary marking warning of the hazardous voltages contained within.

Action: A cautionary marking shall be installed in a plainly visible location on the outside of the enclosure stating the following or equivalent:



No. H6010/6011-B1DHP_ (Available Sizes: S,T,U)

Reference: NFPA 79, 16.2.1
NEC®, Section 110.3(a)(8)

Verified as corrected on August 21, 2009

8.0 TESTING RESULTS AND INSTRUMENTS

8.1 Field Testing

The following field-testing was completed with the summary results as indicated. Please refer to the Product Evaluation Data Sheet in Appendix B in this report for complete details on the specific tests completed.

8.1.1 Current and Voltage Measurements

Current and voltage measurements were taken at the input to each piece of equipment listed in Section 5.0 under normal operating conditions. The measurements obtained were verified to be within the voltage and current ratings of the devices installed.

8.1.2 Temperature Rise Test

A temperature rise test was performed on all components within each piece of equipment listed in Section 5.0 under normal operating conditions. The test was performed using an infrared (I.R.) thermometer to verify the temperature rise for each component did not exceed those specified in UL 508. Temperatures obtained were verified to be sufficiently low enough not to constitute risk of fire or to adversely affect any material employed in the equipment. The temperature rise obtained for each component is a result of test conditions only, and is not necessarily indicative of the possible temperatures generated in the operating environment.

8.1.3 Insulation Resistance Test

An insulation resistance test was performed on the equipment listed in Section 5.0 to verify the dielectric integrity of the insulating medium. Voltage was applied phase to ground at 1000 Volts DC for one minute on the incoming supply conductors of each piece of equipment tested. There were no indications of insulation breakdown as evidenced by arcing or sparks and therefore the test results indicate satisfactory results.

8.1.4 Bonding Test

The equipment bonding was verified as being properly installed. The resistance was measured from the main equipment grounding terminal to all applicable exposed metal structures or surfaces and installed equipment ground points. The maximum resistance permitted is 0.1 Ohm. The test results indicated satisfactory bonding with all resistance measures below 0.1 Ohm.

8.1.5 Leakage Current Test

With the equipment energized, the surface leakage current was tested by inserting an impedance network into the grounding path. The test points were the applicable exposed metal structures or surfaces that might be contacted by an operator. The maximum leakage current permitted is 3.5 mA. The test results found the maximum leakage current recorded to be less than the maximum allowed.

8.2 Test Equipment

All equipment has been calibrated to NIST reference standards. Certificates of calibration are available upon request.

Test Equipment	Model	eti Asset No.	Calibration Date
Fluke, True RMS Multimeter	87 IV	N/A	12//2008
Fluke AC Current Probe	80i-600A	N/A	Not Required
AVO Megger Digital Low Resistance Ohmmeter	DLRO 10	24-1113	03/2008
Micron Infrared Camera	7200B	24-01119	01/2008
Biddle Insulation Resistance Test Set	BM400/2	10-00786	03/2008
eti Conformity Services Leakage Current Tester	LCT-1	N/A	Not Required

Appendices

APPENDIX A

Summary of Project Contacts

eti Conformity Services:

Reference No.	3103669F
Name:	Albuquerque Area Service Center
Address:	8336 Washington Place, N.E.
City, State, Zip:	Albuquerque NM 87113
Phone:	(505) 822-0237
Fax:	(505) 822-0217
Compliance Engineer:	Ross Bender

Client Information:

Company Name:	Louisiana Energy Services, LLC
Street Address:	275 Andrews Highway
City, State, Zip:	Eunice, New Mexico 88231
Phone:	(575) 394-6532
Contact:	Ms. Debra Edwards
Purchase Order No:	LES-GSA-3069, REV 1

Site Information / Intended Installation Location:

Site Name:	National Enrichment Facility
Street Address:	275 Andrews Highway
City And State:	Eunice NM 88231

Jurisdiction Information:

Inspector's Name:	Ronnie Killgore, Electrical Inspector
Jurisdiction:	NM Construction Industries Division

Manufacturer's Information:

Alpha Monitor

Manufacturer Name: MG P Instruments
Model No.: ABPM201S
Serial No.: 080925
eti Label No.: 0115770
Phone: 770-432-2744
Email: www.mirion-hp.com

APPENDIX B

Test Data Sheet

eti
Conformity Services

PRODUCT EVALUATION TEST DATA

CLIENT:				etiCS JOB NUMBER:	3103669
Louisiana Energy Services				etiCS LABEL NUMBER:	115480 through 485
LOCATION:		ENGINEER:		DATE:	
NEF (Eunice, NM)		Ross Bender		August 21, 2009	
EQUIPMENT:		MODEL:		SERIAL NO:	
Six (6) Alpha Monitors + two (2) LDU		ABPM201S		090501-01 through -06	
Manufacturer:	RATINGS:			☑ 1 PHASE 2+ GND WIRE	
MGE	120	15.0	60	☐ 3 PHASE 3+ GND WIRE	
	VOLTS	AMPS	HZ		

INSULATION RESISTANCE TEST DATA (MEG-OHMS)

DATE:	TEST VOLTAGE:	TEST EQUIP ASSET #:	CALIBRATION DATE:
August 21, 2009	500 VDC	10-00786	3-2009

	PHASE TO GROUND			PHASE TO PHASE		
CIRCUIT IDENTIFICATION	A	B	C	A-B	B-C	C-A
Mains (All 6)	>999Meg					

VOLTAGE AND CURRENT MEASUREMENTS

VOLTAGE MEASUREMENTS						CURRENT MEASUREMENTS				
PHASE A-G	PHASE B-G	PHASE C-G	PHASE A-B	PHASE B-C	PHASE C-A	PHASE A	PHASE B	PHASE C	NEUTRAL	GROUND
121.5						4.8			4.8	0

REMARKS: All fed from same source

COMPONENT TEMPERATURE RISE DATA

DATE:	AMBIENT TEMP:	TEST EQUIP ASSET #:	CALIBRATION DATE:
August 21, 2009	64 °F	24-01063	3-2009

COMPONENT IDENTIFICATION	COMPONENT TEMP.	TEMPERATURE RISE	TEST METHOD
All components either UL listed or UR recognized			
Main pump motor	99°F	35°F	Thermocouple

GROUND RESISTANCE TEST DATA

DATE:	AMBIENT TEMP:	TEST EQUIP ASSET #:	CALIBRATION DATE:
August 21, 2009	64 °F	24-01113	3-2009

	Resistance	Result:	Resistance	Result:
AC Power to skid	0.09 Ohm	A		
Control Panl to skid	0.04 Ohm	A		
Control Panl to Pump	0.05 Ohm	A		

EMO AND INTERLOCK TESTS

EMO FUNCTION TESTS		INTERLOCK FUNCTIONAL TESTS			
DATE:		DATE:			
LOCATION	RESULT	INTERLOCK DESCRIPTION	RESULT	INTERLOCK DESCRIPTION	RESULT
Main C.P	A	N/A			

LEAKAGE CURRENT AND RESISTANCE

Location	Resistance (Ohms)	Voltage (mV)	Leakage Current (mA)
Note 2			
Main Power Cord	0.09	0.25	0.0002 mA

GENERAL NOTES

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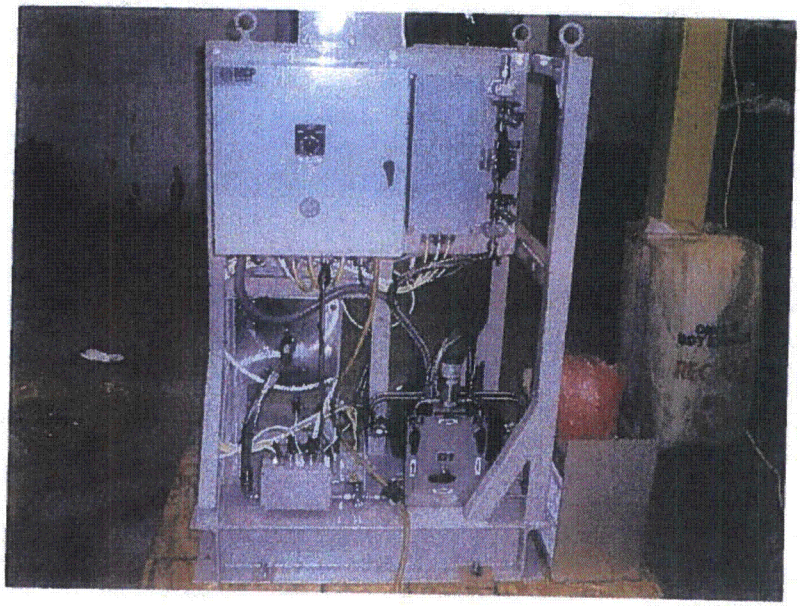
A = Acceptable, N/A = Not Applicable, C = Corrected, R = Needs Repair

APPENDIX C

Photos

Figure 1 is the front view of the Alpha monitor. Main power control is on top left.



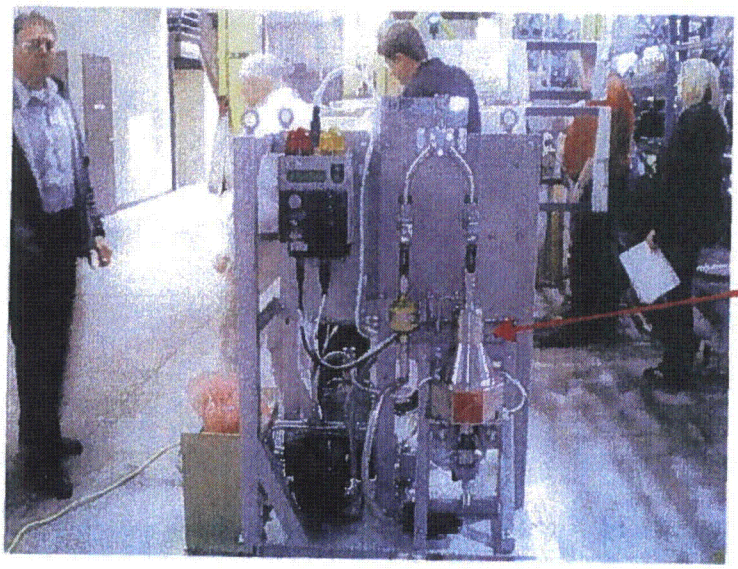


Figure 2 is rear view of machine showing air pump on left, filter and detector piping in foreground on chassis.

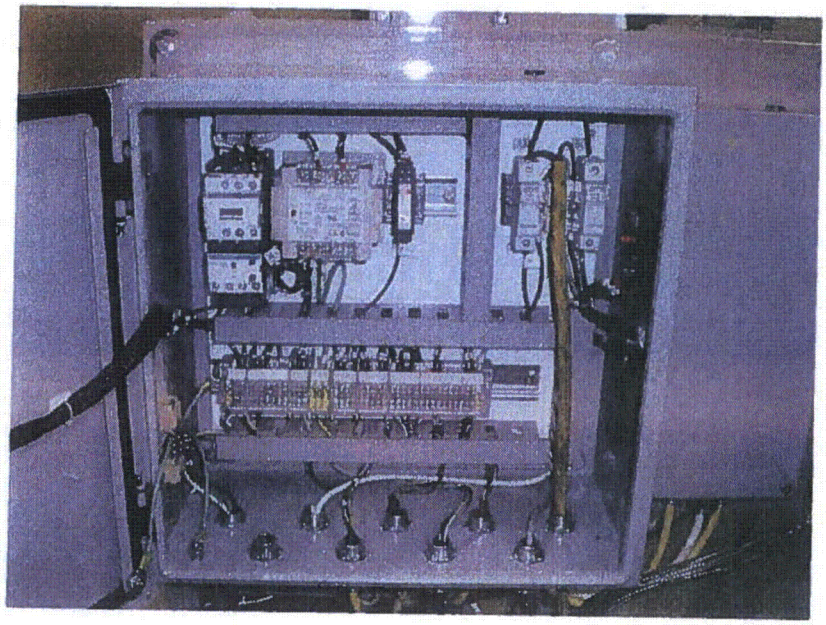


Figure 3 is a view of the interior of the power and control enclosure.

Functional Location 1001-562-1MA2

Fan Speed(2) (1001-662-241)	Target Stack Flow (or mA) (LDU mA input)	Measured Stack Flow from Process Flow Meter (Blackwatch Panel Meter Reading) (m3/hr)	(scfm)	Measured Alpha Monitor Process Flow Rate (LPDU Stack Flow)	Target Alpha Monitor Sample Flow Rate (LPDU Target Flow Rate)	Actual Alpha Monitor Sample Flow Rate (LPDU Skid Flow Rate)	Within Tolerance?
0	4.086	5	2.945	5.819	40	40.5	No *
25	7.937	250	147	132.5	40	40.5	Yes
50	10.440	410	241	223	43.7	41.9	Yes
75	12.786	559	329	328.5	52.5	50.5	Yes
99	14.917	695	409	413.8	60	57.5	Yes

* Test considered acceptable fan speed of <25% is not by design. 4 points are acceptable. 3/22/10
System is acceptable in the area of normal operation

Verified by Initials/Date/Time ~~DLS~~ 13/26/10 / 16:20

Verified by Initials/Date/Time HMH / 3-26-01 / 1640