118

CLEAN AIR ACT COMPLIANCE FMPC RESPONSE TO ITEMS B1 - B4 OF CLEAN AIR ACT SECTION - FFCA FEDERAL FACILITIES COMPLIANCE AGREEMENT

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Clean Air Act Compliance:
FMPC Response to Items B1-B4 of Clean Air Act Section of the Federal Facilities Compliance Agreement

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RESPONSE TO ITEMS B1-B4 OF CLEAN AIR ACT SECTION
FEDERAL FACILITIES COMPLIANCE AGREEMENT

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FFCA - CLEAN AIR ACT COMPLIANCE

ACTION B-1

Compliance Action B-1 for the Clean Air Act requires the installation of "real-time monitors on all major emission points." There are two major emission point sources; dust collectors and scrubbers.

There are currently 59 dust collectors operating at FMPC which handle uranium dust. All but one of these collectors are equipped with a single point particulate sampler. Dust Collector G-15-001 is in intermittent service on exhausts from lab hood vents and presently lacks a sampler. A work order has been issued to have one installed. The projected installation date is September 1, 1986.

The sampler consists of a pleated paper filter in a cupshaped holder. Air is drawn through the filter leaving any dust particulates on the paper. At regular intervals, the filters are destructively analyzed for uranium content. A drawing of this type sampler is shown in Figure 1.

Pancake type Geiger-Muller Alarming Monitors which detect beta and gamma radiation are installed in 23 of the stack samplers. The probe in the form of a grid is suspended above the filter in the sampler housing to detect the radiation on the filter. A high radiation level limit is set at which an alarm is activated. The arrangement of the probe in the filter housing is shown in Figure 2.

Two of the dust collectors at FMPC are equipped with Auburn trioboelectric monitors instead of the Geiger-Muller monitors. With these monitors, a long, thin probe protrudes into the exhaust duct. When a particulate strikes the probe, a count is registered. If the count rate exceeds a pre-set limit, an alarm is sounded. The arrangement is shown in Figure 3.

The major emission points which are not monitored are the streams exiting the scrubbers. Due to the high moisture content of the exiting gas, conventional monitors cannot be used. In the case of a filter sampler, the paper quickly becomes saturated and restricts airflow. A trioboelectric monitor is incapable of distinguishing between water and uranium dust particulates. Opacity monitors also cannot distinquish between the two types of particulates, and the water would collect on the lenses. To date, a real-time monitor has not been found which can be used in the scrubber exhausts.

Table 1 lists each of the uranium handling dust collectors and indicates whether they are equipped with a sampler and alarm monitor. Also in Table 1 is a record of the kilograms of uranium which were emitted from each stack for the past 12 months, between June 1, 1985 and July 1, 1986. In three instances there are only records for the past eight months. As this table shows, the highest 12 month loss from any non-monitored collector is 0.3 kg Uranium which is equivalent to 12.8 ounces per year or 1 ounce each month. These stacks are not considered to be major emission points. Therefore, with exception of the scrubbers which currently cannot be monitored with state-of-the-art technology, all major emission points have real-time alarm monitors installed.

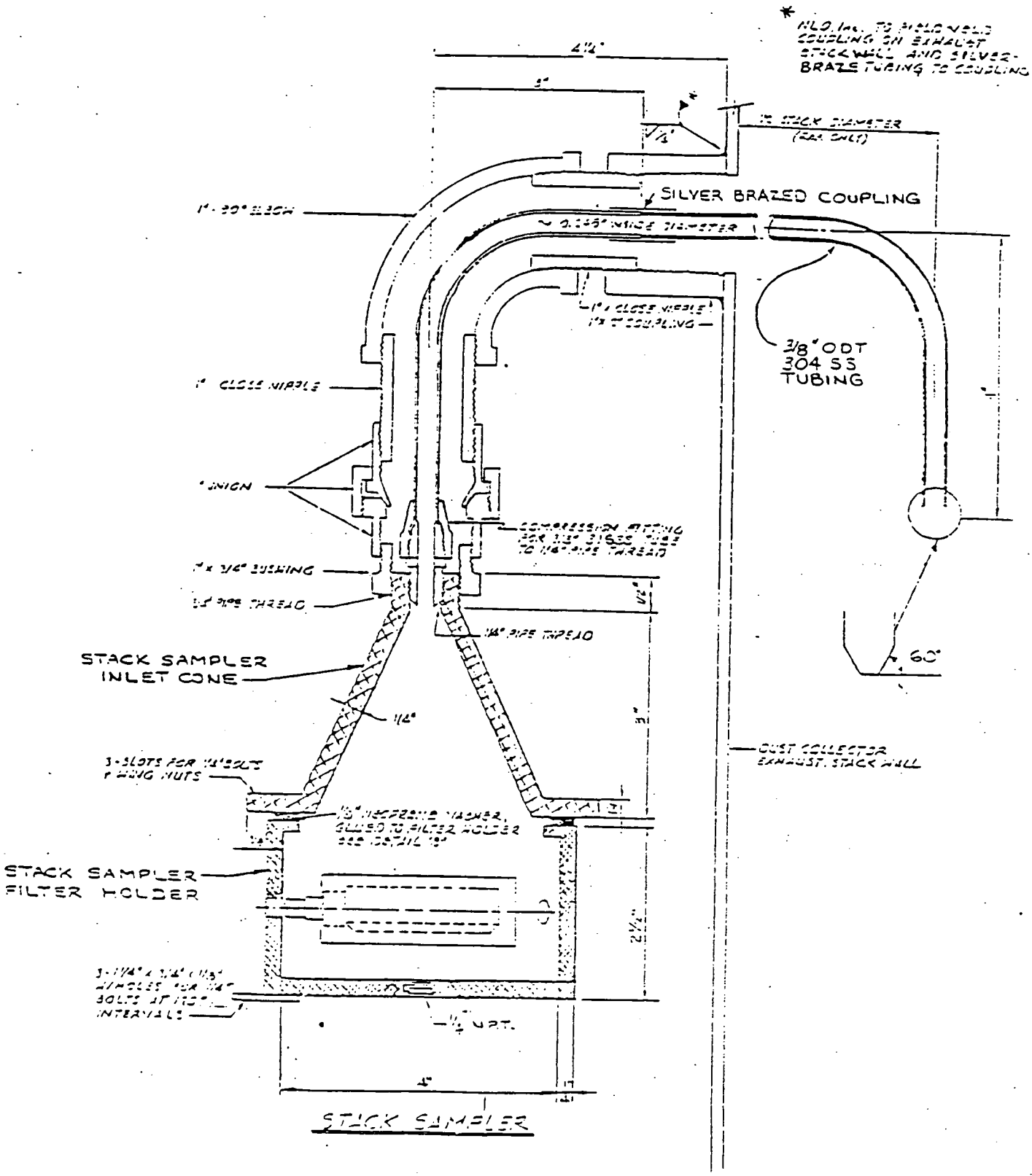
SILVER BRAZED COUPLING
3/8" ODT
304 SS
TUBING
STACK SAMPLER
INLET CONE
STACK SAMPLER
FILTER HOLDER
DUST COLLECTOR
EXHAUST STACK WALL
60°
STACK SAMPLER

Fig. 1

GEIGER-MULLER MONITOR PROBE

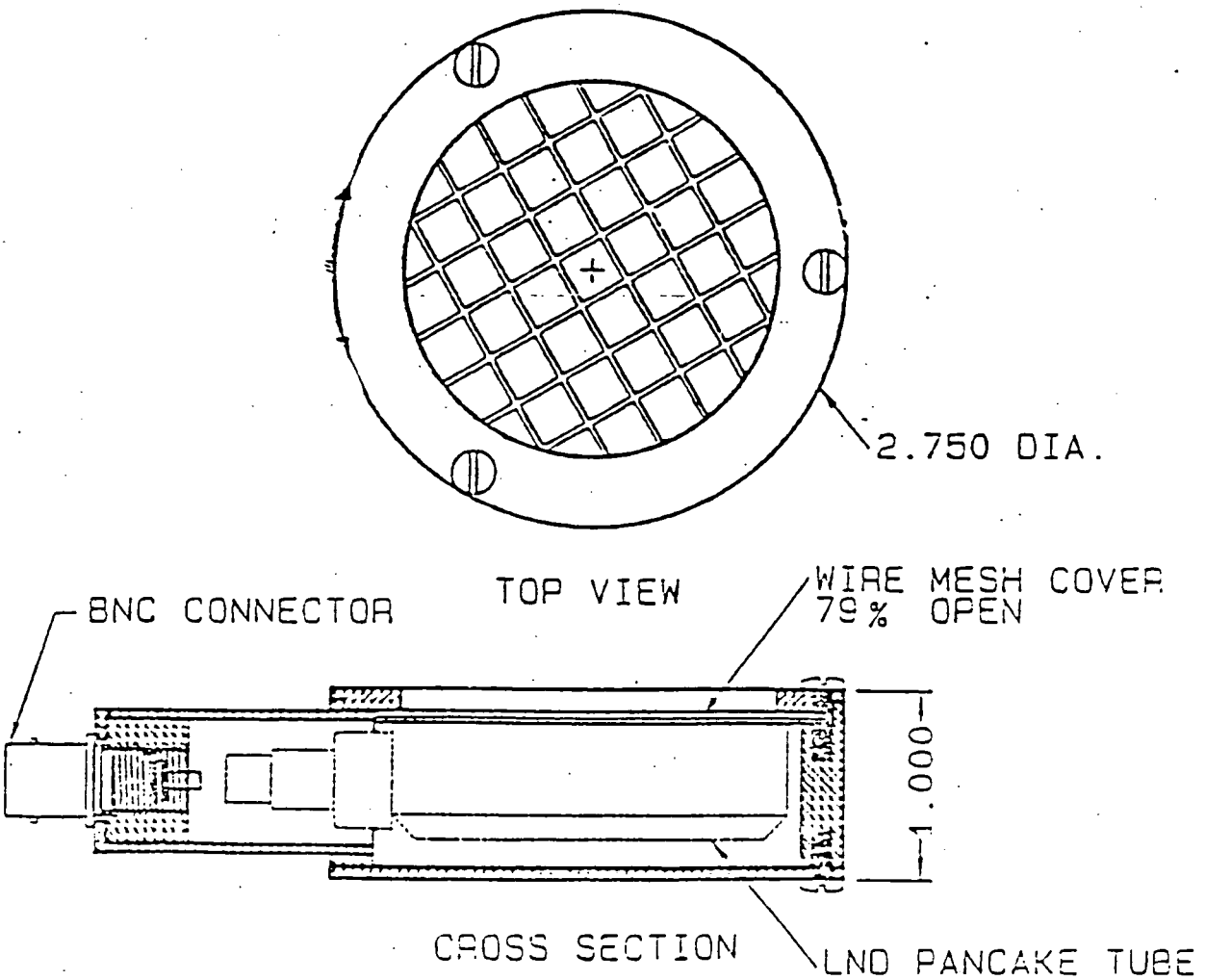

Fig. 2

AUBURN TRIBOFLOW PARTICULATE MONITOR

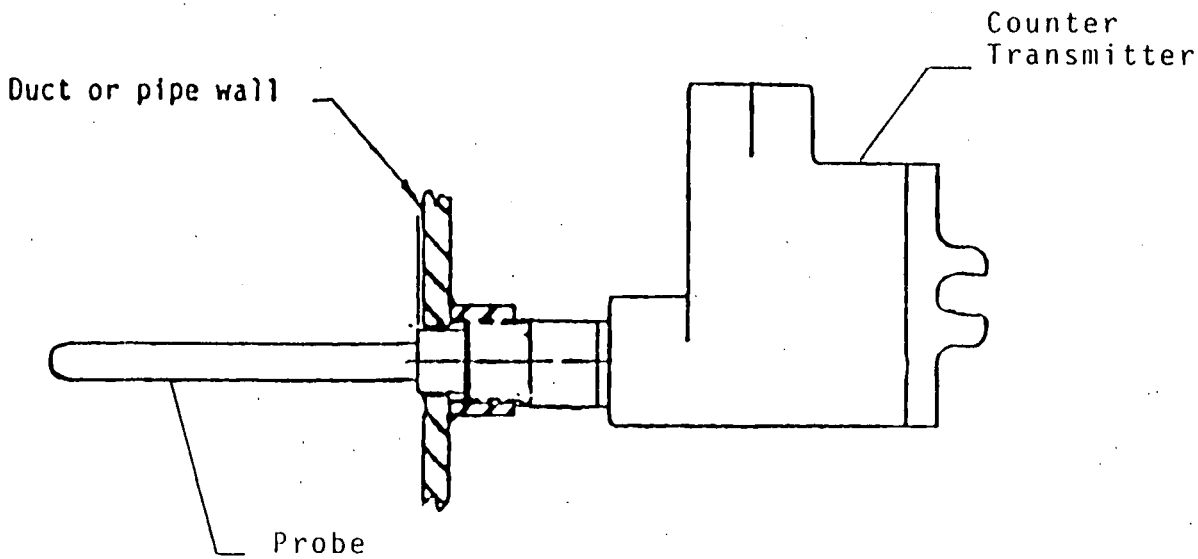

Fig. 3

TABLE 1

URANIUM HANDLING DUST COLLECTORS

PLT#	COLLECTOR #	SAMPLER	ALARM MONITOR	kgU/12mo
01	G2-1	X		0.0
01	G2-2	X		0.0/8mo
01	G2-64	X		0.0
01	G2-76	X		0.0
01	G2-171	X		0.0
01	G2-172	X		0.0
01	G2-235	X		0.0
01	G2-6014	X		0.0/8mo
01	G2-6015	X		0.0/8mo
01	G2-6042	X	X	0.0
02	G1-94	X		0.0
02	G2-252	X		0.0
02	G1-856	X		0.0
02	G2-103	X	X	0.0
02	G2-104	X		0.0
04	G4-1	X		0.0
04	G4-2	X	X	1.3
04	G4-4	X		0.2
04	G4-5	X	X	0.0
04	G4-7	X	X	0.7
04	G4-12	X	X	0.0
04	G4-13	X		0.0
04	G4-14	X	X	1.4
04	G4-15	X		0.0
05	G5-247	X	X	0.0
05	G5-248	X	X	0.0
05	G5-249	X	X	0.0
05	G5-250	X	X	0.5
05	G5-251	X	X	0.3
05	G5-253	X	TBI	0.0
05	G5-254	X	X	0.3
05	G5-256	X	TBI	0.1
05	G5-258	X	X	0.0
05	G5-259	X	X	0.0
05	G5-260	X	X	0.0
05	G5-261	X	X	5.9
05	G5-262	X		0.0
05	G5-267	X	X	0.4
05	G55-E-100	X	X	0.0
05	G5A-100	X	X	0.0
05	G5A-101	X	TBI	0.3
06	G6-6057	X		0.0
06	G6-3579	X		0.0
06	G6-3578	X		0.0

TABLE 1

URANIUM HANDLING DUST COLLECTORS

PLT#	COLLECTOR #	SAMPLER	ALARM MONITOR	kgU/12mo
08	G43-27	X	X	1.3
08	G43-29	X		0.3
08	G8-021	X		0.0
08	G8-024	X		0.0
08	G8-035	X	X	0.7
08	G8-057	X		0.0
08	G8-7	X		0.0
09	G9E2-400	X	TBI	0.7
09	G9N1-1039	X	X	0.3
09	G42A-100	X		0.0/8mo
13	735-13-7041	X		0.0
13	735-13-7051	X		0.1
13	G-1	X	X	0.7
13	G-2	X	X	0.4
15	G15-001	TBI		

TBI=To Be Installed

ACTIONS B-2 AND B-3

Executive Summary

The FMPC has implemented administrative controls for real-time alarm monitors at all major emission points, and air sample collection and analysis procedures to monitor emissions from potential emission points. In December 1984, a plant directive was issued to immediately implement controls which would monitor and reduce the FMPC stack emissions. These administrative controls, and the Standard Operating Procedures for each plant, ensure that any unplanned release will be detected and dealt with within twenty-four hours. As a result of the new administrative controls, an updated and specific procedure for the inspection and changing of air sampling filters from the stack monitors (IH&R 1.4) was issued. Detailed procedures for the analysis of those samples for uranium and particulates exist and are in use. These administrative controls, and the collection and analytical procedures used to monitor all radionuclide emission points are submitted in this report.

Introduction

The purpose of this report is to respond to the following items:

B.2. Establish and implement administrative controls for real-time monitors to ensure any unplanned releases will be detected and dealt with in 24 hours.

B.3. Establish and implement sample collection and analysis procedures and a QA plan to monitor all radionuclide emission points.

This report will address both of these issues since the required responses are interrelated.

Discussion

There are 203 emission points at the FMPC that have the potential to release radionuclides to the atmosphere. These consist of vents from process storage vessels or hoods, stacks controlled by dust collectors, and wet scrubber stacks.

Table 1 is a catalog of all of these potential emission points and shows the emission control devices for each point. Also shown in Table 1 is a listing of stack samplers, radiation alarm monitors, and the applicable Standard Operating Procedures (SOP) for the stack samplers and alarm monitors.

The FMPC has established administrative controls for real-time alarm monitors on the major radionuclide emission sources. Administrative controls are also in effect to monitor and reduce the emissions of other sources with the potential to emit radionculides to the atmosphere. Stack sampling devices are in place on all operating dust collector systems, and new administrative controls have resulted in specific procedures for their inspection and maintenance.

A directive, "Equipment and Procedural Changes - Dust Collectors" (Attachment 1), issued on December 18, 1984, initiated immediate implementation of site wide procedures for administrative controls to monitor and reduce stack emissions. This directive outlined procedures of response in the event of various types of stack alarms, including alarms from the real-time radiation alarm monitors. It also outlined procedures for monitoring all the dust collectors at the FMPC. The following is a summary of the operational changes made by the those administrative controls.

SUMMARY OF NEW ADMINISTRATIVE CONTROLS

Frequency of stack sampler inspection has been increased.

- From monthly to two per week for 11 most critical stacks.
- From monthly to weekly for remainder of stacks.

Frequency of visual inspection of dust collectors has been increased to once per shift.

- Operator must initial the differential pressure (DP) chart when this inspection is conducted.

All collector instrumentation is checked and the readings recorded on an hourly basis.

- Operating personnel are required to complete a check sheet concerning this function.

Stack monitors have been developed which enable small leaks in the dust collectors to be identified at the time they occur.

- 23 Ludlum radiation monitors have been installed on critical dust collectors
    - 15 units have been tied into the plant central alarm system and work station panels
    - 8 units tied into the work station panel boards only.
- 2 Auburn particulate alarms have been installed at the Pilot Plant.

Additional inspection doors have been added to some dust collectors so that all areas of the baghouse can be more easily seen.

Successful fluorescein dye tests must be conducted before a dust collector can be started that has experienced any emission problems.

New procedures were implemented in the event of the following :

- sounding of stack monitoring alarm
- sounding of differential pressure alarm
- discovery of soiled sampler filter
- indication of low differential pressure on the recorder
- discovery of dusting upon visual inspection of the collector.

These procedures include:

- Immediate shutdown of the dust collector and process equipment.

- Plant supervisor notifies the chemical area plant or metals area plant superintendent of the shutdown and subsequently, the results of the analysis.

- The chemical area or metals area superintendent notifies the general superintendent who, in turn, notifies the manager.

- The manager notifies the DOE/ORO office of any release of one pound or more that occurs during a 24-hour period or less.

Startup of the dust collector is only authorized after it has been determined that all problems have been corrected and the fluorescein dye test indicates there is no leakage.

The FMPC is in the process of reviewing and updating the dust collector Standard Operation Procedures (SOP) to incorporate these administrative controls. This should be completed by December 15, 1986. Adherence to these procedures will ensure that any unplanned release from a dust collector will be detected and dealt with within 24 hours. Procedures outlining administrative controls for response to radiation alarm monitors are recorded in the dust collector operation section of the SOP for each plant. These procedures outline the Operator and Supervisor responsibilities for responding to : 1) stack radiation monitor alarms, and 2) dust collector differential pressure alarms. As an example of these procedures, the SOP for plant 1 is included in Attachment 2. A procedure for the calibration of the alarm monitors, "Calibration of Ludlum Model 177 Alarm Ratemeter" is included in Attachment 3.

The directive of 12-18-84, "Equipment and Procedural Changes - Dust Collectors" resulted in the issuance of IH&R 1.4 "Stack Sampler Inspection and Filter Change Procedure" (Attachment 3). This procedure applies to all dust collectors at the FMPC and provides detailed instructions for inspection of the filters and collection of air samples at all particulate control devices. This inspection procedure provides an important means of monitoring <u>all</u> of the potential particulate emission sources. This procedure is used in conjunction with the plant SOPs for the inspection of stack air samplers and the collection of air samples. These SOPs, the 12-18-84 directive, and IH&R 1.4 provide guidance for the detection of, and response to, unplanned stack emissions within 24 hours of an incident.

The wet scrubber control systems at the FMPC are not equipped with stack monitors. The wet scrubber losses to the atmosphere from the plant 8 scrubber systems are calculated each month according to Materials Control & Accountability procedure, "Reporting Wet Scrubber Losses to the Atmosphere". The FMPC will be performing a characterization of all the scrubber systems at the FMPC to determine potential emission rates for each system. This is scheduled to begin in August of 1986.

A vacuum system (G15-001) in the basement of the Technical Laboratory Building has the potential to release trace amounts of radionuclides to the atmosphere. A stack sampler and Ludlum radiation alarm monitor are scheduled to be installed on this unit by September 30, 1986. The SOP for the inspection of this unit is being prepared. In the interim, the Building Superintendent has instituted a daily monitoring program which requires the unit to be visually inspected daily, and the observations filed in a daily log book.

Random air sampling of emission sources which are not equipped with a stack sampler will be conducted annually to assess the potential for radionuclide emissions.

The analysis of the stack filter air samples are performed at the FMPC. Specific procedures for the analyses are followed. The existing analytical procedures for particulate and uranium determination are "Gravimetric Determination of Non-Volatile particulates on Stack Filters Including Sample Preparation For a Total Uranium Determination", and "The Colorimetric (BrPADAP) Determination of Uranium Via Air Autoanalyzer Interfaced To HP-85 Personal Computer". These procedures are included in Attachment 3. These are un-numbered procedures that are being reviewed and revised.

The Quality Assurance Plan for the environmental compliance activities has been structured to meet the requirements of FMPC QA programs, DOE Order 5700.6A entitled "Quality Assurance":, ANSI/ASME NQA-1, "Quality Assurance Program Requirements for Nuclear Facilities", and other applicable DOE orders and federal and state regulations.

The Quality Assurance Program elements covered in the QA plan include but are not limited to: design control, procurement control, use of instructions procedures and drawings, document control, identification and control of samples, control of measuring and test equipment, inspection, control of nonconformances, corrective actions, quality records, training, audits, and handling storage and shipping.

The QA plan for Environmental compliance, that is applicable for monitoring radionuclides on all emission points, has been developed and is included in this report as Attachment 4.

ACTION B-4

Compliance Action B-4 for the Clean Air Act requires that FMPC "establish a schedule for (the) installation of emission controls". Attached is a table which contains a list of the dust collectors which are scheduled to be replaced. A funding year (FY) and estimated completion date are listed. These dates are dependent upon many conditions including the availability of appropriated funds and any priority shift which might occur. An annual progress report updating this schedule will be issued.

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List of Attachments

Attachment 1: Equipment and Procedural Changes - Dust Collector

Attachment 2: 1-C-701, Plant 1 SOP for Dust Collector Operation

Attachment 3: IH&R 1.4 Stack Sampler Inspection and Filter Change Procedures,
Procedure for Reporting Wet Scrubber Losses to the Atmosphere

The Colimetric (BrPADAP) determination of Uranium Via an Autoanalyzer Interfaced to HP-85 Personal Computer

Gravimentric Determination of Npon-Volatile Particulates on Stack Filters Including Sample Preparatin For Total Uranium Determination

Calibration of Ludlum Model 177 Alarm Ratemeter

Attachment 4: Environmental Compliance Quality Assurance Plan

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Table 1

POTENTIAL RADIONUCLIDE EMISSION POINTS

Emission Point Number	Control ID #	Stack Sampler	Real Time Alarm Monitor	SOP for Air Sample Collection	SOP for Alarm Monitor Response
PLANT 1					
001	G2-172	I		1-C-701; IH&R 1.4	
002	G2-6042	I	H	1-C-701; IH&R 1.4	1-C-701
003	G2-76	I		1-C-701; IH&R 1.4	
004		V			
005	G2-2	I		1-C-701; IH&R 1.4	
006	G2-64	I		1-C-701; IH&R 1.4	
007	G2-1	I		1-C-701; IH&R 1.4	
008		V			
009	G2-6015	I		1-C-701; IH&R 1.4	
010	G2-6014	I		1-C-701; IH&R 1.4	
015	G2-171	I		1-C-701; IH&R 1.4	
016	G2-235	I		1-C-701; IH&R 1.4	
PLANT 2/3					
001		S			
002 - 009		V			
012	G1-856	I		IH&R 1.4	
016		V			
017		V			
018 - 021		V			
022	G2-252	I		IH&R 1.4	
023	G1-94	I		IH&R 1.4	
025 - 034		V			
037 - 058		V			
060		V			
063 - 067		V			
069 - 078		V			
080 - 085		V			
088 - 091		V			
092		S			
093		S			
098 - 099		V			
103 - 105		V			
107		V			
119 - 128		V			
130 - 139		V			
144 - 147		V			
148	G2-103	I	H	IH&R 1.4	(1)
149	G2-104	I		IH&R 1.4	
152 - 154		V			

Table 1

POTENTIAL RADIONUCLIDE EMISSION POINTS

Emission Point Number	Control ID #	Stack Sampler	Real Time Alarm Monitor	SOP for Air Sample Collection	SOP for Alarm Monitor Response
PLANT 4					
001	G4-7	I	L	4-C-701; IH&R 1.4	4-C-701
002		S			
003	G4-13	I		4-C-701; IH&R 1.4	
004	G4-14	I	L	4-C-701; IH&R 1.4	4-C-701
005	G4-2	I	L	4-C-701; IH&R 1.4	4-C-701
006	G4-12	I	L	4-C-701; IH&R 1.4	4-C-701
007	G4-15	I		4-C-701; IH&R 1.4	
008	G4-1	I		4-C-701; IH&R 1.4	
009	G4-5	I	H	4-C-701; IH&R 1.4	4-C-701
025	G4-4	I		4-C-701; IH&R 1.4	
PLANT 5					
2	G5-247	I	H	5-C-701; IH&R 1.4	5-C-701
3	G5-248	I	H	5-C-701; IH&R 1.4	5-C-701
4	G5-249	I	H	5-C-701; IH&R 1.4	5-C-701
5	G5-250	I	H	5-C-701; IH&R 1.4	5-C-701
6	G5-251	I	H	5-C-701; IH&R 1.4	5-C-701
8	G5-253	I	TBI,H	5-C-701; IH&R 1.4	5-C-701
9	G5-254	I	H	5-C-701; IH&R 1.4	5-C-701
10	G5-256	I	TBI,H	5-C-701; IH&R 1.4	5-C-701
11	G5-258	I	H	5-C-701; IH&R 1.4	5-C-701
12	G5-259	I	H	5-C-701; IH&R 1.4	5-C-701
13	G5-260	I	L	5-C-701; IH&R 1.4	5-C-701
14	G5-261	I	L	5-C-701; IH&R 1.4	5-C-701
15	G5A-100	I	H	5-C-701; IH&R 1.4	5-C-701
16	G5A-101	I	TBI,H	5-C-701; IH&R 1.4	5-C-701
17	G5-262	I		5-C-701; IH&R 1.4	
18	G55-E100	I	H	5-C-701; IH&R 1.4	5-C-701
19	G5-267	I	H	5-C-701; IH&R 1.4	5-C-701
PLANT 6					
1	G6-6057	I		6-C-701; IH&R 1.4	
2	G6-3579	I		6-C-701; IH&R 1.4	
3	G6-3578	I		6-C-701; IH&R 1.4	
6		S			
7 - 10		V			

Table 1

POTENTIAL RADIONUCLIDE EMISSION POINTS

Emission Point Number	Control ID #	Stack Sampler	Real Time Alarm Monitor	SOP for Air Sample Collection	SOP for Alarm Monitor Response
PLANT 8					
001	G43-27	I	L	8-C-701; IH&R 1.4	8-C-701
002		S			
003	G8-021	I		8-C-701; IH&R 1.4	
004	G8-024	I		8-C-701; IH&R 1.4	
005		S			
006	G8-035	I	H	8-C-701; IH&R 1.4	8-C-701
007		S			
008	G8-7	I		8-C-701; IH&R 1.4	
009		S			
010		S			
011	G43-29	I		8-C-701; IH&R 1.4	
012 - 015		V			
017 - 019		V			
020	G8-057	I		8-C-701; IH&R 1.4	
021 - 024		V			
028 - 032		V			
PLANT 9					
001	G9E2-400	I		9-C-701; IH&R 1.4	
002	G9N1-1039	I	L	9-C-701; IH&R 1.4	9-C-701
003		V			
005		V			
007	G42A-100	I		9-C-701; IH&R 1.4	
PILOT PLANT					
001		V			
003 - 004		V			
006		V			
008 - 011		V			
015	G-1	I	A	11-C-238; IH&R 1.4	11-C-238
016	G-2	I	A	11-C-238; IH&R 1.4	11-C-238
R-14	735-13-7041	I		11-C-238; IH&R 1.4	
R-50	735-13-7051	I		11-C-238; IH&R 1.4	
LABORATORY					
001	G15-001	TBI	TBI,L		

Table 1

POTENTIAL RADIONUCLIDE EMISSION POINTS

KEY: A - Auburn particulate alarm, alarm sent to control panel
H - Alarm sent to Honeywell computer and operator control panel
L - alarm at operator control panel
S - Scrubber system, characterazation of emissions to begin August, 1986.
TBI - To be installed
V - This is a vent for a process, storage vessel, or hood where there is only the potential to emit trace amounts of radionuclides. Random air sampling of these minor emission points will be conducted annually to assess the potential for radionuclide emissions.
I - Stack sampler is installed.

Footnote:

(1) Manager's Directive, of 12-18-84, "Equipment and Procedural Changes - Dust Collectors", outlines site wide administrative controls to respond to stack alarms.

PROPOSED DUST COLLECTOR REPLACEMENT SCHEDULE

PLT#	COLLECTOR #	LOCATION AND SERVICE	FUNDING YEAR	CONSTRUCT COMPLETE
01	G2-2	Plt 1, 2nd Floor SE, Drum Dumper	FY87	OCT 91
01	G2-64	Plt 1, 4th Floor NW, Mill Area	FY87	OCT 91
01	G2-76	Plt 1, 4th Floor SW, Mill Area	FY87	OCT 91
01	G2-172	Plt 1, 4th Floor NW, Sample Area	FY89	DEC 90
01	G2-6015	Plt 1, Drum Baster Copper Shredder West Outside	FY89	OCT 92
01	G2-6042	Plt 1, 2nd Floor NW, Fitz Mill/Pin Cutter	FY89	DEC 90
02	G1-94	Plt 2/3, 4th Floor East, Digestion Dump Stations	FY87	APR 91
02	G1-856	Plt 2/3, 4th Floor Center, West Metal Dissolver	FY89	APR 90
02	G2-103	Plt 2/3, 4th Floor East, Denitration North Mill	FY85	MAR 88
02	G2-104	Plt 2/3, 4th Floor East, Denitration South Mill	FY89	JUN 91
04	*G4-1	Plt 4, 4th Floor North, UD3 Dump Station	FY85	JUL 87
04	*G4-2	Plt 4, 4th Floor West, UF4 Package	FY85	OCT 87
04	G4-4	Plt 4, 4th Floor SE, UF4 Package	FY85	JUL 87
04	G4-5	Plt 4, 4th Floor SW, Serves G4-11 Hoffman	FY86	DEC 87
04	*G4-7	Plt 4, 4th Floor North, H2 Offgas	FY85	JUL 87
04	G4-12	Plt 4, 4th Floor West, UF4 Package	FY86	MAR 88
04	*G4-13	Plt 4, 2nd Floor West, Bank 8 Packaging	FY85	JUL 87
04	G4-14	Plt 4, 4th Floor South, UF4 Package	FY86	DEC 87
04	*G4-15	Plt 4, 1st Floor North, Enriched Drum Stations	FY85	JUL 87
05	G5-247	Plt 5, 2nd Floor SW, West Jolters	FY88	SEP 90
05	G5-248	Plt 5, 2nd Floor SE, East Jolters	FY88	SEP 90
05	G5-249	Plt 5, 2nd Floor SW, #4 "F" Machine	FY86	JUN 89
05	G5-250	Plt 5, 2nd Floor SW, #5 "F" Machine, W. Cap Station	FY86	JUN 89
05	*G5-251	Plt 5, 2nd Floor SE, #1 "F" Machine	FY85	APR 87
05	*G5-253	Plt 5, 2nd Floor SE, #3 "F" Machine, E. Cap. Station	FY85	APR 87
05	G5-254	Plt 5, 2nd Floor West Center, West Breakout	FY86	DEC 89
05	G5-256	Plt 5, 2nd Floor East Center, East Breakout	FY86	DEC 89
05	*G5-258	Plt 5, 2nd Floor West Center, West Remelt	FY87	OCT 88
05	G5-259	Plt 5, 2nd Floor NW, West Burnout	FY87	OCT 88
05	G5-260	Plt 5, 2nd Floor East, East Remelt, East Separation	FY86	JUL 87
05	G5-261	Plt 5, 2nd Floor NE, East Burnout, East Separation	FY86	JUL 87
05	G5-262	Plt 5, 2nd Floor NW, Graphite Shop	FY86	JUL 87
05	G5-267	Plt 5, West Mezzanine, West Breakout	FY86	DEC 89
05	*G55-E-100	Bldg 55, Top Floor	FY85	MAR 87
05	G5A-100	Plt 5, 2nd Floor NW, W Separation Mold Cleaning	FY87	DEC 90
05	G5A-101	Plt 5, Roof Maint. Shop, East Breakout	FY86	DEC 89
06	G6-6057	Plt 6, Machining	FY88	MAY 90
06	G6-3579	Plt 6, Machining	FY88	MAY 90
06	G6-3578	Plt 6, Machining	FY88	MAY 90

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PROPOSED DUST COLLECTOR REPLACEMENT SCHEDULE

PLT#	COLLECTOR #	LOCATION AND SERVICE	FUNDING YEAR	CONSTRUCT COMPLETE
08	G43-27	Plt 8, 2nd Floor SE, Rotary Kiln	FY88	NOV 91
08	G43-29	Plt 8, Penthouse, Rotex	FY88	NOV 91
08	G8-021	Plt 8, 2nd Floor East, Muffle Furnace, Graphite	FY89	AUG 91
08	G8-024	Plt 8, 2nd Floor East, Muffle Furnace	FY89	AUG 91
08	G8-035	Plt 8, 2nd Floor East, Oxidation #1	FY87	DEC 90
08	G8-057	Plt 8, 2nd Floor West, Lime Dumping, Digestion D102	FY89	AUG 91
08	G8-7	Plt 8, East Pad Outside, Oxidation #2	FY85	DEC 88
09	G42-615	Plt 9, West Pad Outside, Machining	FY88	NOV 89
09	G9E2-400	Plt 9, East Pad Outside, Machining	FY88	DEC 92
09	* G9N1-1039	Plt 9, South Pad Outside	FY85	OCT 86
13	G-1	Pilot Plant, UF6 to UF4 Mezzanine Drum Station	FY89	SEP 91
13	G-2	Pilot Plant, UF6 to UF4 Mezzanine Drum Station	FY89	SEP 91
13	G6-93A	Pilot Plant, Wet Area	FY89	DEC 90
13	735-13-7041	Pilot Plant Annex, Outside SW	FY87	MAY 90
13	735-13-7051	Pilot Plant Annex, Outside SE Rotoblast	FY87	OCT 90

Note:

* Authorization received for collector replacement

Attachment 1

Equipment and Procedural Changes - Dust Collector

NLO, Inc.

A SUBSIDIARY OF NL INDUSTRIES, INC.
CINCINNATI, OHIO 45239

December 18, 1984

SUBJECT EQUIPMENT AND PROCEDURAL CHANGES - DUST COLLECTORS

TO Addressees

FROM R. M. Spenceley

REFERENCE

The following changes in equipment and/or procedures will be implemented immediately:

1. The frequency of the check of stack samplers will be increased from monthly to weekly. (R. Weidner to implement)

2. The frequency of visual inspection of collectors by operating personnel will be increased to once per operating shift. The inspecting operator will initial the DP chart at the time of shutdown for inspection. (E. M. Nutter to implement)

3. All collector instrumentation will be checked and readings recorded on an hourly basis. Operators will sign the check sheet. (E. M. Nutter to implement)

4. Add additional monitors to approximately fifteen collectors - more, if time permits - utilizing capital funds. (E. M. Nutter to prepare paperwork and to establish priorities with Health & Safety and Production supervision.) Those collectors having the greatest potential for loss are to be equipped with monitors first. Time, not money, is the limiting factor. Install as many monitors as possible.

5. Check all DP instruments to assure they are in proper working order. (E. M. Nutter to implement.) Investigate the addition of a pressure transducer to increase the sensitivity of the pressure measurement. (R. Weidner to pursue)

6. Add additional inspection doors to all collectors so that all areas of the bag house can be seen without difficulty. (E. M. Nutter to prepare JOR's - Maintenance to implement)

7. Purchase additional fluorescein dye equipment to provide a unit in each operating plant. (E. M. Nutter to implement)

8. Check on the availability of commercially produced entry suits which will retard the penetration of beta radiation, thus extending the allowable time that mechanical and production personnel may spend in a collector. (M. W. Boback to implement)

9. Preventative maintenance of all instruments and equipment is to be performed as scheduled. If possible, the current computer program should be redone to flag out those items which are overdue. Inability to perform scheduled preventative maintenance will be reported to the Director of Engineering. In addition, appropriate tags will be attached to all equipment at the time scheduled preventative maintenance is completed. (N. R. Leist to implement)

10. Procedures to be followed in the event of various alarms:

    a. Sounding of the <u>stack monitor alarm</u>

        1) Immediately shut down collector.

        2) Call IH&R technician.

        3) IH&R technician to:

            a) Check monitor for proper operation. If monitor is operating properly, it is assumed that filter will be soiled.

            b) Remove soiled filter and weigh as is. Apply factor assay value to determine percent U for that particular collector.

            c) Report preliminary estimate of stack loss to supervisor.

            d) Submit filter for normal analyses.

        4) Supervisor to:

            a) Notify Chemical Plant or Metals Plant Superintendent.

            b) Inspect collector.

            c) If no visual evidence of problem, initiate fluorescein dye test.

            d) Do not restart collector and operations serviced by it until preliminary estimate of stack loss has been reported and approval to restart has been granted by the Chemical or Metals Plants superintendent.

5) Plant Superintendents to:

   a) Notify General Superintendent of problem and status of equipment.

   b) Check that procedures 1 through 4 above have been followed.

   c) Ascertain preliminary estimate of loss and report to General Superintendent.

   d) Maintain equipment in shutdown mode until authorized to restart by the General Superintendent.

6) General Superintendent to:

   a) Notify Manager, or his alternate, of the problem.

   b) Provide Manager, or his alternate, with assurance that procedures 1 through 5 have been followed.

   c) Ascertain preliminary estimate of loss and report to Manager, or his alternate.

   d) Maintain equipment in shutdown mode until restart is authorized by Manager, or his alternate.

7) Manager, or his alternate, to:

   a) Notify the ORO Contract Administrator of the problem.

   b) Recommend that equipment be restarted if the result of visual inspection and the fluorescein dye test prove negative and the preliminary estimate of loss supports a normal buildup of material on the sampler filter as opposed to a rapid accumulation from a failure of some sort.

   c) Withhold restart permission if the visual inspection or the fluorescein dye test indicate problems.

   d) Permit restart only after appropriate repairs have been effected and a fluorescein dye test has been applied to the repaired equipment and has indicated no leakage.

b. Discovery of a soiled sampler filter

1) Immediately shut down collector.

2) IH&R technician to:

a) Remove soiled filter and weigh as is. Apply factor assay value to determine percent U for that particular collector.

b) Report preliminary estimate of stack loss to supervisor.

c) Submit filter for normal analyses.

3) Items 4 through 7 in 10.a above to be followed.

c. Sounding of the Differential Pressure alarm or indications of low Differential Pressure on the recorder

1) Immediately shut down collector.

2) Call IH&R technician.

3) IH&R technician to:

a) Check stack sampler filter.

b) If filter is soiled, remove and weigh as is. Apply factor assay value to determine percent U for that particular collector. Report preliminary estimate of loss to supervisor. Submit filter for normal analyses.

c) If filter is not soiled, so notify supervisor.

4) Supervisor to:

a) Notify Chemical or Metals Plant Superintendent.

b) If sampler filter is soiled, suspect a loose or torn bag or bags and inspect collector for same.

(1) If a bag failure is found, prepare collector for maintenance.

(2) Upon completion of maintenance repairs, initiate a fluorescein dye test.

(3) If dye test is satisfactory, restart the collector, but not the operation serviced by the collector, and check for proper Differential Pressure readings.

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(4) If the Differential Pressure readings are not in the normal range, request the services of an instrument mechanic to service the Differential Pressure instrument.

(5) Cause of low Differential Pressure must be ascertained before consideration can be given to restarting the collector and operations serviced by it.

c) If the sampler filter is not soiled, suspect an instrument failure.

(1) Request the services of an instrument mechanic.

(2) Visually inspect the collector.

(3) Initiate a fluorescein dye test.

(4) Cause of the low Differential Pressure reading must be ascertained before consideration can be given to restarting the collector and operations serviced by it.

5) Items 5 through 7 in 10.a above to be followed.

d. Discovery of dusting upon visual inspection of the collector.

1) Collector is down but shut down operation serviced by collector.

2) Call IH&R technician.

3) IH&R technician to:

a) Check stack sampler filter.

b) If filter is soiled, remove and weigh as is. Apply factor assay value to determine percent U for that particular collector. Report preliminary estimate of loss to supervisor. Submit filter for normal analyses.

c) If filter is not soiled, so notify supervisor.

4) Supervisor to:

a) Notify Chemical or Metals Plant Superintendent.

b) If sampler filter is soiled, suspect a loose or torn bag or bags and inspect filter for same.

(1) If a bag failure is found, prepare collector for maintenance.

(2) Request services of an instrument mechanic to check instrumentation to pinpoint failure to alarm.

(3) Upon completion of maintenance repairs, institute a fluorescein dye test.

(4) Do not restart collector and operations serviced by it until preliminary estimate of stack loss has been reported and approval to restart has been granted by the Chemical or Metals Plant Superintendent.

c) Items 5 through 7 in 10.a above to be followed.

e. Any unusual operation not covered by 10.a through 10.d above shall be treated as a possible failure until proven otherwise. As a minimum:

1) The collector will be shut down.

2) The Chemical or Metals Plant Superintendent will be notified.

3) The sampler filter will be checked.

4) The collector will be visually checked.

5) A fluorescein dye check will be initiated.

6) Assuming all checks above indicate no problem, the collector may be restarted under heavy surveillance with the approval of the General Superintendent and the Manager, or his alternate.

f. Written reporting requirements

1) For those collector problems where the loss is determined to be minimal and the result of normal operational buildup, a "Minor Event" report shall be initiated by the supervisor within 24 hours of the occurrence.

2) For those collector problems where the loss is larger and the result of an operational problem, an "incident report" shall be initiated by the Chemical or Metals Plant Superintendent as soon as the cause of the loss can be ascertained, but no more than 72 hours in any event.

3) Losses resulting from an operational problem will be reported immediately to the Contract Administrator by the Manager. This verbal notification will be followed by an "Unusual Occurrence" report as soon as the incident can be investigated, but no more than 96 hours later in any event.

R. M. Spenceley

RMS:wfk

Distribution:

M. W. Boback (20x)
C. H. Handel
J. H. Harrison
N. R. Leist
E. M. Nutter (20x)
C. E. Polson
G. C. Smith

DOE Investigating Committee
NLI Committee

Attachment 2

Plant 1 SOP for Dust Collector Operation

TITLE	PROCEDURE NUMBER
SOP - PLANT 1 DUST COLLECTORS	1-C-701

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DIVISION & PLANT	SUPERSEDES	PREPARED BY	ISSUE DATE
Operations Plant 1	1-C-701 12-09-77	J. H. Graver	01-29-86
		REVISED BY	REVISION DATE

PAGE 1 REVISION DATE: _____

REFERENCES: SOP 20-C-101, SOP 1-C-904
MS 1-BE-420-1, 1-BE-420-2, 1-BE-420-3, 1-BE-420-4, 1-BE-420-5, 1-BE-420-6, 1-BE-420-7, 1-BE-420-8, 1-BE-420-15
1-BE-490-1, 1-BE-490-2

DEFINED SAFETY SYSTEM INVOLVED: ____ YES __X__ NO

DESCRIPTION OF OPERATION AND EQUIPMENT

Dust collectors are supplemented by various blowers and vacuum cleaners and service Plant 1 equipment and enclosures. The dust collectors and the areas they serve are listed in Table 1.

Collectors filter uranium contaminated dust from the air streams and exhaust the filtered air to the atmosphere. The collected dust falls into a hopper from which it is air conveyed to a vacuum cleaner for drumming.

TABLE 1

PLANT 1 DUST COLLECTION EQUIPMENT

COLLECTOR		TYPE	Associated Collector	EQUIPMENT SERVED
G-2-1	Mikro-Pulsaire	Pulse-Jet		East Packaging Station
G-2-2	Dracco	Shaker (Manual)	G-2-237	Drum dumper, bucket elevator for Titan Mill
G-2-64	Day	Blowring		Titan Mill, Mill Feed Hopper, Top of Bucket Elevator
G-2-68	Day	Blowring		Laboratory (Not In Use)
G-2-75B	Hoffman	Shaker (Manual)		Safe Geometry, General Cleaning
G-2-76	Day	Blowring		Titan Mill Products, Packaging Systems
G-2-171	Turner-Haws	Blowring		G-2-236 Hoffman Vacuum Cleaner
G-2-172	Turner-Haws	Blowring	G-2-236	Sampling Line

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TABLE 1 (cont.)

PLANT 1 DUST COLLECTION EQUIPMENT

COLLECTOR	TYPE	Associated Collector	EQUIPMENT SERVED
G-2-235 Hoffman	Shaker (Manual)		Safe Geometry, General Cleaning
G-2-236 Hoffman	Shaker (Manual)		Laboratory Area, General Cleaning
G-2-237 Hoffman	Shaker (Manual)		G-2-2 Dracco, Cleaning in Dumper Area, Williams Mill
G-2-238 Hoffman	Shaker (Manual)		Drum Reconditioning
G-2-6014 Wheelabrator	Shaker (Powered)		Drum Reconditioning
G-2-6015 Pangborn	Shaker (Powered)		Copper Shredding
G-2-6042A Sly	Shaker (Powered)		Fitzpatrick Mill, Thor Mill (Exhauster Only)
G-2-6042B In-Line Filter	HEPA Filter	G-2-6042A	G-2-6042A Sly Thor Mill

ENVIRONMENTAL CONSIDERATIONS

It is the intention of Westinghouse Materials Company of Ohio to achieve and maintain those levels of air and water quality which will protect health and promote welfare and safety. The responsibility for limiting the uncontrolled or unintended release of pollutants rests with all personnel, both management and operators.

INDUSTRIAL HEALTH AND SAFETY REQUIREMENTS

1. Observe all nuclear safety requirements for dust collector material per referenced Manufacturing Specifications and Standard Operating Procedures listed under "References" at the beginning of this SOP.

2. A dust-type respirator fitted with cartridges approved for radionuclides shall be worn when there is a possible contact with dust.

3. Leather-palm gloves shall be worn when handling drums or when working with dust collector equipment.

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INDUSTRIAL HEALTH AND SAFETY REQUIREMENTS (cont.)

4. Move and store dust collector material per SOP 20-C-101.

5. When working in dusty conditions, vacuum excessive nuclear material from the exterior of clothing before removing the respirator.

6. Respirators must be worn anytime a dust collector is entered. A dust-type air-purifying respirator may be worn when exposure periods inside a dust collector do not exceed five minutes. An airline respirator shall be worn for exposure periods inside a dust collector which exceed five minutes.

7. Safety glasses shall be worn at all times.

8. Dust spills shall be immediately vacuumed.

9. Exhausters shall remain on while the equipment served is in use except in an emergency, or during the inspection of the units. If the dust collector must be shut down, follow the procedure in Table 2, "Operator Emergency Shutdown." The shutdown procedure shall be posted on the dust collector control panel.

10. Process clothing shall be worn and be completely buttoned when working inside the dust collector.

11. Before entering the filter housing enclosure, check that a "Work Permit" NLO-H&S-973 has been issued and is posted outside the collector.

12. Before entering the bag house enclosure, lock and tag "Out Of Service" the power equipment to the collector and the associated unit including the main exhaust motor, blow ring blower motor, or pulse blower motor in accordance with "Lock and Tag Procedure," Section 8.3, NLO Health and Safety Manual.

13. Any circumstance which could have resulted in a significant intake of radioactive materials by inhalation, ingestion, or absorption will be immediately reported to a supervisor. The involved employees, wage or salary, will report to the Medical Department at the end of their shift to submit a urine sample and again report at the start of their next shift to submit another urine sample. The supervisor will inform the Industrial Hygiene Technician of the circumstance and file a minor event report before the end of the shift during which the circumstance happened.

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PROCEDURE

1. Each shift of operation shall perform the following for all collectors:

   1.1 Check the high and low differential pressure alarms. Record that the check has been completed on Form NLO-PRO-1127, "Daily Check of Dust Collectors". Date and replace the recorder chart if less than eight hours remain on the chart. Charts may be used for three days at the rate of one shift per day.

   1.2 Change and initial the differential pressure recorder chart. Forward the completed chart to the office of the supervisor.

   1.3 At a time specified by the supervisor shut down the collector and inspect the collector per items on Form FMPC-PRO-2609, "Dust Collector Inspection Check Sheet."

   WARNING: WEAR A DUST-TYPE RESPIRATOR DURING INSPECTION.

   1.4 If the collector is equipped with a shaker mechanism, shake down the bags. Manually operate the blowring mechanism on collectors equipped with blowrings.

   1.5 If problems exist after inspection per items on Form FMPC-PRO-2609 "Dust Collector Inspection Check Sheet", the supervisor is to correct the problems per Table 4, "Inspection Troubleshooting Guide." If damaged bags are found, notify the Mechanical Department.

2. Each hour of operation check the differential pressure and record on Form NLO-PRO-334 "Dust Collector Inspection Record", or Form FMPC-PRO-2617 "Dust Collector Manometer Readings."

   2.1 If the pressure reading or manometer reading is above the upper limit as listed in Table 2 "Dust Collector Differential Pressure Recorder-Controller Settings and Manometer Readings," check that the instruments are functioning properly and clean the bags or operate the blowrings as required.

   2.2 If the pressure reading or manometer reading is below the lower limit as listed in Table 2, turn off the dust collector and check for broken bags. Shut down all equipment served per Table 3, "Operator Emergency Shutdown."

   2.3 Notify the supervisor if the trouble cannot be corrected.

   2.4 Note on the differential pressure recorder chart that the dust collector was down.

3. Inspect the dust collector hourly for:

   3.1 Visual and audible characteristics. Record on Form NLO-PRO-334 that the unit was inspected. If the dust collector is obviously malfunctioning or emitting unusual sounds, shut down the unit. Notify the supervisor.

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3. Inspect the dust collector hourly for:

   3.2 A sudden rise (100° ± 25°F) in temperature (if equipped with a temperature gage). Shut down the dust collector. Notify the supervisor.

   3.3 Radiation stack monitor readings (if equipped with a stack monitor). Record the readings on Form FMPC-PRO-2608 "Dust Collector Stack Monitor Readings." If the reading increases more than 10 percent of any scale in one hour, notify the supervisor and the Industrial Hygiene Technician.

   3.4 Stack sampler rotometer flow (if equipped with a stack sampler rotometer). Record the reading on Form FMPC-PRO-2612 "Stack Sampler Checksheet". Adjust the flow if necessary and record the adjusted flow on Form FMPC-PRO-334-1.

4. Operation of G-2-64, G-2-68, G-2-76, G-2-171, G-2-172 Day and Turner-Haws Dust Collectors

   NOTE: G-2-64 and G-2-76 empty directly into a production hopper in the Packaging Station. Vacuum out G-2-171 and G-2-172 into a "Knock-Out Drum" using a portable Hoffman unit. Proceed as in 4.8.1.

   4.1 Turn on the main power disconnect.

   4.2 Start the differential pressure recorder-controller.

   4.3 Set the differential pressure recorder-controller at settings as indicated in Table 2. Open the air inlet valves, and close the bypass and drain valves. Alarm points are preset by Maintenance.

   4.4 Turn on the rotary valve.

   4.5 Starting the Dust Collector:

      4.5.1 Press the "START" button on the main exhauster blower, ring blower, and drive motor.

   4.6 Set the selector switch on "AUTO."

   4.7 Shutting Down the Dust Collector:

      4.7.1 Press the "STOP" button for the exhauster motor.

         NOTE: The blowring drive and high pressure blower motors are interlocked with the exhauster motor switch.

   4.8 Empty the collector as follows:

      4.8.1 Perform a scale check of the scale in use per SOP 1-C-904.

      4.8.2 Tare weigh a 30- or 50-gallon drum, record the weight on a Form NLO-AC-1945 "Residue Production Transfer and Identification," and attach the ticket to the drum.

      4.8.3 Premark the drum with a 15-digit lot number and place the drum under the dust hopper outlet or attach a "Knock-Out" cover as required.

      4.8.4 Ensure that the rotary valve is operating. (Not required on units which are vacuumed out.)

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4.8 Empty the collector as follows: (cont.)

4.8.5 To prevent overfilling while discharging the dust, frequently check the drum by tapping or by visual inspection.

4.8.6 When the drum is filled, turn off the rotary valve. (Not required on units which are vacuumed out.)

4.8.7 Remove the full drum and replace with a pretared, premarked empty drum. (Remove the "knock-out" cover if so equipped.)

4.8.8 Gross weigh the filled drum. Enter the lot number, drum number, gross, tare, and net weights on Form NLO-AC-1945. Stencil the data on each drum.

4.8.9 Record on Form NLO-PRO-1416 that the dust collector was emptied.

4.8.10 Forward the Form NLO-AC-1945 to the Production Recording Office.

4.8.11 Retain the materials in Plant 1 for disposal.

5. Operation of G-2-1 Mikro-Pulsaire Dust Collector

NOTE: Vacuum out this unit into a "Knock-Out" drum using a portable Hoffman unit. Proceed per item 5.8.

5.1 Turn on the main power disconnect.

5.2 Turn on the air supply to the bag cleaning mechanism.

5.3 Turn on the differential pressure recorder-controller.

5.4 Set the differential pressure recorder-controller at settings as indicated in Table 2. Open the air inlet valves, and close the bypass and drain valves. Alarm points are preset by Maintenance.

5.5 Turn on the rotary valve.

5.6 Starting the Dust Collector:

5.6.1 Press the "START" button for the main exhauster blower and the compressor motor.

5.7 Shutting Down the Dust Collector:

5.7.1 Press the "STOP" buttons to the main blower and compressor motors.

5.8 Empty the dust collector as follows:

5.8.1 Perform a scale check of the scale in use per SOP 1-C-904.

5.8.2 Tare weigh a 30- or 50-gallon drum, record the weight on a Form NLO-AC-1945, "Residue Production Transfer and Identification" and attach the ticket to the drum.

5.8.3 Premark the drum with a 15-digit lot number and place the drum under the dust hopper outlet, or attach a "Knock-Out" cover as required.

5.8.4 Ensure that the rotary valve is operating. (Not required on units that are vacuumed out.)

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5.8 Empty the dust collector as follows: (cont.)

5.8.5 To prevent overfilling while discharging the dust, frequently check the drum by tapping or by visual inspection.

5.8.6 When the drum is filled, turn off the rotary valve. (Not required on units that are vacuumed out.)

5.8.7 Remove the full drum and replace with a pretared, premarked empty drum. (Remove the "knock-out" cover if so equipped.)

5.8.8 Gross weigh the filled drum. Enter the lot number, drum number, gross, tare, and net weights on Form NLO-AC-1945. Stencil the data on each drum.

5.8.9 Record on Form NLO-PRO-1416 that the dust collector was emptied.

5.8.10 Forward the Form NLO-AC-1945 to the Production Recording Office.

5.8.11 Retain the materials in Plant 1 for disposal.

Table 2
Dust Collector
Differential Pressure Recorder-Controller Settings and Manometer Readings

Collector No.	Recorder-Controller Blow Ring and Shaker (in/H_2O) Low	High	Manometer Readings (in/H_2O) Low	High
G-2-1	2	4		
G-2-2	2	4		
G-2-64	2	2		
G-2-68	2	4		
G-2-75B			4	8
G-2-76	2	4		
G-2-171	2	4		
G-2-172	2	4		
G-2-235			4	8
G-2-236			4	8
G-2-237			4	8
G-2-238			4	8
G-2-6014	2	4		
G-2-6015	2	4		
G-2-6042A	2	4		
G-2-6042B			2	4

6. Operation of G-2-6014 Wheelabrator and G-2-6015 Pangborn Dust Collector

6.1 Turn on the main power disconnect.

6.2 Turn on the differential pressure recorder-controller.

6.3 Set the differential pressure recorder-controller at settings as indicated in Table 2. Open the air inlet valves, and close the bypass and drain valves. Alarm points are preset by Maintenance.

6.4 Turn on the rotary valve.

6.5 Starting the Dust Collector:

6.5.1 Press the "START" button on the control panel.

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6. Operation of G-2-6014 Wheelabrator and G-2-6015 Pangborn Dust Collector (cont.)

6.6 Shutting Down the Dust Collector:

6.6.1 Press the "STOP" button on the control panel.

6.7 Empty the collector as follows:

6.7.1 Perform a scale check of the scale in use per SOP 1-C-904.

6.7.2 Tare weigh a 30- or 50-gallon drum, record the weight on a Form NLO-AC-1945 "Residue Production Transfer and Identification" and attach the ticket to the drum.

6.7.3 Premark the drum with a 15-digit lot number and place the drum under the dust hopper outlet.

6.7.4 Insure that the rotary valve is operating.

6.7.5 To prevent overfilling while discharging the dust, frequently check the drum by tapping or by visual inspection.

6.7.6 When the drum is full, turn off the rotary valve.

6.7.7 Remove the full drum and replace with a pretared, premarked empty drum.

6.7.8 Gross weigh the filled drum. Enter the lot number, drum number, gross, tare, and net weights on Form NLO-AC-1945. Stencil the data on each drum.

6.7.9 Record on Form NLO-PRO-1416 that the dust collector was emptied.

6.7.10 Forward the Form NLO-AC-1945 to the Production Recording Office.

6.7.11 Retain the materials in Plant 1 for disposition.

7. Operation of G-2-75B, G-2-235, 236, 237, 238 Hoffman Dust Collectors

7.1 Turn on the main power disconnect.

7.2 Check the manometers per paragraph 2 of this procedure.

7.3 Starting the Dust Collector:

7.3.1 Push the "START" button on the controller (when operating G-2-236, turn on G-2-172 per paragraph 4 of this procedure).

7.4 Shutting Down the Dust Collector:

7.4.1 Push the "STOP" button on the controller.

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7. Operation of G-2-75B, G-2-235, 236, 237, 238 Hoffman Dust Collectors

7.6 Empty the collector as follows (except G-2-237, which empties directly into the Titan Mill.)

7.6.1 Perform a scale check of scale in use per SOP 1-C-904.

7.6.2 Tare weigh a 30- or 50-gallon drum, record the weight on a Form NLO-AC-1945 and attach the ticket to the drum.

7.6.3 Premark the drum with a 15-digit lot number and place the drum under the dust hopper outlet.

7.6.4 Shut down the dust collector and open the gate valve.

7.6.5 Manually operate the shaker.

7.6.6 To prevent overfilling while discharging the dust, frequently check the drum by tapping or by visual inspection.

7.6.7 Remove the full drum and replace with a pretared, premarked empty drum.

7.6.8 When the hopper is empty, close the gate valve and restart the dust collector.

7.6.9 Gross weigh the filled drum. Enter the lot number, drum number, gross, tare, and net weights on Form NLO-AC-1945. Stencil the data on each drum.

7.6.10 Record on Form NLO-PRO-334 that the dust collector was emptied.

7.6.11 Forward the Form NLO-AC-1945 to the Production Recording Office.

7.6.12 Retain the filled drums in the Plant 1 for disposition.

8. G-2-6042A Sly Dust Collector

(This unit has no bags and exhausts into G-2-6042B In-Line Filter)

8.1 Turn on the main power disconnect.

8.2 Check the manometer readings each hour as indicated in Table 2. Record on Form FMPC-PRO-2617.

8.3 Starting the Dust Collector:

8.3.1 Push the exhauster motor "START" button on the control panel.

8.4 Shutting Down the Dust Collector:

8.4.1 Stop the dust collector by pushing the exhauster "STOP" button.

R - MATERIAL REVISED, ADDED, OR DELETED.

9. G-2-2 Dracco Dust Collector

(This unit empties directly into G-2-75B.)

9.1 Turn on the main power disconnect.

9.2 Turn on the differential pressure recorder-controller.

9.3 Set the differential pressure recorder-controller at settings as indicated in Table 2. Open the air inlet valves, and close the bypass and drain valves. Alarm points are preset by maintenance.

9.4 Turn on the rotary valve.

9.5 Starting the Dust Collector:

8.5.1 Push the exhauster motor "START" button on all control panel.

9.6 Shutting Down the Dust Collector:

8.6.1 Push the "STOP" button for the exhauster motor.

10. Operation of G-2-6042B In-Line Filter

(This unit requires the operation of the G-2-6042A dust collector exhauster. Before using any of the equipment served by this unit, start the G-2-6042A collector per paragraph 5 of this procedure.)

10.1 Shutting Down the In-Line Filter:

10.1.1 Press the "STOP" button for the exhauster motor on G-2-6042.

10.2 Empty the In-Line Filter as follows:

10.1.2 If the manometer indicates more than 4"/H_2O, change the pre-filter.

10.2.2 Place the pre-filter in a premarked drum.

10.2.3 Record the contents on Form NLO-AC-1945 and attach the ticket to the drum.

10.2.4 Send the drum to Plant 8 for disposition.

10.2.5 If the manometer continues to indicate more than 4"/H_2O, change the HEPA filter.

10.2.6 Place the HEPA filter in a plastic bag.

10.2.7 Record the contents on Form NLO-AC-1945 and attach the ticket to the plastic bag.

R - MATERIAL REVISED, ADDED, OR DELETED.

10. Operation of G-2-6042B In-Line Filter (cont.)

10.2.8 Send the plastic bag to Plant 8 for disposition.

10.2.9 Record on Form NLO-PRO-1416 that the dust collector was emptied.

10.2.10 Forward the Form NLO-AC-1945 to the Production Recording Office.

11. Stack Monitor Alarm -- Operator and Supervisor Responsibility

11.1 Operator Responsibility

11.1.1 Notify the supervisor.

NOTE: If the supervisor cannot be located immediately, shut down the dust collector per information in Table 3, "Operator Emergency Shutdown." Emergency information is listed for each dust collector by number. Notify the supervisor of the dust collector shutdown.

NOTE: Information contained in the "Operator Emergency Shutdown " Table 3 is posted on each dust collector control panel.

11.2 Supervisor Responsibility

11.2.1 If the dust collector is not shut down, shut it down per Table 3. Lock and tag "Out Of Service" the main exhauster motor.

TABLE 3

Operator Emergency Shutdown

Dust Collector Number	Shutdown Procedures
G-2-1	1. Notify the following operators to shut down operations. 1.1 Repackaging (enriched) Operator. 2. Shut down the dust collector by pushing the exhauster motor "STOP" button.

R - MATERIAL REVISED, ADDED, OR DELETED.

11. Stack Monitor Alarm -- (cont.)

TABLE 3 (cont.)

Operator Emergency Shutdown

Dust Collector Number	Shutdown Procedures
G-2-2	1. Notify the following operators to shut down operations: 1.1 Mill drum dumper operator. 2. Shut down the dust collector by pushing the exhauster motor "STOP" button.
G-2-64 Day	1. Notify the following operators to shut down operations: 1.1 Titan Mill Operator 1.2 Titan Mill Drum Dumping Operator 2. Shut down the dust collector by pushing the exhauster motor "STOP" button.
G-2-68 Day	(Not In Use)
G-2-75B Hoffman	1. Notify the following operators to shut down operations: 1.1 Cleaning Operators. 2. Shut down the dust collector by pushing the "STOP" button on the controller.
G-2-76	1. Notify the following operators to shut down operations: 1.1 Titan Mill Packaging Unit Operator 2. Shut down the dust collector by pushing the exhauster motor "STOP" button.

R - MATERIAL REVISED, ADDED, OR DELETED.

11. Stack Monitor Alarm -- (cont.)

TABLE 3 (cont.)

Operator Emergency Shutdown

Dust Collector Number	Shutdown Procedures
G-2-171 Turner-Haws	1. Notify the following operators to shut down operations: 1.1 G-2-236 Dust Collector 2. Shut down the dust collector by pushing the exhauster motor "STOP" button.
G-2-172 Turner-Haws	1. Notify the following operators to shut down operations: 1.1 Sample Line Operator 2. Shut down the dust collector by pushing the exhauster motor "STOP" button.
G-2-235 Hoffman	1. Notify the following operators to shut down operations: 1.1 Safe Geometry Digestion Operator 2. Shut down the dust collector by pushing the "STOP" button on the controller.
G-2-236 Hoffman	1. Notify the following operators to shut down operations. 1.1 Enriched Digestion Operator in the Laboratory 2. Shut down the dust collector by pushing the "STOP" button on the controller.
G-2-237 Hoffman	1. Notify the following operators to shut down operations: 1.1 Titan Mill Operator 2. Shut down the dust collector by pushing the "STOP" button on the controller.
G-2-238 Hoffman	1. Notify the following operators to shut down operations: 1.1 Shot Blaster Operator 2. Shut down the dust collector by pushing the "STOP" button on the controller.
G-2-6014 Wheelabrator	1. Notify the following operators to shut down operations: 1.1 Shot Blaster Operator 2. Shut down the dust collector by pushing the exhauster motor "STOP" button.

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11. Stack Monitor Alarm -- (cont.)

TABLE 3 (cont.)

Operator Emergency Shutdown

Dust Collector Number	Shutdown Procedures
G-2-6015 Pangborn	1. Notify the following operators to shut down operations. 1.1 Copper Shredder Operator 2. Shut down the dust collector by pushing the exhauster motor "STOP" button.
G-2-6042A Sly	1. Notify the following operators to shut down operations. 1.1 Fitzpatrick Mill Operator 1.2 Pin Cutter Operator 1.3 Laboratory Operator 2. Shut down the dust collector by pushing the exhauster motor "STOP" button.
G-2-6042B In-Line Filter	1. Notify the following operators to shut down operations. 1.1 Fitzpatrick Mill Operator 1.2 Pin Cutter Operator 1.3 Laboratory Operator 2. Shut down the Sly dust collector by pushing the exhauster motor "STOP" button. This will shut down the In-Line Filter.

R - MATERIAL REVISED, ADDED, OR DELETED.

11. Stack Monitor Alarm -- (cont.)

11.2.2 Notify an Industrial Hygiene Technician.

11.2.2.1 Industrial Hygiene Technician Responsibility

11.2.2.1.1 Check the monitor for proper operation. If the monitor is operating properly, check it for a soiled filter. If the filter is changed, submit the soiled one for normal analysis.

11.2.2.1.2 Notify the supervisor of the filter condition.

11.2.2.1.3 Notify the supervisor of the soiled filter analysis.

11.2.3 Notify the Chemical Plants Manager of the condition of the soiled filter being analyzed.

11.2.4 Inspect the collector for evidence of dust, and if dust is present, determine the source.

11.2.5 Obtain the filter analysis and notify the Chemical Plants Manager.

NOTE: Do not restart the dust collector or operation(s) served by the dust collector until an analysis of the stack loss has been reported and approval to restart has been granted by the Chemical Plants Manager.

11.2.6 If the Chemical Plants Manager determines from filter analysis that there has been a dust loss, and the leak has not been located, initiate fluorescein dye test to find the leak per paragraph 11.2.7.

11.2.7 Fluorescein Dye Test

11.2.7.1 Check that all dust collector bags are in place inside the baghouse.

11.2.7.2 If repairs have been completed, "Post-Maintenance Check Sheet," Form FMPC-PRO-2610 must be completed before proceeding with dye test.

11.2.7.3 Turn on the exhaust blower of the dust collector.

NOTE: High vacuum and blow ring units must be turned off during the dye test.

R - MATERIAL REVISED, ADDED, OR DELETED.

11. Stack Monitor Alarm -- (cont.)

11.2.7.4 Add fluorescein dye to the dust collector system at the closest possible inlet to the baghouse so that the dye is routed through the baghouse.

NOTE: The amount of dye added to the system is determined by the amount of filtering area in the baghouse. Specifications require that 1 lb. dye/1000 sq. ft. of filter area be added to the system.

11.2.7.5 Allow the dust collector to run for 30 seconds after all of the fluorescein dye has been added to the system.

11.2.7.6 Shut down the main exhaust blower and lock out the electrical controls prior to entering the baghouse.

11.2.7.7 Obtain all necessary equipment including required safety items as specified in "Industrial Health and Safety Requirements." Enter the baghouse with an ultraviolet light to the check bags.

NOTE: Do not enter the baghouse unless another operator is on standby outside of the baghouse enclosure.

11.2.7.8 Using the ultraviolet light, check the bags for fluorescein dye particles. Detailed inspection should be on the bag/flange connections, seams and flange/baghouse wall interfaces, and all surfaces of the bags.

11.2.7.9 Have the Industrial Hygiene Technician remove the stack sampler filter for ultraviolet light inspection.

11.2.8 If the leak source has been located, clean the collector and notify the Maintenance Supervisor to make repairs.

11.2.9 After repairs are completed, clean the collector and run a dye test, per paragraph 11.2.7.

11.2.10 At completion of the dye test, complete the "Post-Maintenance Check Sheet," Form FMPC-PRO-2610.

11.2.11 Notify the Chemical Plants Manager of the results of the dye test.

NOTE: The Chemical Plants Manager shall make the determination to restart the collector.

11.2.12 A "Minor Event" report is to be completed by the supervisor prior to the completion of the shift.

R - MATERIAL REVISED, ADDED, OR DELETED.

12. Stack Sampler Filter - Inspection and/or Change (Stack sampler filters are checked and/or changed at regular intervals by an IH Technician.)

12.1 Industrial Hygiene Technician Responsibility

12.1.1 Notify the supervisor of the filter inspection and/or change.

12.1.2 Notify the supervisor of the condition (soiled or unsoiled) of the filter.

12.1.3 If the filter is changed, submit the filter for normal analysis.

12.1.4 Notify the supervisor of the filter analysis.

12.2 Supervisor Responsibility

12.2.1 If the filter is changed but is not soiled, resume normal operation of the dust collector.

12.2.2 If the filter is soiled, shut down the dust collector per information in Table 3. Lock and tag "Out Of Service" the main exhaust motor per Lock and Tag procedure (Section 8.3, NLO Health and Safety Manual).

12.2.3 Notify the Chemical Plants Manager of the condition of the soiled filter being analyzed.

12.2.4 Inspect the dust collector for evidence of dust, and if dust is present, determine the source.

12.2.5 Obtain the filter analysis and notify the Chemical Plants Manager.

NOTE: Do not restart the dust collector or operation(s) served by the dust collector until an analysis of the stack loss has been reported and approval to restart has been granted by the Chemical Plants Manager.

12.2.6 If the Chemical Plants Manager determines from the filter analysis that there has been a dust loss, and the leak has not been located, run a dye test to find the leak per paragraph 10.2.7.

12.2.7 If the leak source has been located, clean the collector and notify the Maintenance Supervisor to make repairs.

12.2.8 After repairs are complete, clean the collector and run a dye test, per paragraph 11.2.7.

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12. Stack Sampler Filter (cont.)

12.2.9 At completion of the dye test, complete a "Post-Maintenance Check Sheet," Form FMPC-PRO-2610.

12.2.10 Notify the Chemical Plants Manager of the results of the dye test.

NOTE: The Chemical Plants Manager shall make a determination to restart collector.

12.2.11 A "Minor Event" report is to be completed by the supervisor prior to the completion of his shift.

13. Sounding of a Differential Pressure Alarm or Indications of High or Low Differential Pressure on the Recorder -- Operator and Supervisor Responsibility

13.1 Operator Responsibility

NOTE: If the supervisor cannot be located immediately, shut down the dust collector per information in Table 3, "Operator Emergency Shutdown." Emergency information is listed by number for each dust collector. Notify the supervisor of the dust collector shutdown.

NOTE: Information contained in the "Operator Emergency Shutdown," Table 3 is posted on each dust collector control panel.

13.2 Supervisor Responsibility

13.2.1 If the dust collector is not shut down, shut it down per Table 3. Lock and tag "Out Of Service" the dust collector main exhaust motor per Lock and Tag procedure (Section 8.3, NLO Health and Safety Manual).

13.2.2 Notify an Industrial Hygiene Technician.

13.2.2.1 Industrial Hygiene Technician Responsibility

13.2.2.1.1 Check the monitor for proper operation. If the monitor is operating properly, check for a soiled sample filter and if the filter is changed submit the soiled filter for normal analysis.

13.2.2.1.2 Notify the supervisor of filter condition.

13.2.2.1.3 Notify the supervisor of soiled filter analysis.

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13. Sounding the Differential Pressure Alarm (cont.)

13.2.3 If the Industrial Hygiene Technician reports the filter is not soiled and if the cause of low or high differential pressure cannot be determined, notify the Instrument Shop to service the differential pressure gage.

WARNING: THE CAUSE OF HIGH OR LOW DIFFERENTIAL PRESSURE MUST BE DETERMINED BEFORE CONSIDERATION CAN BE GIVEN TO RESTARTING THE COLLECTOR AND OPERATIONS SERVED BY THE COLLECTOR.

13.2.4 Notify the Chemical Plants Manager of condition of the soiled filter being analyzed, or if the filter was not soiled, what action has been taken.

13.2.5 Inspect the collector for evidence of dust, and if dust is present, determine the source.

13.2.6 If there is no visual evidence of a dust collector problem, initiate a fluorescein dye test per paragraph 11.2.7. Report the results of the dye test to the Chemical Plants Manager.

13.2.7 Obtain the filter analysis and notify the Chemical Plants Manager.

NOTE: Do not restart the dust collector or operation(s) served by the dust collector until an analysis of the stack loss has been reported and approval to restart has been granted by the Chemical Plants Manager.

13.2.8 If the Chemical Plants Manager determines from the filter analysis that there has been a dust loss, and the leak has not been located, run a dye test to find the leak per paragraph 11.2.7.

13.2.9 If a leak source has been located, clean the collector and notify the Maintenance Department to make repairs.

13.2.10 After repairs are complete, clean the collector and run a dye test, per paragraph 11.2.7.

13.2.11 At completion of the dye test, complete a "Post Maintenance Check Sheet," Form FMPC-PRO-2610.

13.2.12 Notify the Chemical Plants Manager of the results of the dye test.

NOTE: The Chemical Plants Manager shall make the determination to restart the collector.

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13. Sounding the Differential Pressure Alarm (cont.)

13.2.13 Check for the specified differential readings and record them once each hour.

13.2.14 A "Minor Event" report is to be completed by the supervisor prior to the completion of the shift.

14. Any Unusual Circumstance Not Covered By Paragraph 1 thru 12 Shall Be Considered As A Possible Failure Until Determined Otherwise and the Supervisor Shall Proceed As Follows:

14.1 Shut down the collector per Table 3. Lock and tag "Out Of Service" the main exhaust motor per Lock and Tag procedure (Section 8.3, NLO Health and Safety Manual.)

14.2 Notify the Chemical Plants Manager.

14.3 Request an Industrial Hygiene Technician to check the sampler filter.

14.4 Visually check the collector.

14.5 Initiate a dye test per paragraph 11.2.7.

14.6 A "Minor Event" report is to be completed by the supervisor prior to the completion of the shift.

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TABLE 4

INSPECTION TROUBLESHOOTING GUIDE

Item No.	Problem	Condition And/Or Cause	Corrective Action
1.	Dust on the floor of the baghouse or tube sheet	Broken bag/ Loose bag connection	Clean the baghouse. Notify the Mechanical Department to replace bags or repair connections.
2.	Dust on the blow rings/ pulse jets or shakers	Broken bag/ Blow ring binding/ Loose bag connection	Clean the baghouse. Notify the Mechanical Department to replace bags/repair blow rings/ tighten connections.
3.	Misalignment of the blow rings/pulse jets	Broken blow ring/ Loose bag	Notify the Mechanical Department to repair blow rings or bag connections.
4.	Blow ring chain drive or cable malfunction	Chain/ Cable broken	Notify the Mechanical Department to repair the chain or cable.
5.	Reversing motor malfunction	Electrical problems	Notify the Mechanical Department to repair broken or loose hoses.
6.	Blower hose leaking	Broken hose or loose connection	Clean the baghouse. Notify the Mechanical Department.
7.	Damaged or Broken Bags	Bag installation/ Connection loose	Clean the baghouse. Replace bags.
8.	Bag loose at the flange connections, top and bottom	Improper installation.	Clean the baghouse. Notify the Mechanical Department to tighten connections.
9.	Dye check - Leak indications	Bag installation/ Hose connections/ Bag damage	Clean the baghouse. Check bag conditions and connections/ hose connections. Inspect the dust collector.

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TABLE 4 (cont.)

INSPECTION TROUBLESHOOTING GUIDE

Item No.	Problem	Condition And/Or Cause	Corrective Action
10.	Dust inside the Hoffman unit	Bag connections/ Bag damage	Clean the baghouse. Notify the Mechanical Department to repair or replace bags. Inspect bag conditions and connections.
11.	Dust leaking around the bags	Bag connection/ Improper installation or bag damage	Clean the baghouse. Notify the Mechanical Department to repair.

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NLO, INC.

WORK PERMIT

Permit No. ____

NOTE: For Instructions and Suggested Check Points see reverse side.

GENERAL INFORMATION - SECTION A

BUILDING: | AREA: | EQUIPMENT:

JOB DESCRIPTION:

STARTING DATE: | TIME: | ISSUED TO: | INITIATED BY:

Work complete, equipment requires testing. ☐ (Signature not required unless checked)

Signed ____ (FOREMAN) Date ____ Time ____

SECTION B

☐ FLAME & WELDING PERMIT

☐ Suggested Check Points Followed.

SPECIAL PRECAUTIONS:

PERMIT EXPIRES: | FIRE & SAFETY INSPECTOR:

PERMIT EXTENSION: | FIRE & SAFETY INSPECTOR:

SECTION C

☐ CORROSIVE MATERIAL

☐ Acid ☐ Caustic ☐ Solvent

☐ Suggested Check Points Followed.

SPECIAL PRECAUTIONS:

INDUSTRIAL HYGIENE - SECTION D

☐ Radiation Evaluation Needed.

Respirator Required: ☐ Airline ☐ Chemical Cartridge Type ☐ Dust Type ☐ None

EVALUATION DATA	RE-EVALUATION DATA
EXTERNAL RADIATION (AT WORKING DISTANCE):	EXTERNAL RADIATION (AT WORKING DISTANCE):
β + γ ____ mrads/hr. γ ____ mr/hr.	β + γ ____ mrads/hr. γ ____ mr/hr.
RECOMMENDED TIME LIMIT (PER MAN, PER WEEK):	RECOMMENDED TIME LIMIT (PER MAN, PER WEEK):
EXPIRATION DATE: / IND. HYGIENE & RADIATION DEPT.	EXPIRATION DATE: / IND. HYGIENE & RADIATION DEPT..

SPECIAL PRECAUTIONS:

SECTION E

☐ ACCESS PERMIT ☐ Suggested Check Points Followed.

Atmospheric Considerations: ☐ Toxic Gas or Vapor ☐ Oxygen Deficiency ☐ Flammable Gas or Vapor ☐ Not Applicable

SPECIAL PRECAUTIONS:

PERMIT EXPIRES: | FIRE & SAFETY INSPECTOR: | PERMIT EXTENSION: | FIRE & SAFETY INSPECTOR:

NO.	DISTRIBUTION OF COPIES
1	White - Posted at Location
2	Blue - Fire & Safety (RECORD COPY)
3	Yellow - IH & R (RECORD COPY)

[X] Condition Applicable When Checked.

Work Permit
FORM NLO-AC- 973
Figure 1 (Sheet 1 of 8)

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NLO-T-1028 (REV. 1/14/88)

RESIDUE PRODUCTION — TRANSFER & IDENTIFICATION

	XX
PL	NO
CARD	

NOTE: "XX" Card is NOT to be forwarded to Data Processing. It is to remain with the material until consumption is complete, then forwarded to the Plant Prod. Recording office

NEGATIVE (ENTER 4)	DATE			SHIFT	BADGE NO
	MO	DAY	YEAR		

DO NOT LEAVE CARD IN EMPTY CONTAINER

CARD SEQUENCE NO 624108

COPY

PO NO	SOURCE
MATERIAL CLASS	MATERIAL TYPE
LOT SEQUENCE NO	
MATERIAL DESCRIPTION	
SHAPE CODE	PRODUCT MIA / PLANT

INTRAPLANT TRANSFER DATA
(DO NOT COMPLETE THIS SECTION UNLESS THE MATERIAL IS TO BE TRANSFERRED INTRAPLANT AT TIME OF PRODUCTION)

MIA TRANS TO	PLANT
DATE TRANSFERRED	
SHIFT	

DRUMS OR ITEM NO
GROSS WEIGHT
TARE WEIGHT
NET WEIGHT

NLO-AC-1945 (REV. 5/14/81)

Residue Production-Transfer and Identification
FORM NLO-AC-1945
Figure 1 (Sheet 2 of 8)

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NLO, Inc.

DUST COLLECTOR INSPECTION RECORD

Any dust collector or filter to be used will be inspected each morning or before startup. No dust collector or filter will be operated without being inspected before startup. Recording charts to be changed after each daily inspection.

PLANT:	DUST COLLECTOR NUMBER:	DATE:
		DATE:
		BAGS INSTALLED:

INSPECTION

	GOOD	BAD	
Bag Condition.....	____	____	
Ring Blowers.....	____	____	(If applicable)
Doors/Insp. Ports.....	____	____	
Dust Accumulation	____	____	
Dust Bins	____	____	

COMMENTS:

EXHAUST SAMPLER READING:	HIGH D.P. SET POINT:	LOW D.P. SET POINT:

HOURLY D.P. READINGS

TIME	READING	BADGE	TIME	READING	BADGE	TIME	READING	BADGE
0830			1630			2430		
0930			1730			0130		
1030			1830			0230		
1130						0330		
1230			2030			0430		
1330			2130			0530		
1430			2230			0630		
1530			2330			0730		

NLO-PRO-334 (1/2/86)

Dust Collector Inspection Record
FORM NLO-PRO-334
Figure 1 (Sheet 3 of 8)

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FMPC
PRODUCTION DIVISION

DUST COLLECTOR RADIATION STACK MONITOR READINGS

Date _____

TIME	c/m	c/m	c/m	c/m	c/m	c/m	c/m	c/m	c/m	c/m	c/m	c/m	c/m
8 A.M.													
9													
10													
11													
12 NOON													
1 P.M.													
2													
3													
4													
5													
6													
7													
8													
9													
10													
11													
12 MID.													
1 A.M.													
2													
3													
4													
5													
6													
7													

OPERATORS: _____ (FIRST SHIFT) _____ SECOND SHIFT _____ THIRD SHIFT

Remarks: _____

FMPC-PRO-2608-1 (5/15/85)

Dust Collector Stack Monitor Readings
FORM FMPC-PRO-2608-1
Figure 1 (Sheet 4 of 8)

FMPC

DUST COLLECTOR INSPECTION CHECK SHEET

PLANT ___ DUST COLLECTOR NUMBER: ___

SHIFT/DATE	OPERATOR INITIALS	DOOR GASKET & LATCHES	BAG CONDITION IN HOFFMAN UNIT	DUST IN HOFFMAN UNIT	BAG/FLANGE CONNECTIONS TOP & BOTTOM	BAG CONDITION	BLOWRING BLOWER HOSES	REVERSING MOTOR/LIMIT SWITCHES	CHAIN/CABLE FOR BLOWRING DRIVE	BLOWRING ALIGNMENT	DUST ON BLOWRINGS IN BAGHOUSE
1st											
2nd											
3rd											
1st											
2nd											
3rd											
1st											
2nd											
3rd											
1st											
2nd											
3rd											
1st											
2nd											
3rd											
1st											
2nd											
3rd											
1st											
2nd											
3rd											

FMPC-PRO-2609 (3/7/86)

Dust Collector Inspection Check Sheet
FORM NLO-PRO-2609
Figure 1 (Sheet 5 of 8)

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FMPC
PRODUCTION DIVISION

POST-MAINTENANCE CHECK SHEET - DUST COLLECTORS

Date: _____ Plant: _____ Dust Collector Number: _____

ITEM	MAINTENANCE	PRODUCTION	COMMENTS
Blowring Alignment			
Chain/Cable Blowring Drive			
Reversing Motor Blowring Drive			
Blowring Blower Hose			
Bag Condition			
Bag/Flange Connections			
Blowring Limit Switches			
Door Gaskets and Latches			
Cleanliness (Tools & Debris Removed)			
Approved for Operation (Signature Required)			
Dye Test			
Repeat Dye Test (If Required)			

APPROVED:

Plant Superintendent: _____ Date: _____

NO.	DISTRIBUTION
1	Plants Superintendent
2	General Superintendent
3	Mechanical Superintendent

FMPC-PRO-2610 (REV. 10/21/85)

Post Maintenance Check Sheet - Dust Collectors
FORM FMPC-PRO-2610
Figure 1 (Sheet 6 of 8)

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NLO-T-1028 (REV. 1/14/85)

FMPC

STACK SAMPLER CHECK SHEET

(Stack Sampler Prescribed Flow Rate - (SCF/H)

Dust Collector Number: ____

Date: ____

TIME	ACTUAL FLOW RATE	ADJUSTED TO	OPERATOR BADGE NUMBER	COMMENTS
8:00 a.m.				
9:00 a.m.				
10:00 a.m.				
11:00 a.m.				
12 Noon				
1:00 p.m.				
2:00 p.m.				
3:00 p.m.				
4:00 p.m.				
5:00 p.m.				
6:00 p.m.				
7:00 p.m.				
8:00 p.m.				
9:00 p.m.				
10:00 p.m.				
11:00 p.m.				
12 Midnight				
1:00 a.m.				
2:00 a.m.				
3:00 a.m.				
4:00 a.m.				
5:00 a.m.				
6:00 a.m.				
7:00 a.m.				

Supervisor's Remarks: ____

FMPC-PRO-2612 (2/11/86)

Stack Sampler Check Sheet
FORM FMPC-PRO-2612
Figure 1 (Sheet 7 of 8)

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SHIFT _____ DUST COLLECTOR MANOMETER READINGS DATE _____

PLANT ____

COLLECTOR NUMBER	HOUR 1	HOUR 2	HOUR 3	HOUR 4	HOUR 5	HOUR 6	HOUR 7	HOUR 8

Dust Collector Manmeter Readings
FORM FMPC-PRO-2617
Figure 1 (Sheet 8 of 8)

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This SOP has been approved by the Chemical Plants Superintendent, Mechanical Department Superintendent, General Superintendent, Health, Safety and Environmental Division, and the Quality Assurance/Quality Control, Production Technology, and Materials Control and Accountability Departments.

AUTHORIZED BY:

ORIGINAL SIGNED BY PRODUCTION OPERATIONS MANAGER, DATED 01-17-86.

SIGNATURE ON FILE IN QUALITY SYSTEMS OFFICE.

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RECORD OF REVISIONS

PAGE	DATE	DESCRIPTION AND AUTHORITY
1 thru 32	01-29-86	Procedure revised and reissued per SOP Change Request No. 1081, initiated by D. A. Nixon.

LIST OF EFFECTIVE PAGES

PAGE	DATE
1 thru 32	01-29-86

R - MATERIAL REVISED, ADDED, OR DELETED.

NLO - FMPC MANUFACTURING STANDARDS

TITLE:			INDEX NO.:
SOP - REFINERY DUST COLLECTOR SYSTEMS			2-C-701
DIVISION & PLANT:	SUPERSEDES:	PREPARED BY:	DATE ISSUED:
Prod. Ref.		E. M. Nutter	11/21/75

DESCRIPTION OF EQUIPMENT AND OPERATION

Name or Number	Service
G2-94	Ore Dumping Systems
G2-856	West Metal Dissolver Tank
G5-252	Ore Dumping Systems
North Buffalo	Northside UO_3 Packaging System
South Buffalo	Southside UO_3 Packaging System
G1-99	Digestion Area High Vacuum
G-240	Denitration Area High Vacuum

Units G2-94 and G5-252 are Day Autoclean dust collectors that have wool, hard pressed filter bags. The bags are cleaned by slow traveling reverse jet cleaning rings discharging high pressure air. Differential pressure instruments operate the blowrings and record the differential pressures.

Collector G2-856 is a Hersey type (Turner-Haws) with wool felt bags. An individual blowring surrounds each bag and is automatically controlled by the differential pressure across the bag. Blowring reverse operation is controlled by limit switches. Cleaning air is provided by a positive displacement type air blower.

Collectors G1-99 and G1-240 are Hoffman high vacuum units having cotton bags that are cleaned by a manual external shaker. Collected material is discharged through a rotary valve into a drumming station.

The Buffalo collectors are pulse type bag collectors using virgin wool and/or Dacron bags. The dust laden air enters the collector at the hopper side wall and the dust is deposited on the outside of the bags while the clean air travels up through the center of the bag into the plenum. Cleaning of the bags is accomplished by discharging a short blast of high pressure air into the top of the bag.

ENVIRONMENTAL CONSIDERATIONS

It is the intention of the National Lead Company of Ohio to achieve and maintain those levels of air and water quality which will protect health and promote welfare and safety. The responsibility for limiting the release of pollutants to tolerable quantities rests with all personnel, both management and operators.

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INDUSTRIAL SAFETY

1. Leather palm gloves will be worn.

2. Safety glasses will be required at all times.

3. Dust-type respirator will be worn when inspecting dust collectors and changing drums at the drumming station.

4. Any incident which could have resulted in a significant intake of radioactive materials by inhalation, ingestion, or absorption will be immediately reported to a supervisor. The involved employees, wage or salary, will report to the Medical Department at the end of the shift to submit a urine sample and again report at the start of their next shift to submit another urine sample. The supervisor will inform the Fire and Safety Inspector of the incident before the end of the shift during which the incident occurred.

PROCEDURE

1. G2-94 - Ventilating the Ore Dumping Stations and Associated Equipment

   1.1 Align valves and blast gates for proper operation.

   1.2 Start the dust collector.

   1.3 Set differential pressure recorder points as instructed by the foreman.

   1.4 Check collector operation at panelboard.

   1.5 When collector is being operated, it will be inspected once each shift as follows:

      1.5.1 Shut collector down.

      1.5.2 Open doors and check for dust accumulation, broken bags and mechanical malfunctions.

      1.5.3 After dumping each continuous digestion batch, empty the dust bins.

      1.5.4 Record results of inspection on "Daily Dust Collector Inspection Report" NLO-PRO-1416.

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2. G5-252 - Ventilating the Ore Dumping Stations and Associated Equipment

2.1 Align valves and blast gates for proper operation.

2.2 Start the collector.

2.3 Set differential pressure recorder points as instructed by foreman.

2.4 Check collector operation at panelboard.

2.5 When collector is being operated it will be inspected once each shift as follows:

2.5.1 Shut collector down.

2.5.2 Open doors and check for dust accumulation, broken bags and mechanical malfunctions.

2.5.3 After dumping each continuous digestion batch, empty the dust bins.

2.5.4 Record results of inspection on "Daily Dust Collector Inspection Report" NLO-PRO-1416.

3. G2-856 - Ventilating at the West Metal Dissolver Tank

3.1 Align vent ducts for proper venting.

3.2 Start the collector.

3.3 Set differential pressure recorder points as instructed by the foreman.

3.4 Check collector operation at panelboard.

3.5 Once each shift shut down the collector for inspection.

3.5.1 Open doors and check for broken bags, leaking hose connections and mechanical malfunctions.

3.5.2 Check operation of blowring drive and carriages.

3.5.3 Record results of inspection on "Daily Dust Collector Inspection Report" NLO-PRO-1416.

4. Buffalo Collectors - Ventilating the Orange Oxide Packaging Systems
(north and south side of the Denitration Area)

NOTE: These collectors are identical and ventilate identical packaging systems.

4.1 Start dust collector.

4.2 Set differential pressure recorder points as instructed by foreman.

4.3 Turn rotary valve on "Auto".

4.4 Turn bag cleaning mechanism on "Auto".

4.5 Observe collector operation at panelboard before leaving the area.

4.6 Once each shift shut down the collector for inspection.

4.6.1 Open the plenum access door and check for dust accumulation.

4.6.2 Record results of inspection on "Daily Dust Collector Inspection Report" NLO-PRO-1416.

4.6.3 If any dust is noted in the plenum chamber, notify the foreman immediately.

5. G1-99 - Emptying Dust Bins Under F1-94 and Cleaning

NOTE: G1-99 provides vacuum to empty the dust bins under G1-94 and to clean dry dust from floors and equipment in the Digestion Area.

5.1 Start collector G1-94.

5.2 Start the vacuum collector.

5.3 After startup check that the bag house and blower are functioning properly.

5.4 Once each day manually shake the bags.

5.5 Once each week shutdown the unit for inspection.

5.5.1 Open doors on the bag house and check for broken bags.

5.5.2 Record results of inspection on "Daily Dust Collector Inspection Report" NLO-PRO-1416.

5.6 To empty the collector:

5.6.1 Place drum in drumming station.

5.6.2 Close valve at inlet to drumming station.

5.6.3 Shut down vacuum collector.

5.6.4 Open discharge valve on vacuum collector hopper.

5.6.5 Fill drum by operating valve at inlet to drumming station.

5.6.6 When hopper is empty, close the discharge valve.

5.6.7 Check with foreman on disposition of filled drums.

6. G1-240 - Supplying High Vacuum for Cleaning in Denitration Area

NOTE: G1-240 provides for vacuum cleaning dust spills from equipment and floors in the Denitration Area.

6.1 Start the vacuum collector.

6.2 After startup, check that the bag house and blower are functioning properly.

6.3 Once each day manually shake the bags.

6.4 Once each week shut down the unit for inspection:

6.4.1 Open doors on the bag house and check for broken bags.

6.4.2 Record results of inspection on "Daily Dust Collector Inspection Report" NLO-PRO-1416.

6.5 To empty the collector:

6.5.1 Place drum in drumming station.

6.5.2 Close valve at inlet to drumming station.

6.5.3 Shut down vacuum collector.

6.5.4 Open discharge valve on vacuum collector hopper.

6.5.5 Fill drum by operating valve at inlet to drumming station.

6.5.6 When hopper is empty, close the discharge valve.

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6.5.7 Check with foreman on disposition of filled drums.

The above SOP has been approved by the Plant Superintendent, General Superintendent, the Health & Safety Division, the Nuclear Materials Control, Production Technology and the Quality Control Department.

AUTHORIZED BY:

Assistant Manager

11/13/75
Date

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Attachment 3

Air Sample Collection and Analysis Procedures,
Calibration Procedure for Alarm Ratemeter

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NLO, Inc.

INDUSTRIAL HYGIENE AND RADIATION DEPARTMENT

TITLE: **STACK SAMPLER INSPECTION AND FILTER CHANGE PROCEDURE**

NUMBER: **IH&R Procedure No. 1.4**

DATE: **July 2, 1981 (Rev. 1/1/85)**

AUTHOR: K. N. Ross and R. B. Weidner

SCOPE: This procedure gives specific instructions for inspecting and changing filters in dust collector stack samplers.

1.0 REQUIRED EQUIPMENT

1.1 Rotameter, 0 to 60 Lpm, with Schrader fittings.

1.2 Pre-numbered type "S" pleated filters.

1.3 Polyethylene bags.

1.4 Screwdriver and pliers.

1.5 Stack Sampler Inspection Report (NLO-H&S-2240) (hereinafter called the "Inspection Report").

1.6 Dust Collector Log Book.

1.7 Stack Sampling Report Form (NLO-H&S-).

1.8 Stack Discharge Report (NLO-H&S-2563).

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2.0 SPECIAL PRECAUTIONS

2.1 Many stack samplers are located near ceiling levels. Use care to avoid falls when working on ladders, walkways, and other elevated structures.

2.2 Do not attempt to inspect outside stack samplers when there is ice on the ladders and walkways.

3.0 PROCEDURES

3.1 All stack samplers shall be inspected once each week and all filters will be changed at least once per month.

3.2 Obtain required equipment at IH&R Decontamination room. Obtain numbers of installed filters and prescribed flow from the Stack Log book and fill in on Inspection Report.

3.3 At the control panel of the dust collector being inspected, observe the differential pressure chart.

3.3.1 Log the high and low pressure on the Inspection Report. Also, see that there is no unusual pattern on the chart and that the collector cleaning mechanism is operating in the correct D.P. range.

3.3.2 Any unusual or incorrect operation should be noted in the Remarks section of the Inspection Report.

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3.4 At the stack sampler, check to see that the stack sampler, vacuum tubing, and other sampling equipment is operating properly. If any defects are found, note them in the Remarks section.

3.5 Determine the existing sampling rate by inserting the rotameter between the vacuum line and the filter holder.

3.5.1 Record this reading under "Rate-actual" on the Inspection Report and adjust to prescribed rate, if necessary.

3.5.2 If the prescribed rate is not obtainable, this should be noted on the Inspection Report sheet.

3.6 Strike the cone section of the filter holder several times around the periphery of it with the handle of the screwdriver to dislodge any material that might be clinging to the inside of the cone.

3.7 Using the screwdriver, loosen the three 1/4" bolts and carefully lower the bottom section of the filter holder.

3.8 If the filter shows evidence of any accumulation of material, remove the pleated filter and place it in a plastic sample bag. Care must be taken to assure that none of the material falls from or is blown off of the filter while it is being removed and placed in the bag.

3.9 If a filter change is necessary, insert a new pleated filter (pre-numbered) in the filter holder.

3.9.1 Using the three 1/4" bolts, secure the filter holder tightly to the cone using pliers and screwdriver.

3.9.2 If no change is made, check that the filter number is correct before closing the filter holder.

3.10 Recheck the sampling rate of the stack sampling assembly. Adjust to the prescribed rate, if necessary.

3.10.1 Remove the rotameter and reconnect the vacuum line to the sampler.

3.10.2 If the prescribed rate could not be obtained, note this on the Inspection Report sheet.

3.11 If the filter has been changed and there is only a small amount of material on it, go to the next step. If the filter shows evidence of a gross amount of material, immediately inform the plant supervisor or his representative of this finding and follow this procedure, beginning with step 3.14.

3.12 Go to the next dust collector and continue the inspection by repeating steps 3.3 through 3.12 until all dust collectors in the plant are inspected.

3.13 If any filters were changed or if there is any deficiency in a sampler or dust collector operation, advise the Plant Supervisor or his representative of the facts before leaving the plant and make suggestions for correcting any deficiencies. Note the Plant Supervisor's name or his representative's name and the time and date he was notified on the Inspection Report sheet.

3.14 After returning to the IH&R Decontamination room, fill out a Report of Chemical Analyses form (NLO-T-200) with all required information for the analysis of the filters removed from the stack samplers.

3.14.1 Under "Sample Description" write the date the filter was put into the sampler and the date it was taken for analysis.

3.14.2 Request analysis for total uranium, and particulates.

3.14.3 Immediately take the completed Report of Chemical Analyses form and all filters to the Technical Laboratory. The IH&R Technician or Technologist shall ask the Technical Laboratory to perform the analysis immediately and to telephone the results to them as soon as they are available.

3.15 irregularities noted on the Inspection Report shall be brought to the attention of an IH&R Technologist on returning to the Decontamination Room after the inspection is completed.

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4.0 RECORDKEEPING

4.1 During the actual inspection of the stacks, a rough copy of the Inspection Report is carried in a pocket because it is unsafe to climb ladders with a clipboard. This copy is prepared before the inspection by copying the old filter identification number and the prescribed sampling rate from the previous Inspection Report. (Note that any new filter identification numbers on the previous Inspection Report now become the old filter identification numbers on the rough copy.)

4.2 During the inspection the actual rate in the L/m column is filled in for each sampler. The flow measurement is the rate of sampling in L/m as determined in step 3.5. The D.P. reading minimum and maximum are the high and low readings on the D.P. chart.

4.3 After the inspection is complete, all information that has been recorded on the rough copy of the Inspection Report must be transferred to the permanent record copy of the Inspection Report.

4.3.1 Five copies of the Inspection Report shall be prepared and distributed as follows:

- Original - routed to Chief, IH&R Department for review. On return it will be filed in the Stack Log Book and shall be the record copy.
- Copy to Director, Health and Safety Division.
- Copy to General Superintendent, Production Division.

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- Copy to Chemical Area/Metals Area Superintendents.
- Copy to Production Supervisor.

4.4 Each filter change must also be recorded in the Dust Collector Log book.

4.4.1 The filter number of the new filter and the date it was put into service is logged on the line below the old filter number. The date the old filter was taken out of service is logged in the line starting with the old filter number.

4.4.2 As soon as the Technical Division reports the results of the analysis of the stack samples filter to the IH&R Department, the IH&R Technician will immediately calculate the losses and record them in the Dust Collector Log Book and on the Stack Sampling Report Form.

4.4.3 The IH&R Technician will then notify the Plant Supervisor of the amount of the calculated loss (in person or over the telephone).

4.4.4 The IH&R Technician will then take the completed Stack Sampling Report Form to the Chief, IH&R Department.

4.4.5 If the filter is not analyzed, the IH&R Technician will record the reason for making the change in the space usually used for the analytical data in the Dust Collector Log Book.

4.5 On the last working day of each month the Stack Discharge Report will be submitted to the Chief of the IH&R Department.

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4.6 The record copy of the analytical results shall be kept in the Bioassay Laboratory.

4.7 The completed Stack Sampling Report Form shall be distributed as follows:

- Original - routed to the Chief, IH&R Dept.
- Copy to Manager
- Copy to Director, Health & Safety Division
- Copy to General Superintendent
- Copy to Chemical Area/Metals Area Superintendents
- Copy to Production Supervisor
- Copy to IH&R Technologist - Technician.

5.0 QUALITY CONTROL

5.1 During the last week of each month an IH&R Technologist will compare the Stack Discharge Report, the Dust Collector Log Book and the Stack Log Book to determine that all entries have been properly made each month. Any differences between log books and report will be discussed with the Inspector and corrected if possible. The IH&R Department Chief will be consulted if this cannot be done.

Approved by:

R. B. Weidner

R. B. Weidner, Chief
IH&R Department

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Date Prepared:
July 30, 1986

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PROCEDURE FOR REPORTING WET SCRUBBER LOSSES TO THE ATMOSPHERE

The Plant 8 area supervisor submits to MC&A on the first workday of the new month the following information:

1. The total hours each furnace operated during the reporting month; and

2. The pounds of uranium material fed to each furnace by U-235 enrichment.

MC&A technical personnel use the above information to calculate the quantity of uranium lost to the atmosphere through each alkaline wet scrubber. The quantity of U and U-235 lost to the atmosphere is calculated based on the following methodology:

1. Divide the total hours a given furnace operated during the month by 3; this quotient equals the total hours for dumping nuclear materials into the furnace.

2. Multiply hours of dumping by the factor for that particular scrubber. The product equals the total quantity of U (in gms.) lost to the atmosphere. The table below shows the factors to be applied to each scrubber. These factors were devised based on studies performed by K. N. Ross, IH&R Section, in the early 1980's. Efforts are being made by the MC&A and IH&R to revise these factors.

3. Multiply the total U gms. lost to the atmosphere for the given scrubber by the ratio of pounds of uranium material fed by U-235 enrichment to the total pounds fed. This product yields U gms. lost to the atmosphere by enrichment.

4. Multiply U gms. lost to the atmosphere for each enrichment by the percent U-235 to calculate the quantity of U-235 lost.

5. For reporting atmospheric losses to NMMSS at Oak Ridge, combine all wet scrubber losses by enrichment. Report all enriched U losses and only normal and depleted uranium losses of 0.5 lb. U or greater for the month.

6. For reporting scrubber loss data to be included with the IH&R Stack Discharge Report to FMPC management, use the U lost to the atmosphere as calculated in step no. 2 above for both the reporting month and calendar year-to-date total. Also list the hours of operation for each scrubber for the reporting month.

TABLE I

Furnace	Factor (U gms. lost/hr. of dumping)
Box	1.47
Rotary Kiln	20.4
Oxidation No. 1	7.84
Oxidation No. 2	7.84

Prepared By:

R. W. Bardo
MC&A

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NLO, INC.

THE COLORIMETRIC (Br PADAP) DETERMINATION OF URANIUM VIA AN AUTOANALYZER INTERFACED TO HP-85 PERSONAL COMPUTER

I. SCOPE

This procedure is applicable to the determination of low concentrations of uranium. It may be used as an alternate to the fluorometric method. The normally applied concentration ranges are: 0-10 g/L; 0-10%; and 0-10,000 ppm. By applying the appropriate modification most types of samples may be analyzed employing this procedure.

II. PRINCIPLE

Uranium is estimated by measuring the absorbance of the uranium 2-(5-bromo-2-pyridylazo)-5-diethylaminophenol (Br PADAP) complex which absorbs strongly at 580 nm. Uranium is separated from major interferences by extracting it into trioctylphosphine oxide (TOPO) in cyclohexane. The extracting solution contains F^- and $PO_4^{\equiv}$ ions to inhibit the extraction of Th, Zr, and Fe; and HNO_3 to establish the proper acidity for uranium extraction. Ascorbic acid reduces V^{+5} to V^{+4}, Ce^{+4} to Ce^{+3}, Cr^{+6} to Cr^{+3}, and Fe^{+3} to Fe^{+2}. The interferences of these cations is much less severe at the lower valence state.

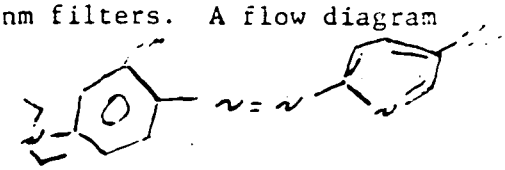
A complexing solution is added during color development to prevent interference from traces of interfering elements which extract. Sulfosalicylic acid masks interference of Be and Al. NaF reduces Th and Zr interference and 1,2-diaminocyclohexane tetraacetic acid (Cy DTA) complexes many cations but not U^{+6}.

A Technicon AutoAnalyzer II system is used to analyze the samples via this colorimetric method. An HP-85 Personal computer has been interfaced to this analyzer using an HP-BCD parallel interface, which is connected to an HP model 3470 Digital Voltmeter. The DVM receives signals directly from the colorimeter via a connection to the telemetry output junction of the colorimeter.

III. APPARATUS

1. A Technicon AutoAnalyzer II system consisting of an industrial sampler, pump III, and flowcell colorimeter is required. The colorimeter is equipped with a 15 mm flowcell and 580 nm filters. A flow diagram is attached.

2. Hewlett-Packard 85B Personal Computer.



3. Hewlett-Packard Model 3470 Digital Voltmeter.

4. ROM Drawer, HP #82936A.

5. BCD Interface, HP #82941A.

6. I/O ROM module, HP #85-15003.

7. "Attenuator Box" to connect DVM to colorimeter.

Note: The tubing used to pump the sample itself must be all kept the same length for the program to function correctly, therefore when changing any of the sample tubing make sure it is identical in length to the old tubing.

IV. REAGENTS

1. Extracting Solution. Dissolve 100 g of Al $(NO_3)_3 \cdot 9H_2O$ in 1000 mL of water. Dissolve 200 g of $KF \cdot 2H_2O$ in 1000 mL of water. Add 1100 mL of 70% HNO_3 to 1000 mL of water, mix, add the Al $(NO_3)_3$ solution and the KF solution. Add 25 mL of concentrated H_3PO_4, dilute to 5000 mL, and mix thoroughly.

2. Ascorbic Acid, 200 g/L. Dissolve 20 g of ascorbic acid in 100 mL of water. Make fresh daily.

3. TOPO in cyclohexane 25. g/L. Dissolve 25 g of trioctylphosphine oxide in 1000 mL of cyclohexane (practical grade).

4. Complexing Solution, Stock. Suspend 12.5 g of 1,2-diaminocyclohexane tetraacetic acid (Cy DTA) 2.5 g of NaF and 32.5 g of sulfosalicylic acid in 800 mL of water. Adjust the pH to 8.35 with 45% NaOH. Dilute to 1000 mL with water.

5. Complexing Solution, Diluted. Dilute a volume of stock complexing solution with an equal volume of water.

6. Buffer Solution, pH 8.35. Dissolve 149 g of triethanolamine in 800 mL of water. Adjust the pH to 8.35 with perchloric acid.

7. Br PADAP, Stock Solution, 0.5 g/L. Dissolve 0.5 g of Br PADAP in 1000 mL of absolute ethanol.

8. Br PADAP, Working Solution, 0.050 g/L. Add 100 mL of 0.5 g/L Br PADAP solution to 850 mL of absolute ethanol. Then add 50 mL of H_2O.

9. Mixed Acid, 2 M HNO_3; 1 M HF. Dilute 130 mL of 70% HNO_3 (reagent grade) and 30 mL of 50% HF (reagent grade) to 1000 mL with water.

10. Uranium Standard Solution, 0.025 g/L. Ignite a sample of NBS standard U_3O_8 #950 A in a muffle furnace at 900°C for 1 hour. When cool, store standard in a desiccator until used. Weigh 0.1179 g of U_3O_8 standard into a 150 mL beaker. Dissolve the U_3O_8 in 50 mL of 1-1 HNO_3. Quantitatively transfer the solution to a 4000 mL volumetric flask and dilute to the mark with distilled water. (Supplied normally by Analytical Quality Control.)

11. Uranium Calibration Standard for High Thorium Samples, Th = 380 g/L, U = 0.0125 g/L. Dissolve 905 g of reagent grade thorium nitrate crystals in 200 mL of water. Add 65 mL of 70% HNO_3. Transfer the solution to a 1000 mL volumetric flask. Add 500 mL of the 0.025 g/L

uranium standard (Reagent #10). Dilute to the mark with water. Prepare a second solution in the same manner but omit the uranium. Use the second solution as a "blank" for the calibration standard.

V. SAFETY PRECAUTIONS

1. **Safety glasses are to be worn in the laboratory at all times.**

VI. PROCEDURE

A. For Low Interference Samples.

Procedure	Comments
1. Transfer the dissolved sample to an 8 dram vial with 3 M HNO_3. Add 10 mL of extracting solution (sol #1), 1 mL of ascorbic acid solution, and 5 mL of 0.1 M TOPO-cyclohexane solution.	1a. Refer to the addendum for sample dissolution instructions. b. Extracting volumes of TOPO-cyclohexane should be 5 mL only. c. Analyze a blank in the same manner as the samples are analyzed. Substitute 3 M HNO_3 for the sample. d. The concentration of uranium in the TOPO-cyclohexane should not exceed 12.5 ug/mL. e. Write the dilution used on each vial.
2. Shake vial for 1 minute on the Burrell shaker.	
3. When the phases separate, place the vial in noted position on the Technicon sampler.	3a. Set the timers for 2.0 minutes "sample" and 4.5 minutes "total". b. Adjust solution level with extracting solution so that sample is taken from organic layer. c. Turn on pump 5 minutes prior to starting sampler.
4. Prompt message on CRT of HP-85 should read "Enter Ø to Run Calibration Factors, Enter 1 to Run Unknowns". Depress "1" and "ENDLINE" keys.	4. Standardization, Section VII of this procedure must be completed before attempting to analyze samples. The standardization procedure is to be done once at beginning of each shift.

Procedure	Comments
5. Prompt message on CRT now reads "Enter number of samples to be run". Enter number of samples and depress "ENDLINE" key.	5. Do not run more than 6 samples per run.
6. Next prompt message on CRT now reads "Enter lab numbers of samples in order that they will be analyzed. Enter also dilution factor of each of these samples." Enter lab number (i.e. 10.0401), dilution factor (i.e. 1.00) and depress "ENDLINE" key for each sample.	6a. Lab number must be of form - plant number, 4 digit sequential number; i.e. 10-402, enter as 10.0402. b. The dilution factor (Z) is entered to nearest hundredth, i.e. 5-100-2-5. $Z = \frac{V_1 \times V_2 \cdots V_n}{V \times A_1 \times A_2 \times \cdots A_n}$ $Z = \frac{100 \times 5}{5 \times 2} = 50$ Enter as 50.00
7. After all dilution factors and lab numbers are entered the CRT prompt message will read "Type concentration units; Enter 1 for U g/L, 2 for U #/gal., 3 for U ppm, and 4 for % U". Each lab number previously entered will be brought up one at a time on the CRT. *Depress choice 1-4 and "ENDLINE" key for each sample. *CAUTION!! Do not enter concentration unit for last sample until base line on recorder is stable (accomplished by having pump and recorder turned on 5 minutes previous to this step.)	7. If either selection 3 or 4 (ppm or %) is selected a further input is required for that sample. The prompt message on the CRT will read "Enter weight in grams of sample." Simply type in weight and depress "ENDLINE" key.
8. After concentration entry for last sample has been inputted (see caution under this section, step 7) CRT will display the following message: "Turn pump and recorder on and allow to come to equilibrium, start sampler now." IMMEDIATELY start sampler to begin sampling first sample.	

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Procedure	Comments
9. The computer will present the following information for each sample: a. Lab Number b. Dilution Factor c. Base Line d. Peak Height e. Corrected % Abs. (peak height less base line ± Blank) f. Concentration of uranium in specified units.	9a. Compare recording of sample to print out. If corrected % Abs. does not agree within 2.0% of each other, use recording data to calculate concentration by hand, see Calculation Section VIII. b. Check data card to determine if correct dilution factor was entered from data on data card into computer. c. Any corrected reading above 230.0 is to be further diluted and reanalyzed. The DVM will not read above 240.0.
10. After all the samples have been analyzed in this run the CRT will display the same message as stated in step 4 above (ready for next set of samples).	10. When cross-checking results if % Abs. corrected from computer agrees within ± 2.0% of recording corrected % Abs., then only the proper dilution factor needs to be confirmed before reporting the result. The analyst need not perform the calculation if all data entries are correct.

B. For Samples Containing More Than 10 Grams Per Liter Thorium.

Procedure	Comments
1. Transfer a dissolved sample that contains no more than 2.5 grams of thorium to a 100 mL volumetric flask.	1a. Analyze a thorium calibration standard and blank with the sample. b. Write the dilution used on the flask. c. See addendum for dissolution instructions.
2. Add 50 mL of HF-HNO_3 mixed acid solution (sol. #9), 5 mL of 0.1 M TOPO-cyclohexane solution.	
3. Shake the flask for 2 minutes.	
4. Add 0.2 M HNO_3 to the flask until the organic layer is brought into the neck of the flask. Transfer organic to an 8 dram vial.	4a. Use a pipet to transfer the organic. b. Write dilution used on the vial.
5. Add 10 mL extracting solution (sol. #1).	
6. Proceed with part VI, Section A, step 2 of this method.	

C. For Samples Containing More Than 10 Grams Per Liter Zirconium

Procedure	Comments
1. Transfer a dissolved sample containing no more than 0.05 gram of Zirconium into a 60 mL separatory funnel.	1. See addendum for dissolution instructions.
2. Add 10 mL of extracting solution (sol. #1), 2 mL of ascorbic acid solution and 5 mL of TOPO-cyclohexane solution.	
3. Shake the funnel for 2 minutes.	
4. Discard aqueous layer and repeat steps 2 and 3.	
5. Transfer organic to 8 dram vial. Add 10 mL of extracting solution (sol. #1) and 1 mL of ascorbic acid solution. Repeat step #3.	5. Write the dilution used on each vial.
6. Proceed with Part VI, Section A, step 2 of this method.	

General Information Notes:

NOTE: The data recorded represents scale readings that are directly proportional to concentration. The scale readings are a function of absorbance (log Abs. or O.D.), which is the term used for instruction purposes.

A. Recorder & DVM Adjustments

1. Turn recorder, colorimeter, pump, DVM, and HP-85 "on" at least 15 minutes prior to making adjustments.

2. Rotate the 5 position colorimeter switch to "Zero". Turn chart drive of recorder "on".

3. If necessary, adjust the recorder to zero with "zero adjust" potentiometer on the colorimeter. (DVM can't be adjusted but if it does not read 0±0.5 contact Electronics Department.)

4. Rotate the 5 position switch on the colorimeter to "full scale".

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B. For Samples Containing More Than 10 Grams Per Liter Thorium.

Procedure	Comments
1. Transfer a dissolved sample that contains 2.0 ± .1 grams of thorium to a 100 mL volumetric flask.	1a. Analyze a thorium calibration standard and blank with the sample. b. Write the dilution used on the flask. c. See addendum for dissolution instructions. d. This procedure is designed for 2 grams thorium. If less thorium is used the volume of mixed acid must be proportionately adjusted.
2. Add 50 mL of HF-HNO_3 mixed acid solution (sol. #9), 5 mL of 0.1 M TOPO-cyclohexane solution, and 2 mL of 20% Ascorbic Acid.	
3. Shake the flask for 2 minutes.	
4. Add 0.2 M HNO_3 to the flask until the organic layer is brought into the neck of the flask. Transfer organic to an 8 dram vial.	4a. Use a pipet to transfer the organic. b. Write dilution used on the vial.
5. Add 10 mL extracting solution (sol. #1).	
6. Proceed with part VI, Section A, step 2 of this method.	

C. For Samples Containing More Than 10 Grams Per Liter Zirconium.

Procedure	Comments
1. Transfer a dissolved sample containing no more than 0.05 gram of Zirconium into a 60 mL separatory funnel.	1. See addendum for dissolution instructions.
2. Add 10 mL of extracting solution (sol. #1), 2 mL of ascorbic acid solution and 5 mL of TOPO-cyclohexane solution.	
3. Shake the funnel for 2 minutes.	
4. Discard aqueous layer and repeat steps 2 and 3.	
5. Transfer organic to 8 dram vial. Add 10 mL of extracting solution (sol. #1) and 1 mL of ascorbic acid solution. Repeat step #3.	5. Write the dilution used on each vial.
6. Proceed with Part VI, Section A, [illegible]	

Procedure	Comments
3. Insert tape casette that has program entitled "Low U" on it into HP-85.	3. Power should be "on" HP-85 before inserting casette.
4. Depress "LOAD" key and type "Low U" (include parenthesis, then depress the "ENDLINE" key.	4a. This operation erases previous program in computer's memory and places steps of program entitled "Low U" into its current memory. b. Program is loaded into memory after indicator light under tape drive goes out.
5. Depress key labeled "RUN".	5. This action will initialize program and take program to first step where input is needed.
6. The following prompt message will appear on CRT, "Enter your last name, first initial." Type in last name, first initial, and depress "ENDLINE" key.	6. Example: Name: John Doe Entry: Doe, J "ENDLINE"
7. Next prompt message on CRT will state "Enter Today's Date (in form of July 26, 1983)." Enter today's date as demonstrated then depress "ENDLINE" key.	7. The name entered in step 6 and this date entered in this step will be outputted with all results from the computer until standardization is performed again.
8. Next prompt message on CRT will be "Enter Ø to run calibration factors, Enter 1 to run Unknowns." Depress "Ø" and "ENDLINE" keys.	8. This standardization section must be completed <u>BEFORE</u> analyzing unknowns as described in Section VI of this procedure.
9. Next prompt message will state "Enter number of factors". Depress "4" and "ENDLINE" keys.	9. Standard procedure utilizes 4 factors and a reagent blank.
10. Next prompt message that appears will be "Enter concentration of standard used for factors (Ug/L)". Enter concentration in g/L units, then depress "ENDLINE" key.	10a. Example: concentration of std. is 0.0250 g/L U. Entry: 0.0250 "ENDLINE" b. Place reagent blank followed by factors into sampler now.

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Procedure	Comments
11. Next prompt message on CRT will be "Enter dilution factors beginning with factor #1". *Proceeding in sequential order from least concentrated to most concentrated standard enter dilution factor (Z) for each of the standards followed by depressing the "ENDLINE" key. *CAUTION!! DO NOT enter last factor's dilution factor until AutoAnalyzer system is stabilized (pump and recorder on 5 minutes previous to this step).	12a. Example: Factor #1 — Dilution 1-5 #2 — 2-5 #3 — 3-5 #4 — 5-5 Entries: 5.00 "ENDLINE" 2.50 "ENDLINE" 1.67 "ENDLINE" *1.00 "ENDLINE"
12. IMMEDIATELY after entry of last factor's dilution factor, start sampler to begin sampling reagent blank.	12. Prompt message will have stated "Place blank in position #1 of sampler followed by factors and start sampler now".
13. The computer will then proceed to determine a reagent blank (B), 4 factors [F ( )], and 3 break points [T ( )].	13a. The blank (B) printed by computer is the absolute value. The computer will determine whether to add or subtract it from readings. b. The 4 factors (F(1), F(2), F(3), and F(4)) will be in units of mg U/% Abs.-mL. c. The 3 break points (T(1), T(2), and T(3)) are the points (% Abs.) which determine which factor is to be used to calculate the unknown. d. See Section VIII "Calculations" for more exact details of determinations of blank, factors, and break points.
14. When standardization is complete the computer will return to the prompt message as stated in step 8 above. Ready to analyze unknowns or rerun factors.	14a. To cross-check factors: 1) compare % Abs. corrected from computer to those obtained from recordings, 2) also check to make sure proper dilution factors were entered. If corrected % Abs. agree within ± 2.0% and dilution factors agree with those on data cards then use factors now entered into memory of computer, otherwise see step 14b below.

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Procedure

Comments

14b. If the analyst chooses to enter blanks, 4 factors, and 3 break points manually (without actually analyzing them again) the following procedure must be followed:

1. Depress "STEP/PAUSE" key.
2. Depress "RUN" key.
3. Type in name as prompt message is requesting.
4. Type in today's date as prompt requires.
5. Prompt message is now "Enter 0 to Run Calibration Factors, Enter 1 to Run Unknown". Depress "STEP/PAUSE" key.
6. Enter following:

B	= ___	depress "ENDLINE"	-Blank
F(1)	= ___	"	"-Factor #1
F(2)	= ___	"	"-Factor #2
F(3)	= ___	"	"-Factor #3
F(4)	= ___	"	"-Factor #4
T(1)	= ___	"	"-Break Pt. #1
T(2)	= ___	"	"-Break Pt. #2
T(3)	= ___	"	"-Break Pt. #3

Note: Calculations to determine these factors, blank, and break points are in Section VIII of this procedure.

7. Depress "SCRATCH/CONT." key.
8. Now you are ready for input to question as stated in step 5 above. Ready to enter 1 to run unknowns, as directed in Section VI of this procedure.

B. For Procedure "B"

1. Pipet 5 mL of the thorium calibration factor standard into 2 100 mL volumetric flasks.

2. Pipet 5 mL of the thorium "blank" solution into a second 100 mL flask.

3. Proceed with step "2" of Procedure "B".

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VIII. CALCULATIONS

For Parts "A" and "C"

let:

R = Uncorrected absorbance of sample solution
D = Absorbance of reagent blank
L = Base line of recording
B = Corrected reagent blank
S = Total correction for base line and blank
A = Absorbance of sample solution corrected for S
C = Uranium concentration of standard
F = Factor for converting absorbance to U mg/mL
Z = Dilution factor for volumes
Y = Dilution factor for weighed samples
v = Initial volume of sample in mL
v_1 = First diluted volume
a_1 = First aliquot
v_2 = Second volume
w = Weight of initial sample in grams

then:

1. $B = D - L$

Examples:

(a) $L = 1.0$
$B = 2.0$
$S = 2.0 - 1.0 = 1.0$

(b) $L = 1.0$
$D = 0.0$
$B = 0.0 - 1.0 = 1.0$*

*Computer will print only absolute value.

2. $S = L + B$

Examples:

(a) $L = 1.5$
$B = 1.0$
$S = 1.5 + 1.0 = 2.5$

(b) $L = 1.5$
$B = 1.0$
$S = 1.5 - 1.0 = 0.5$

3. $A = R - S$

Example:

$R = 25.5$
$S = 0.5$
$A = 25.5 - 0.5 = 25.0$

4. $F = \frac{C}{A}$

Example:

$C = 0.005$ mg/mL
$A = 38.4$
$F = \frac{0.0050}{38.4} = 0.000130$ mg/mL per scale unit → F(1) by computer definition.

NOTE: Calculate a factor for each standard analyzed. Apply the factors obtained on subsequent sample readings as described below. Use factor for 0.005 mg/mL standard for readings from 0 to midway between readings for 0.005 mg/mL standard and 0.010 mg/mL standard T(1). Use factor for 0.010 mg/mL standard for readings from midway between 0.005 mg/mL standard and 0.010 mg/mL standard to midway between 0.010 mg/mL standard and 0.0150 mg/mL standard T(2). Use factor calculated for 0.0150 mg/mL standard for all readings from midway between 0.010 mg/mL standard and 0.0150 mg/mL standard to midway between standards 0.0150 mg/mL and 0.0250 mg/mL T(3). Use factor calculated for 0.0250 mg/mL above midway between 0.0150 mg/mL and 0.0250 mg/mL standards.

Examples:

I → F(1)	II → F(2)	III → F(3)	IV → F(4)
C = 0.0050	C = 0.010	C = 0.0150	C = 0.0250
A = 38.4	A = 75.4	A = 97.2	A = 192.0
F = 0.000130	F = 0.000133	F = 0.000129	F = 0.000130

For readings (A) between 0 and 56.9, use Factor I.
For readings (A) between 56.9 and 86.3, use Factor II.
For readings (A) between 86.3 and 145, use Factor III.
For readings (A) above 145 use Factor IV.

5. $Z = \frac{v_1 \cdot v_2}{v \cdot a_1}$

Example:

$v = 2.00$ mL
$v = 5.00$ mL
$Z = \frac{5}{2} = 2.5$

6. $Y = \frac{v_1 \cdot v_2}{w \cdot a_1}$

Example:

$v_1 = 100$ mL
$v_2 = 5.00$ mL
$w = 1.00$ g
$a_1 = 5$ mL

$$Y = \frac{100 \cdot 5}{1.00 \cdot 5} = \frac{500}{5} = 100 \text{ mL/g}$$

7. U g/L = FAZ

Example:

F = 0.000132
A = 20.0
Z = 2.5
U g/L = 0.000132 x 20.0 x 2.5 = 0.007

8. U µg/mL = 1000 FAZ

Example:

F = 0.000132
A = 20.0
Z = 2.5
U µg/mL = 1000 x 0.000132 x 20.0 x 2.5 = 7

9. $\% U = \frac{FAY}{10}$

Example:

F = 0.000132
A = 40.0
Y = 100 mL/g

$$\% U = \frac{0.000132 \cdot 40.0 \cdot 100}{10} = 0.053$$

10. U ppm = 1000 FAY

Example:

F = 0.000132 mg/mL per scale unit
A = 40.0
Y = 10.0 mL/g
U ppm = 1000 · 0.000132 · 40.0 · 10 = 53

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NOTE: When the HP-85 is interfaced with this technicon unit, only corrected % Abs. (as compared to recordings) from computer and dilution factors need be cross-checked. The calculation need not be performed since if data is correct the result will be correct.

For Part "B"

$$\text{U ppm (Th basis)} = \frac{1{,}000{,}000\ FAZ}{Th}$$

where: Th = Thorium g/L

Example: (1)

F = 0.000132 mg/mL per scale unit
A = 15.0
Z = 1.0
Th = 250 g/L

$$\text{U ppm (Th basis)} = \frac{1{,}000{,}000 \cdot 0.000132 \cdot 15.0 \cdot 1.0}{250} = 7.9$$

Example: (2)

$$\text{U ppm (Th basis)} = 100{,}000\ \frac{FAY}{Th}$$

where: Th = % Th

F = 0.000132 mg/mL per scale unit
A = 10.0
Y = 5 mL/g sample
Th = 87.5%

$$\text{U ppm (Th basis)} = \frac{100{,}000 \cdot 0.000132 \cdot 10.0 \cdot 5}{87.5} = 7.5$$

IX. REFERENCES

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3. C. A. Horton and J. C. White, Separation of Uranium by Solvent Extraction with Tri n-octylphosphine Oxide, Anal. Chem. Vol. 30, 1958.

4. Hewlett Packard, HP-85 Owner's Manual and Programming Guide, 1979.

5. Hewlett Packard, Operations and Service Manual for Measurement System 3470 (DVM).

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6. V. R. Gill, The Interfacing of Technicon AAII Unit to HP-85 Personal Computer to Determine Uranium Concentrations by Br PADAP Colorimetric Method, March 1984.

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V. R. GILL

March 1984

ADDENDUM

SAMPLE PREPARATION (AQUEOUS)

1. Place a magnetic stirring bar in the sample jar, and place the jar on a magnetic stirrer.

2. While stirring is taking place, draw a sample into a clean dry pipet.

3. Adjust the meniscus to the line.

4. Drain the pipet into a clean 125 ml Erlenmeyer flask.

5. Consult Table I for the volume of reagents required for dissolution.

1. If a large amount of solids are present, shake the sample first to disperse the solids.

2. The volume of sample normally used is given in Table I, however, changes in plant operations may require a change in volume.

SAMPLE PREPARATION (ORGANIC)

1. Pipet 1 ml of organic sample (AX or CR) into a 60 ml separatory funnel.

2. Add 5 ml of 2% HF to the separatory funnel.

3. Shake the funnel for 1 minute.

4. Permit the phases to separate and drain the aqueous phase into a 125 ml Erlenmeyer flask.

5. Repeat steps 2-4.

6. Add 5 ml of distilled water to the funnel and shake it for 1 minute.

7. When the phases separate drain the aqueous phase into the flask containing the 2% HF extracts.

1. Organic samples are TBP in kerosene.

8. Add 5 ml of 70% HNO_3 to the flask, place the flask on a hot plate and evaporate the solution to near dryness.

8. Place a pyrex buret funnel in the neck of the flask.

9. Remove the flask from the hot plate, cool, and redissolve residue in 3 M HNO_3.

10. Proceed with Part VI-A step 1.

SAMPLE PREPARATION (THORIUM SAMPLES)

A. For aqueous samples.

1. Material presently received and processed is soluble, therefore, no dissolution procedure is required.

1a. If material is received in the future containing insoluble material, dissolution techniques will be required.

b. Purified thorium samples such as CP_x, and boil downs do not require dissolution procedures.

2. Dissolve Th metal in 15 ml of 35% HNO_3 plus 6 drops of 2% HF for every gram of sample.

3. Dissolve ThO_2 in 30 ml of 35% HNO_3 plus 6 drops of HF for every gram of sample.

TABLE I

AQUEOUS SAMPLE PREPARATION

Plant Number	Sample Type	Determination	Filter	Sample ml	70% HNO_3 ml	70% $HClO_4$ ml
1	Sump Liquor	Total U	no	5	5	5
2	AR & Raffinate	Extractable U	no	2	none	none
2	AR & Raffinate	Total U	no	2	5	5
2	Filtrate	Total U	no	2	5	none
2	Slop	Total U	no	2	5	5
2	Sump Liquor	Total U	no	5	5	5
2	Cake Slurry	Soluble	yes	1-2-5→100-2	5	none
2	Cake Slurry	Total U	no	1-2-5→100-2	5	5
4	Filtrate	Total U	no	1	5	none
4	HF*	Total U	no	1*	5	5
5	Sump Liquor	Total U	no	2	5	5
6	Sump Liquor	Total U	no	5	5	none
8	Floor Water	Total U	no	2	5	5
8	Sump Liquor	Total U	no	2	5	5
9	Sump Liquor	Total U	no	5	5	none
9	Lime Slurry**	Total U	no	1	10	none
10	Tank Sump Liquor	Total U	no	5	5	5
10	Heel	Total U	no	2→100-5	5	5
10	Pit Pumping	Soluble U	yes	5	5	none
10	Pit Pumping	Total U	no	2	5	5
10	River Pumping	Total U	no	5	5	none
10	Decontamination Sump Liquor	Total U	no	2	5	5
10	Tracer (Plt.2)	Total U	no	5	5	none
10	Tracer (Lab.)	Total U	no	5	5	none
10	Tracer (Plt.6)	Total U	no	5	5	none
10	Tracer (Decontam.)	Total U	no	2	5	5
10	Tracer (Pilot Plt.)	Total U	no	5	5	5
10	Tracer (Plt.5)	Total U	no	5	5	5
10	Tracer (Tank Farm)	Total U	no	5	5	5
13	Sump Liquor	U g/l	no	5	5	5
13	AR	U g/l	no	5	5	5

* Use polyethlene pipet and fume in a platinum dish.

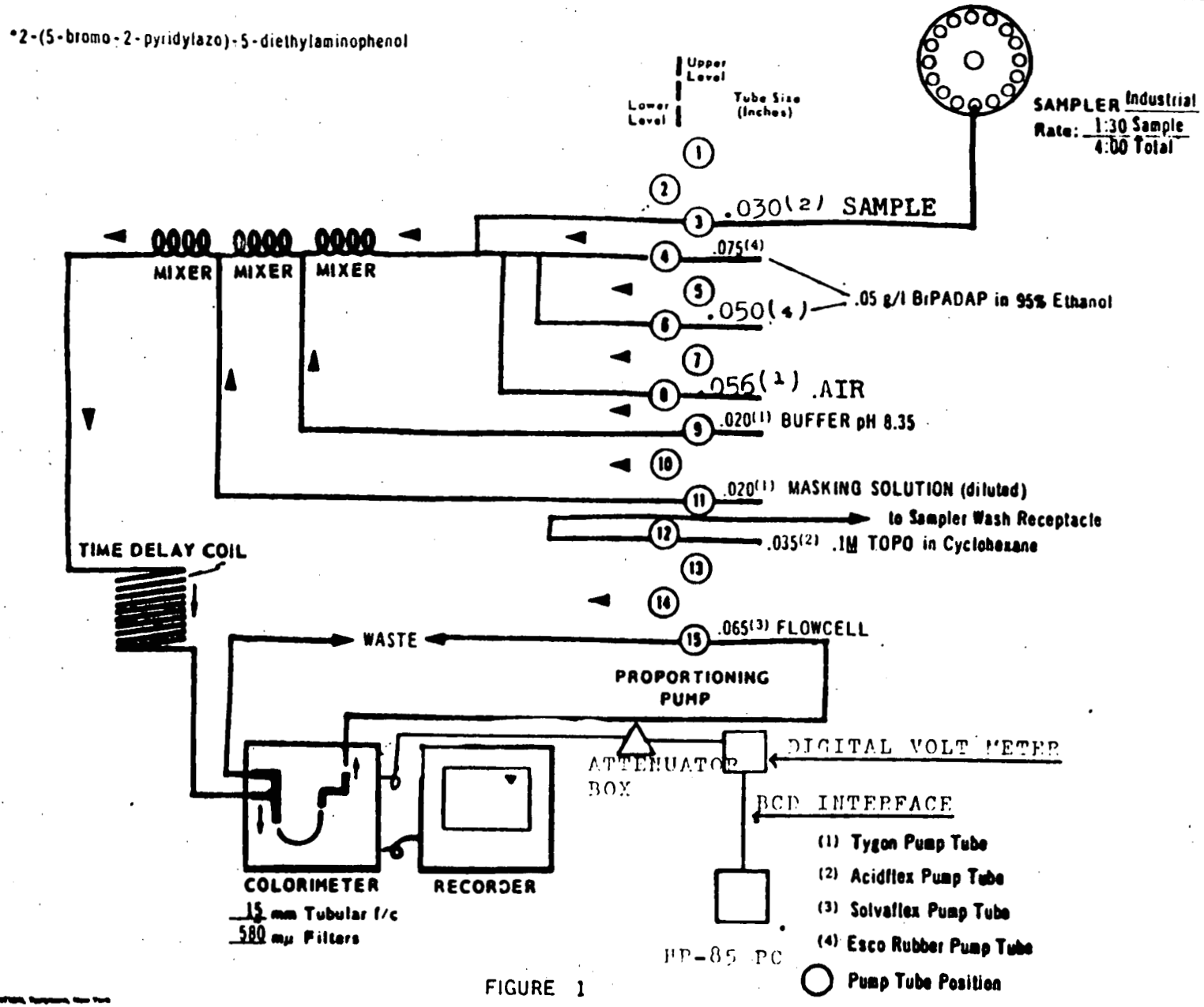
*2-(5-bromo-2-pyridylazo)-5-diethylaminophenol
Upper Level
Lower Level
Tube Size (Inches)
SAMPLER Industrial
Rate: 1:30 Sample / 4:00 Total
.030(2) SAMPLE
.075(4)
.050(4)
.05 g/l BrPADAP in 95% Ethanol
.056(1) AIR
.020(1) BUFFER pH 8.35
.020(1) MASKING SOLUTION (diluted)
to Sampler Wash Receptacle
.035(2) .1M TOPO in Cyclohexane
.065(3) FLOWCELL
MIXER
MIXER
MIXER
TIME DELAY COIL
WASTE
PROPORTIONING PUMP
ATTENUATOR BOX
DIGITAL VOLT METER
BCD INTERFACE
COLORIMETER
RECORDER
15 mm Tubular f/c
580 mμ Filters
HP-85 PC
(1) Tygon Pump Tube
(2) Acidflex Pump Tube
(3) Solvaflex Pump Tube
(4) Esco Rubber Pump Tube
Pump Tube Position

FIGURE 1

ADDENDUM
(Cont'd)

SAMPLE PREPARATION FOR THE DETERMINATION OF TRACE URANIUM IN SOIL SAMPLES

1. Weigh entire soil sample (200-800 grams approximate) into a newly cleaned and numbered 400 mL evaporating dish which has been previously tare weighed (T_w). Record this weight as gross wet weight (G_{wet}) on data card.

2. Place a newly cleaned watch glass on top of evaporating dish and place in drying oven at 100-110°C for 24 hours.

3. After 24 hours remove sample from drying oven and allow sample to cool to room temperature.

4. Reweigh each sample in its evaporating dish and record this weight on data sheet as dry gross weight (G_{dry}).

5. Transfer dried sample from evaporating dish into newly cleaned mortar. Mix and grind sample with pestle for 5-10 minutes.

6. Pour ground sample onto 35 mesh sieve. Shake sieve so as to allow fraction that is finer than 35 mesh (-35) to pass through the sieve into a sieve collection pan.

7. When separation is complete pour the +35 mesh fraction back into the mortar.

8. Repeat steps 5-7 two more times.

9. Transfer all of the -35 mesh fraction of sample (that which passed through sieve) into 8 oz bottle properly labeled with Lab No., Date, I.D. No., Analyst, and -35 fraction note.

10. Determine the net weight of the +35 mesh portion of sample now remaining (that which would not pass through sieve) and record weight on a data sheet as Net Ungrindable Solid Weight (UGS_n).

11. Place the +35 mesh fraction of sample into a second 8 oz bottle. Properly label bottle with Lab No., +35 mesh note, I.D. No., Date, and Analyst. This portion will not be analyzed for uranium, but will be held for future reference.

12. Take the -35 fraction of sample in 8 oz bottle from step 9 and mix on Sample Room Bottle Blender for 15 minutes.

13. Weigh out 10 grams ± 0.1 of mixed -35 mesh sample from step 12 above into newly cleaned 600 mL beaker. Record this sample weight on data card (wt).

SAMPLE PREPARATION FOR THE DETERMINATION OF TRACE URANIUM IN SOIL SAMPLES

(Cont'd)

14. Add 100 mL 70% HNO_3 and 100 mL of 38% HCl to sample in beaker. Place watch glass on top of beaker.

15. Place the beaker on top of hot plate which is on medium heat setting.

16. Evaporate sample to 25 mL or less total volume. (Do not take to dryness.)

17. Remove sample from the hot plate and cool solution to room temperature.

18. Rinse watch glass into beaker with distilled water. Add 40 mL of deionized water.

19. Filter the sample into a vacuum filtering flask using a Büchner Funnel with #41 Whatman filter pad to remove undissolved solids. Keep volume under 100 mL but wash retained solids with water into filtering flask.

20. Transfer the filtrate from the filtering flask into a newly cleaned 100 mL volumetric flask.

21. Dilute volumetric flask to volume with deionized water.

22. Take aliquot of sample from 100 mL volumetric flask and proceed to analyze as per procedure titled, "The Colorimetric (Br PADAP) Determination of Uranium Via an AutoAnalyzer Interfaced to HP-85 Personal Computer," Section VI (normal Aliquot is 5 mL).

CALCULATIONS FOR % VOLATILES

$$\% \text{ Volatiles} = \frac{(G_{wet} - G_{dry}) - T_w}{G_{wet} - T_w} \times 100$$

where: G_{wet} = gross weight of wet sample + evaporating dish

G_{dry} = gross weight of dried sample + evaporating dish

T_w = weight of evaporating dish

GRAVIMETRIC DETERMINATION OF NON-VOLATILE PARTICULATES ON STACK FILTERS INCLUDING SAMPLE PREPARATION FOR A TOTAL URANIUM DETERMINATION

I. SCOPE

This procedure is specifically designed for use on -1- Staplex Type TFA "S" pleated filters used in high volume air samplers.

II. PRINCIPLE

Filters containing non-volatile particulates collected in air samplers are ashed by heat lamp and furnace. Particulates are determined by subtracting the weight of a previously determined ash blank from the weight of the ashed sample. This ash is then treated with acids to provide a solution suitable for a uranium determination.

III. SPECIAL APPARATUS

None

IV. REAGENTS

1. Hydrofluoric acid, reagent, 48%.
2. Nitric acid, reagent, 70%.
3. Perchloric acid, reagent, 70%.

V. SAFETY PRECAUTIONS

1. Safety glasses are required to be worn at all times in the laboratory.

VI. PROCEDURE

1. Transfer the filter to be analyzed to a tared 500 mL platinum dish with cover. Record the tare weight as W_1.

COMMENTS

1. a. *Record on data sheet the identification number of the platinum dish and cover by corresponding lab number/ plant I.D. number to assure that no sample mix-up occurs.

   *Note: Take all prudent and reasonable care to assure no sample mix-up occurs.

   b. Filters are received inside plastic bags. Remove the filter from the bag for analysis. Transfer any material remaining in the bag to the dish using a moistened ash-free filter paper.

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VI. PROCEDURE	COMMENTS
2. Transfer the dish and filter to a rack arranged to apply heat from heat lamps to the underside as well as the upper surface of the dish. Covers should be removed during this step of the procedure.	2. Do this preliminary ashing in a fume hood. Adjust the upper heat lamps to approximately two inches above the surface of the filter.
3. When the sample has quit smoking transfer it to a muffle furnace set at 700°. Recover the dishes with appropriate covers before placing in furnace.	3. This phase of the operation usually is complete in 15-20 minutes.
4. When all carbonaceous material has disappeared, remove the dish from the furnace.	4. This step normally requires 20-25 minutes.
5. After the dish has cooled weigh the dish, cover, and contents accurately.	5. Record this weight as W_2.
6. Add 3 mL of HF, 10 mL of HNO_3, and 10 mL of $HCLO_4$ and transfer to a hotplate in a perchloric acid hood.	
7. Fume the sample to a volume of approximately 5 mL. Set aside to cool.	7. Fume the sample with the cover on the dish to prevent any possible losses.
8. Transfer the sample to a 100 mL volumetric flask. Dilute to the mark. The sample is now ready for a uranium determination.	8. a. Use funnel to transfer sample to flask. b. Label flask with lab number/plant I.D. number which was recorded on data sheet for this particular dish. c. Wash inside of dish cover into dish to remove any uranium residue.

VII. BLANK

1. Using at least 3 new filters from the same lot follow steps 1 through 5 of the general procedure.	1. Calculate a blank as the average difference between W_2 and W_1.

VIII. CALCULATIONS

Particulates, mg = $(W_2-W_1-B)1000$

where:

W_1 = tare weight of dish + cover, g
W_2 = weight of dish + ash + cover, g
B = blank weight, average weight of 3 or more ash blank determinations

5/17/85 - J. F. WERDMANN
REVISION I - 7/5/85 - V. R. GILL
REVISION II - 9/11/85 - V. R. GILL

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SAMPLE PREPARATION FOR THE DETERMINATION OF TRACE URANIUM IN SOIL SAMPLES

(Cont'd)

CALCULATIONS FOR % UGS +35 (UNGRINDABLE SOLIDS)

$$\% \text{ UGS } +35 = \frac{UGS_n}{(G_{dry} - T_w)} \times 100$$

where: UGS_n = net weight of +35 fraction of sample

G_{dry} = gross weight of dried sample + evaporating dish

T_w = weight of evaporating dish

NLO, Inc.

Bioassay Department

TITLE: CALIBRATION OF LUDLUM MODEL 177 ALARM RATEMETER

NUMBER: I 0118.10

AUTHOR: M. J. Eversole

DATE: March 20, 1985

1.0 SCOPE

1.1 This procedure describes the steps to be followed for calibrating Ludlum Model 177 Alarm Ratemeters.

2.0 SUMMARY OF METHOD

2.1 Ludlum Model 177 Alarm Ratemeters are designed for measuring in counts per minute from 0 to 500,000. The instrument is set to read pulses from a pulse generator at a ratio of 1:1 in counts per minutes. A probe is attached to the ratemeter and the counting efficiency of the system is determined by exposing the probe to NBS traceable alpha sources.

3.0 SPECIAL APPARATUS

3.1 Digital Voltage Meter.

3.2 Adjustment Tool: JFD type.

3.3 Screwdriver; small common.

3.4 Pulse Generator: capable of pulses 10 Hz to 90 MHz such as a Ludlum Model 500 Pulser.

3.5 Sources: Four ^{239}Pu alpha sources such as Eberline's S94-1 Pu alpha calibration set.

3.6 Wipes: lint-free, disposable.

3.7 Note pad.

3.8 Survey Instrument Maintenance Log.

3.9 Survey Instrument Calibration Log.

4.0 REAGENTS

4.1 Alcohol: ethyl, absolute.

5.0 SPECIAL PRECAUTIONS

5.1 Never interchange probes from one instrument to another. Each probe has been adjusted to operate with a specific meter. Only Instrument Laboratory personnel may change instrument probes.

5.2 When adjusting the operating voltage to determine the instrument plateau, never exceed 1300 volts.

6.0 PROCEDURE

6.1 Scheduling of Alarm Ratemeters for Calibration.

6.1.1 Alarm Ratemeters must be calibrated:

6.1.1.1 Whenever any component is changed which might affect the response of the unit.

6.1.1.2 At least once a year for routine preventive maintenance.

6.2 Pre-calibration Inspection and Servicing of Alarm Instruments.

6.2.1 Maintenance Log:

6.2.1.1 Record the reason for calibration and any maintenance performed. Be sure to include the ratemeter serial number, then date and initial the log entry.

6.2.2 Batteries.

6.2.2.1 Insure that ratemeter is OFF, then remove batteries.

6.2.2.2 Visually inspect batteries; replace them if damaged or leaking (see Step 6.2.2.4).

6.2.2.3 Check voltage of each battery with a digital volt meter; replace any batteries reading below 5.0 volts d.c. (see Step 6.2.2.4).

6.2.2.4 Check new batteries with a digital volt meter before installing them in the instrument. New batteries must read 6.0 volts d.c. or greater.

6.2.3 Coaxial Cable.

6.2.3.1 Disconnect the coaxial cable from the probe and meter. While disconnecting cable, check that connectors lock tightly to the probe and meter; replace cable if connectors are defective.

6.2.3.2 Visually inspect cable for dents, tears, and properly attached connectors; replace cable if defective.

6.2.3.3 Using the digital volt meter, check that the center wire measures zero resistance; if resistance is not zero, replace cable.

6.2.3.4 Using the digital volt meter, check that the shield measures zero resistance; if resistance is not zero, replace cable.

6.2.4 Needle Movement.

6.2.4.1 Insure that ratemeter is still OFF. Check if the meter needle indicates zero. If it does not, adjust it to zero by turning the screw on top of the meter cover. If the needle cannot be set to zero, submit the instrument to the Instrument Laboratory for service.

6.2.4.2 Check Needle for Freedom of Movement.

6.2.4.2.1 Turn ratemeter ON. Press battery check. The needle should move freely upscale to "Batt Good" section of the meter display. If it does not, submit the instrument to the Instrument Laboratory for service.

6.2.4.2.2 Turn ratemeter OFF. The needle should smoothly return to zero. If it does not, submit the instrument to the Instrument Laboratory for service.

6.3 Calibration of Alarm Ratemeter.

6.3.1 Turn pulse generator ON and allow to warm up for five minutes.

6.3.2 Disconnect pancake probe and connect cable to pulse generator (using Alarm Ratemeter cable).

6.3.3 Turn ratemeter ON and set range switch to X1 position.

6.3.4 Set pulse generator at 120, 260, and 380 CPM.

6.3.4.1 Pause each time to verify that ratemeter reads 1:1 to pulse generator.

6.3.4.2 If any number is not 1:1, adjust the potentiometer for the corresponding range (i.e., X1, X10, etc.).

6.3.4.3 If ratemeter cannot be adjusted, remove from service and submit it to the Instrument Laboratory for repairs.

6.3.4.4 Turn audio knob clockwise, and ratemeter should emit a clicking sound.

6.3.4.4.1 If no sound is emitted, submit the ratemeter to the Instrument Laboratory for repair.

6.3.5 Turn range switch to X10. Repeat Steps 6.3.4 - 6.3.4.3.

6.3.6 Turn range switch to X100. Repeat Steps 6.3.4 - 6.3.4.3.

6.3.7 Turn range switch to X1K. Repeat Steps 6.3.4 - 6.3.4.3.

6.3.8 Turn ratemeter to OFF, and disconnect from pulse generator.

6.3.9 Make entry in Instrument Calibration Log that unit was set 1:1 to Pulse Generator.

6.3.10 Reconnect pancake probe.

6.3.11 Determine the operating voltage as follows:

6.3.11.1 Turn H.V. potentiometer to its lowest setting using the adjustment tool.

6.3.11.2 Turn range switch to X100 and set pancake probe on the ^{239}Pu source with a value of 36,800 d/m.

6.3.11.3 Increase the voltage in 50 volt increments, making notes of the voltage and the CPM.

6.3.11.4 Note: Do not exceed 1300 Vdc.

6.3.11.5 Graph the CPM (Y-axis) versus the voltage settings (X-axis) on linear graph paper. Set the high voltage to a value which is just above the first knee of the CPM-voltage curve.

6.3.11.6 Make entry in Instrument Calibration Log specifying H.V. setting.

6.3.12 Determine the C/M using the range switch settings and sources indicated below; record each C/M value in the Instrument Calibration Log:

Range Switch Setting	Alpha Source
X1	2900 d/m
X10	2900 d/m
X10	36800 d/m
X100	36800 d/m
X100	340200 d/m
X1K	340200 d/m
X1K	3230000 d/m

6.3.13 Calculate probe efficiency for each source by dividing CMP by the activity of the source in d/m.

6.3.14 Test alarm circuit as follows:

6.3.14.1 Turn range switch to X1, and turn alarm set range switch to 0.5.

6.3.14.2 Place pancake probe on the highest alpha source. This should cause the ratemeter to alarm.

6.3.14.2.1 Make an entry in Instrument Calibration Log stating "Pass Alarm Test."

6.3.14.2.2 If ratemeter does not alarm, submit ratemeter to the Instrument Laboratory for service.

6.3.15 Place a self-sticking label on ratemeter that is worded "Calibrated," followed by the date and initials of person performing the calibration.

7.0 RECORDKEEPING

7.1 Store the Survey Instrument Calibration Log and the Survey Instrument Maintenance Log in the filing cabinet in the Instrument Laboratory and retain according to current DOE records management criteria.

Prepared by:

M. J. Eversole
Bioassay Instrument Laboratory

Approved by:

T. A. Dugan, Supervisor
Bioassay Department

CALIBRATION FORM
FOR THE SM177

Date_____

Manufactor_____ Model_____ S/N_____

(1) Adjust Background to zero._____

(2) Set 1:1 to pulse generator

Meter Range	Reading before Adjustment	Reading after Adjustment
X1		
X1		
X10		
X10		
X100		
X100		
X1K		
X1K		

(3) Recorder Output check linear: Yes_____ No_____

(4) Alarm test good: Yes_____ No_____

(5) Battery test good: Yes_____ No_____

Calibration performed by_____
Reason for calibration:

Attachment 4

Environmental Compliance Quality Assurance Plan

ENVIRONMENTAL COMPLIANCE QUALITY ASSURANCE PLAN

1.0 Purpose and Scope

The purpose of the Environmental Compliance Quality Assurance Plan (QAP) is to identify the quality assurance requirements to be used for the environmental compliance program. The plan includes the functions necessary to assure proper compliance with environmental requirements. This plan applies to all environmental compliance activities conducted by the Westinghouse Materials Company of Ohio (WMCO). Environmental compliance activities include sampling, analysis and evaluations of environmental substances, processing hazardous materials, and facility operations which include environmental compliance.

2.0 Quality Assurance Program Elements

2.1 This plan has been structured to meet the requirements of the FMPC QA programs, DOE Order 5700.6A entitled "Quality Assurance", ANSI/ASME NQA-1, "Quality Assurance Program Requirements for Nuclear Facilities", and other applicable DOE orders and federal and state regulations.

2.2 Operations affecting environmental compliance will be subjected to a Quality Assurance Analysis (QAA) to establish risks and define preventative actions to be integrated into the overall QA plan. The QAA will be performed and documented in accordance with established procedures.

2.3 The Applicable Quality Assurance Program elements contained in ANSI/ASME NQA-1, will be applied to environmental compliance activities as summarized below:

2.3.1 Organization

The WMCO organization chart is shown in Figure 2-1. The responsibility for environmental regulatory compliance is assigned to the Regulatory Compliance Section within the Environment, Safety and Health (ES&H) Department. The organization of the ES&H Department is shown in Figure 2-2. Figure 2-3 shows the administrative organization of the Regulatory Compliance Section.

While the Regulatory Compliance Section is the focal point for assuring and maintaining compliance with the rules, regulations, and guidelines cited in this document, other organizations within WMCO are responsible for implementing and complying with the environmental requirements imposed on the FMPC operations. The ES&H Department has the authority to stop work or to control further operations where significant conditions adverse to environmental compliance are identified.

The Quality Assurance Department is responsible to verify that the quality assurance requirements specified in this plan and other quality related documents are met. To this end, Quality Assurance performs review and approval actions, auditing, surveillance and inspection activities to a level commensurate with ensuring environmental compliance.

The functional organization of the FMPC, with areas of responsibility clearly defined, is currently being developed. Functional relationships for all aspects of environmental compliance will be specified in this section at a later date.

2.3.2 Design Control

The FMPC Quality Assurance Program requires designs which affect environmental compliance be reviewed by the Environmental organization and verified. The extent of the verification, the requirement that shall be met, and the method used for verification shall be documented by the organization responsible for the design. Personnel performing design verifications shall have the knowledge, experience, and training to perform an adequate design verification but shall not have a direct responsibility for the original design. Design changes shall be documented and the approval shall be at a level equivalent to that required for the original design.

The environmental organization reviews designs affecting environmental compliance before they are considered acceptable for final release. This includes facility and equipment designs and changes and modifications thereto.

2.3.3 Procurement Control (Document and Purchased Services)

FMPC purchase requests pertaining to environmental compliance equipment shall be submitted to the Environmental organizations for review. All reviews will be documented.

When applicable, procurement documentation shall show environmental compliance quality requirements, either by reference or by specifications or drawings that are made a part of these documents. When additional requirements or parts of reference documents are used, they should be clearly stated on procurement documents. Changes to the procurement document shall be reviewed by the original reviewers.

Source inspections and audits required by the requisitioner, the environmental organization, or quality assurance shall be clearly stated on the procurement documents. Access to the supplier's plant facilities and appropriate records shall be requested in the procurement documents when such actions are deemed necessary.

Procurement documents shall define the environmental compliance records that are to be prepared, maintained, and submitted by the supplier.

2.3.4 Instructions, Procedures and Drawings

Environmental compliance activities shall be prescribed by written instructions, procedures, or drawings, and shall be accomplished in accordance with these documents. When drawings are required they shall be approved for use through drawing control procedures. When applicable, instructions, procedures, and drawings shall include appropriate quantitative or qualitative acceptance criteria for determining that environmental compliance activities (monitoring and sampling) have been satisfactorily

accomplished, including frequencies, analysis and logs and records to be maintained.

Operating procedures not currently controlled by SOPs will be performed according to an executive order. The ES&H Department Manager will issue an executive order that requires all environmental compliance activities be conducted in such a manner as to establish, implement, and achieve an environmental quality program consistent with protection of public health, safety and the environment. The program objective is to comply with standards, regulations, guidelines, and best management practices applicable to air and water quality, toxic substances, and waste management and is consistent with ALARA principles.

Preventative maintenance requirements criteria associated with environmental control processes, equipment, and piping and vents shall be documented. These procedures shall specify the type and frequency of preventative maintenance and the need for maintenance logs and records of maintenance. Prior to approval and final release, these documents shall be subject to the appropriate design verification and shall be reviewed for adequacy by the Environmental organization.

2.3.5 Document Control

Document control procedures shall be developed to specify the provisions for control of environmental compliance document preparation, review, approval, distribution, and revision. The preparation, issue, and change of documents shall be

controlled to assure that only the latest issue of a document is being employed. A listing of documents that are to be subject to review and approval shall be maintained current. Documentation shall exist of the individuals who are authorized and responsible for reviewing, approving, and issuing environmental compliance documents. Approval of changes to these documents shall be at a level equivalent to that required for the original document.

2.3.6 Identification and Control of Analyses Samples

Procedures shall be issued for the identification and control of environmental samples being processsed for laboratory analysis. Physical identification of the sample shall occur as soon as possible after the sample is taken. Identification markings and associated records shall be clear and indelible and shall provide traceability from the location and time the sample was taken through the laboratory analysis. Change-of-custody controls shall be established for transfer of samples. Samples shall be packaged, stored and handled in a manner to prevent damage, contamination, or deterioration. If samples are designated as hazardous materials, they shall be so marked and shall be packaged and shipped according to 49 CFR U. S. Department of Transportation Hazardous Materials Regulations. Samples having a limited life from the time the sample is taken until laboratory analysis is accomplished shall be so identified and controlled to preclude the expiration of the sample life.

2.3.7 Inspection

Inspections required for equipment and facilities based on environmental compliance considerations shall be performed in accordance with documented instructions, procedures, or drawings. Inspection procedures shall provide for:

- o identification of characteristics and activities to be inspected;
- o identification and certification of individuals responsible for inspection;
- o acceptance-rejection criteria;
- o description of the method of inspection;
- o listing of mandatory inspection hold points; and
- o identification of data records and/or method of reporting the results of the inspection.

2.3.8 Control of Measuring and Test Equipment

Measuring and test equipment used for monitoring, sampling, and analysis of environmental releases and which require periodic calibration shall be clearly identified in project documents. The measuring and test equipment shall be uniquely identified and calibrated at prescribed intervals using certified calibration equipment. Written procedures for calibrating measuring and test equipment shall be issued to assure calibration techniques uniformity. The method and interval of calibration for each item of measuring and test equipment shall be documented. Measuring and test equipment shall be stored, handled and maintained in an environment

controlled to the extent necessary to ensure the required accuracy. The reference standards used for calibration shall be traceable to the National Bureau of Standards or accepted values of natural physical constants. If no national standards exist, the basis for traceable calibration shall be documented. Calibration records shall provide for traceability between the measuring and test equipment and the measurement standards used.

When measuring and test equipment are found to be out of calibration, an evaluation shall be made and documented for the validity and acceptability of previous test results.

The procurement requirements for measuring, test, and calibration equipment used in environmental compliance shall be reviewed by the Environment organization before the purchase request is approved.

Records shall be maintained to assure that calibration schedules have been followed. Equipment shall be labeled to indicate the date of last calibration, by whom it was calibrated, and the date for the next calibration. Equipment that has exceeded the calibration dates shall not be used.

2.3.9 Handling, Storage, and Shipping

Requirements for handling, storage, and shipping of hazardous materials, substances, and wastes shall be described in formal procedures. The documents shall cover requirements for cleaning, packaging, marking, shipping, preservation, and

storage. Procedures shall identify the need for routine maintenance and inspection and, where necessary, retesting to assure that all reusable containers meet applicable design standards.

Criteria shall be established for the purpose of assuring that procured packages and containers meet the applicable specifications. Packages and containers fabricated by FMPC shall be built, inspected, and accepted in accordance with approved specifications.

2.3.10 Inspection, Test, and Operating Status

The status of inspection and analytical activities shall be identified on documents traceable to the sample. The status shall be maintained on the change-of-custody documentation.

2.3.11 Control of Nonconformances and Unusual Occurrences

Nonconforming items, processes, or conditions and unusual incidents that affect environmental compliance shall be identified, segregated, controlled, and reported in a timely manner in accordance with established procedures. The disposition of these nonconformances shall be concurred in by the Environmental organization.

2.3.12 Corrective Action

Unsatisfactory conditions adverse to environmental compliance shall be promptly identified, evaluated, and corrected. The cause of the unsatisfactory condition shall be determined and corrective action taken to preclude repetition.

Corrective action shall include:

- o analysis of unsatisfactory condition to determine the extent and causes;
- o analysis of quality trends to provide a basis for improvements;
- o introduction of required improvements and corrections, an initial review of the adequacy of such measures, and monitor the adequacy of the corrective actions taken; and
- o follow-up action to verify implementation of corrective action.

2.3.13 Quality Records

Sufficient records shall be prepared as work is performed to furnish objective documentary evidence of the quality of items, processes, and operations affecting environmental compliance. Records shall be consistent with applicable codes, standards, drawings, specifications, project record lists, and contracts and shall provide for the verification of quality. Records shall include, but not be limited to log books, documentation of reviews, inspection and analysis data, material and equipment certifications, drawings and specifications, calibration data, and nonconformance, corrective action, and audit reports.

Records shall be identified, indexed, filed, and maintained in a manner which will permit prompt retrieval and traceability to the specific item, process, or condition to

which they apply. Record retention time scales shall be specified.

Records shall be maintained in facilities that provide suitable protection against deterioration, damage, and loss.

2.3.14 Audits

Audits shall be planned, scheduled, and implemented to assure compliance with environmental and quality assurance requirements.

Audits shall be scheduled to ensure that an effective quality assurance and compliance program exists during the planning, designing, procuring, and operating activities and shall be coordinated in a manner to provide coverage of ongoing environmental program activities. Audits shall be conducted at a frequency commensurate with the states and importance of the activity. The audit schedule shall be reviewed periodically and revised as necessary. Audits may be conducted either periodically or on a random unscheduled basis.

Certification of QA auditors shall be documented and filed. Audits shall be performed in accordance with written procedures using audit checklists.

The results of the audit shall be documented and provided to management having responsibility in the area audited. The report shall include a summary of audit results with appropriate recommended actions.

Management of the audited organization or operation shall respond in writing to any audit finding. This response shall include results of the investigations and corrective actions planned or taken.

Follow-up to assure corrective actions are adequate and have been completed shall be documented.

2.3.15 Training

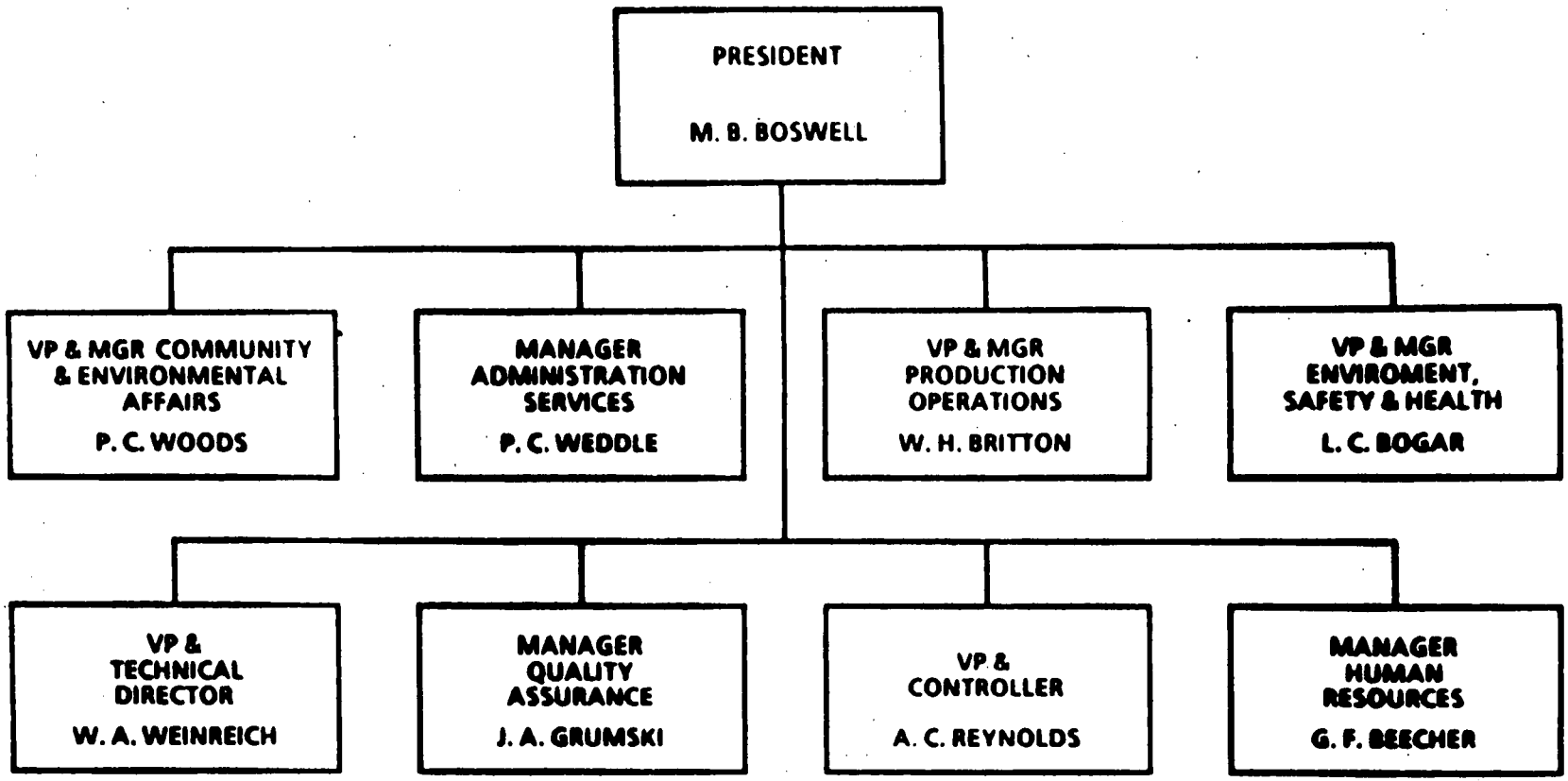
WMCO personnel performing activities that impact or affect environmental compliance shall receive indoctrination and training as required to assure that suitable proficiency is achieved and maintained such that personnel are able to fulfill their assigned tasks and they are knowledgeable of FMPC environmental compliance and associated quality assurance procedures.

3.0 Implementing Procedures

Environmental compliance activities are encompassed in a series of Standard Operations Procedures (SOP). A complete list of these implementing procedures will be furnished at a later date.

4.0 Other Regulatory Documents

A complete list of the regulatory documents and their associated implementary procedures will be furnished at a later date.



RESPONSIBLE FOR TOTAL PROJECT MANAGEMENT INCLUDING:

- CUSTOMERS SERVICE/INTERFACES
- COMMUNITY RELATIONS
- PRODUCTION
- OVERALL SAFETY AND SECURITY
- PERSONNEL MANAGEMENT
- EEO PROGAM
- QUALITY ASSURANCE
- COST AND SCHEDLUE CONTROL

Figure 2-1. WMCO Organization Chart

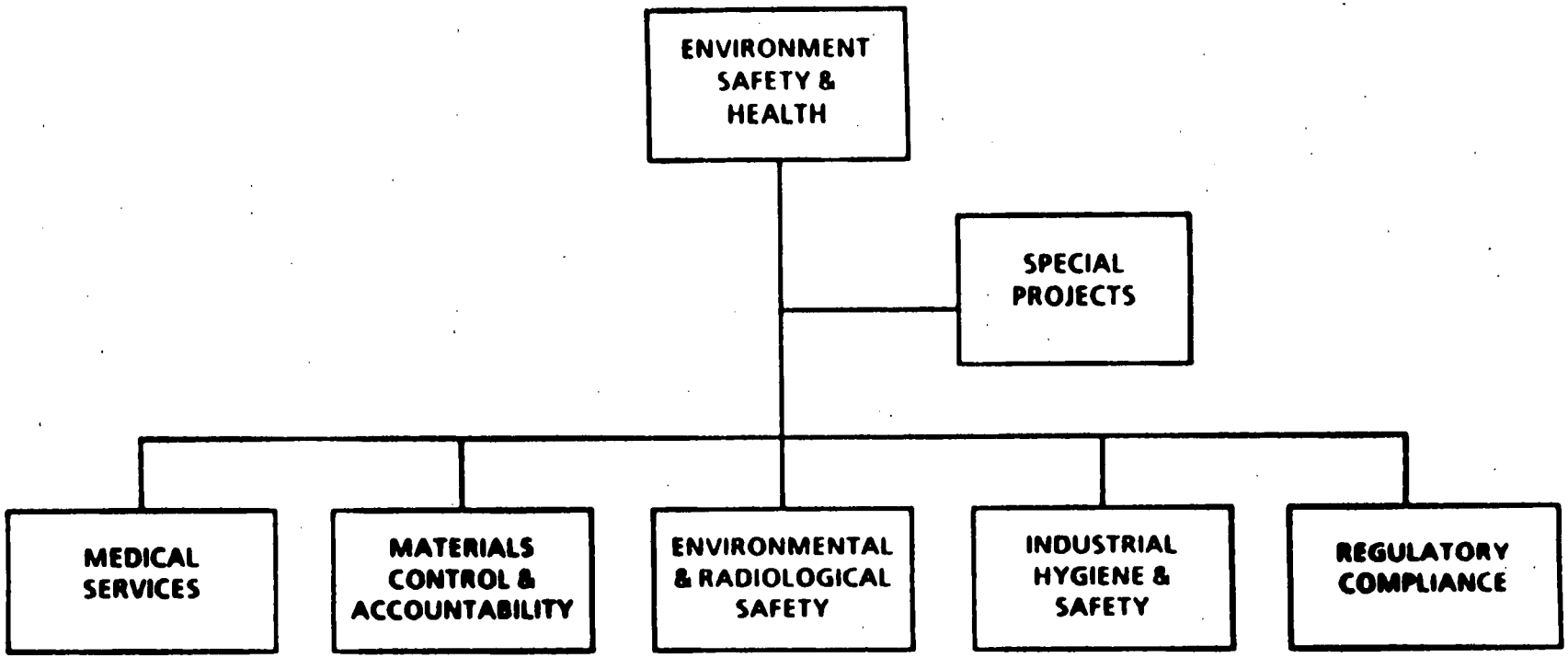
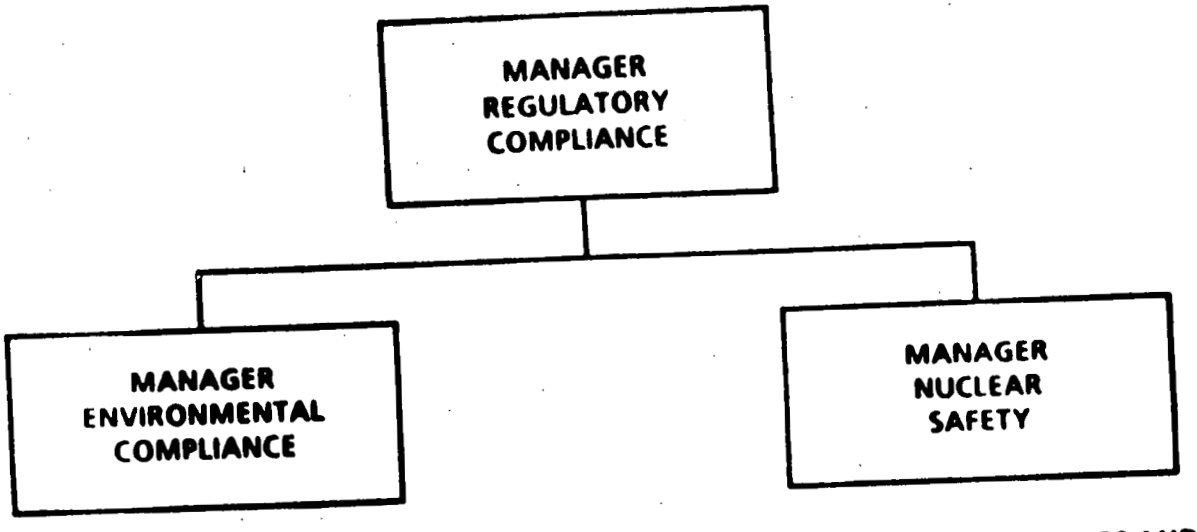


Figure2-2. ES&H Department Organization Chart

Compliance Action B-4 for the Clean Air Act requires that FMPC "establish a schedule for (the) installation of emission controls". Attached is a table which contains a list of the dust collectors on site which are scheduled to be replaced. A funding year (FY) and estimated completion dated are listed. These dates are dependant upon many conditions including a change in the funds received from the DOE each year, any priority shift which might occur, and the maintenance of adequate personnel to complete the project on time. An annual progress report updating the schedule will be issued as requested.



- PREPARE PERMITTING
- ASSURE COMPLIANCE WITH ALL ENVIRONMENTAL REGULATIONS (USEPA, OEPA, DOE ORDERS)
- INTERFACE WITH OTHER FUNCTIONAL AREAS TO ASSURE COMPLIANCE AND TO ASSESS THE IMPACTS OF NEW REGULATIONS
- GENERATE ALL NEPA DOCUMENTATION
- DEVELOP AND PREPARE ALL REQUIRED ENVIRONMENTAL DOCUMENTATION
  - PROGRAM PLANS
  - MONITORING PROGRAMS
  - PROCEDURES
- INVESTIGATE ENVIRONMENTAL PROBLEMS

- PERFORM FAILURE MODES AND EFFECTS ANALYSIS
- DEVELOP SITEWIDE FINAL SAFETY ANALYSIS REPORTING
- GENERATE NEW FACILITIES SAFETY ANALYSIS DOCUMENTATION
- PERFORM NUCLEAR CRITICALITY SAFETY ANALYSIS
- DEVELOP AND PRESENT CRITICALITY SAFETY TRAINING
- ASSURE CONFIGURATION CONTROL
- ASSIST WITH TRANSPORTATION SAFETY AND PACKAGING

Figure 2-3. Regulatory Compliance Section Organization Chart