7837 R-020-208.13

INCLUSION OF RESPIRATOR WASHING FACILITY INTO REMOVAL ACTION NUMBER 9 - (LETTER REQUESTING CONCURRENCE ON DOING SO)

09/23/96

DOE-1368-96
DOE-FN EPAS
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LETTER

7837

Department of Energy

Ohio Field Office
Fernald Area Office
P. O. Box 538705
Cincinnati, Ohio 45253-8705
(513) 648-3155

SEP 23 1996

DOE-1368-96

Mr. James A. Saric, Remedial Project Director
U.S. Environmental Protection Agency
Region 5 - SRF-5J
77 West Jackson Blvd.
Chicago, IL 60604-3590

Mr. Thomas A. Schneider, Project Manager
Ohio Environmental Protection Agency
401 E. Fifth Street
Dayton, OH 45402-2911

Dear Mr. Saric and Mr. Schneider:

INCLUSION OF THE RESPIRATOR WASHING FACILITY INTO REMOVAL ACTION NUMBER 9

The purpose of this letter is to request approval to incorporate the Fernald Environmental Management Project (FEMP) Respirator Washing Facility (RWF) into Remedial Action Number 9 (RA #9), Removal of Waste Inventories. As currently operated, almost all of the respirators processed through the RWF are used in conjunction with Comprehensive Environmental Response Compensation and Liability Act (CERCLA) related activities. A small percentage of the respirators are generated through maintenance activities which indirectly support remediation programs at the FEMP. A copy of the RWF operating procedure (46-C-301) is enclosed.

To meet the demand for respirators as the number of CERCLA activities at the FEMP increases, we intend to add an additional dryer and one combination washer/dryer to the RWF.

The current RWF configuration was installed under air emission source Permit to Install (PTI) 14-3348 and operates under Permit to Operate (PTO) P284. (Note: The original air permit to install application for the RWF was submitted in 1992 prior to implementation of CERCLA remediation actions at the FEMP). These permits establish the substantive requirements applicable to this air emission source. For the RWF, the substantive requirements consist of the utilization of Best Available Technology (BAT). BAT for this source is the use of High Efficiency Particulate-Air (HEPA) filtration. A PTI application was submitted to the OEPA in December of 1995 incorporating the additional dryer and combination washer/dryer modifications. A copy of this application, detailing the environmental requirements and methods used to address them, is enclosed. This application is presently in Columbus

awaiting issuance of the PTI; no adverse comments have been received from the OEPA concerning this source. With the anticipated signing of the OU3 Record of Decision (ROD) in the very near future, the implementation of remedial activities for all of the FEMP's OUs will be formally underway. The OU3 ROD provides for the continued use of RA #9 during the FEMP's remediation process.

As the RWF provides a supporting service primarily to CERCLA related activities, we believe it is appropriate to utilize the exemption from administrative permit requirements provided by CERCLA Section 121e and Paragraph XIII of the Amended Consent Agreement, and include the RWF under RA #9. This will allow the FEMP to proceed with its proposed installations and avoid any respirator shortages.

Enclosed is information describing the proposed changes to the RWF along with a copy of the current RWF Operating Procedure. The submittal of the RWF Operating Procedure is consistent with the Amended Consent Agreement's requirement to provide appropriate documentation for activities associated with RA #9. Your concurrence to include the RWF under RA #9 is requested by October 1, 1996, so that we may begin modifications.

If you have any questions concerning this matter, please contact Ed Skintik at (513) 648-3151.

Sincerely,

Johnny W. Reising
Fernald Remedial Action
Project Manager

FEMP:Skintik

Enclosure: As Stated

cc w/enc:

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Manager, TPSS/DERR, OEPA-Columbus
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S. Beckman, FDF/65-2
T. Hagen, FDF/65-2
G. Hazlewood, FDF/66
K. Klee, FDF/65-2
C. Little, FDF/2
P. Spotts, FDF/65-2
T. Walsh, FDF/65-2

APPLICATION FOR AN AIR PERMIT TO INSTALL

MODIFICATIONS TO THE RESPIRATOR WASHING FACILITY

1. **Describe the product or service to be produced by the applicant along with a description of the proposed source/facility.**

The Respirator Washing Facility located within the Services Building at the Fernald Environmental Management Project (FEMP) is to be modified via the addition of a new dryer unit and a combination washer/dryer unit. The addition of these units is necessary to meet the expected increase in demand for clean respirators as FEMP remediation activities expand.

Contaminated respirators are removed from drums at the unloading station and hand washed in the sink of the main washer unit or washed in the High-pressure Spray Decontamination Glovebox if heavily soiled. Respirators are then transferred and washed in an automatic washer. The cleaned, wet respirators are wet-vacuumed to remove excess moisture prior to being dried. This water and the water from the sink and washer cycles is discharged to an existing FEMP water treatment system outside the RWF. Lastly, the cleaned and dried respirators are radiologically monitored, inspected/repaired, and packaged before being released for reuse.

2. **List the name and quantity of all materials and chemicals (solid, liquid, or gaseous) that will be used or produced by the source/facility.**

The Respirator Washing Facility consists of equipment that is used to clean respirators used within the FEMP. The respirators are scrubbed and sanitized using a soap cleanser and a chlorine bleach solution. The following table lists the materials to be used in the expanded process under normal operating conditions.

MATERIALS USED	QUANTITY	MATERIALS PRODUCED	QUANTITY
Used Respirators	83/hr	Clean Respirators	83/hr
Water	1,133 lb/hr	Contaminated Waste-water	1,138 lb/hr
Soap Cleanser	0.080 lb/hr		
Chlorine Bleach	2.73 lb/hr		
Liquid Detergent	3.91 lb/hr		

3. **State the reason for the application. Is this a new installation, modification to an existing source/facility, reconstruction of an existing source/facility, or startup of a source/facility that has been permanently shutdown for_____ years? (State number of years)**

This is a modification of an existing facility. The modifications are necessary to meet the expected increase in demand for clean respirators as FEMP remediation activities expand.

4. **Has a previous Ohio EPA application or plan submission been filed for this source/facility? If so, state the date and type of the application previously submitted.**

Yes. The RWF was installed under PTI application 14-3348, dated May 25, 1994.

5. **Will the proposed source/facility comply with all rules, laws, and regulations of Ohio EPA and U.S. EPA?**

Yes, the proposed source will comply with all rules, laws and regulations of the Ohio EPA and the US EPA.

6. **State the amount of each air contaminant (actual emissions) from each source in pounds per hour and tons per year at maximum and average conditions.**

Estimated actual emissions from the entire RWF are listed in the table below.

AIR CONTAMINANT	Actual Emissions		Potential Emissions	
	lb./hr	Tons/yr	lb./hr	Tons/yr
Particulate	6.96E-04	2.17E-03	1.04E-03	4.57E-03
Uranium (0.1% of particulate)	6.96E-07	2.17E-06	1.04E-06	4.57E-06

7. **Are the proposed sources required to comply with the following federal requirements?**

   i. **New Source Performance Standards (NSPS).**----------No.
   ii. **National Emission Standards for Hazardous Air Pollutants (NESHAPS).**----------Yes.
   iii. **Prevention of Significant Deterioration (PSD).**----------No.
   iv. **Appendix "S" - Emission Offset Policy.**----------No.

8. **Will the proposed sources employ best available technology?**

Yes. Best Available Technology for the Respirator Washing Facility was determined to be a HEPA filtration system with a designed control efficiency of 99.97% at 0.3 microns.

9. **Will the proposed sources cause the significant degradation of air quality.**

No, emissions from the RWF will not cause significant degradation of air quality.

10. **Will the proposed sources interfere with the attainment and maintenance of current air quality standards?**

No, RWF emissions will not interfere with the attainment and maintenance of current air quality standards.

11. **Describe any source monitoring, emissions monitoring, or control equipment monitoring devices to be installed by the applicant.**

None.

12. **Will the proposed sources involve the use of asbestos, benzene, beryllium, mercury, or vinyl chloride?**

No, the RWF will not involve the use of asbestos, benzene, beryllium, mercury, or vinyl chloride.

13. **Complete and attach an anticipated construction schedule for each proposed source.**

See the attached Installation Schedule.

14. **Please include the estimated cost of any air pollution control equipment to be installed on the proposed sources.**

None. The new equipment will be vented through existing control equipment.

15. **An appendix for each air contaminant source must accompany this application. From the following description of the appendices, determine which should accompany your application.**

See the attached Appendix A.

OHIO ENVIRONMENTAL PROTECTION AGENCY

INSTALLATION SCHEDULE

TO ACCOMPANY APPLICATION FOR PERMIT TO INSTALL

THIS FORM CONSTITUTES PART OF THE APPLICATION OF:

FACILITY NAME: Fernald Environmental Management Project

ADDRESS: 7400 Willey Road, Fernald, Ohio 45030

FOR A PERMIT TO INSTALL THE FOLLOWING AIR CONTAMINANT SOURCE:

IDENTIFICATION: Respirator Washing Facility Dryer

DESCRIPTION: The Dryer and Washer/Dryer units are enclosed units and will be vented through the existing RWF control system.

THE INSTALLATION OF THE ABOVE AIR CONTAMINANT SOURCE IS PLANNED TO FOLLOW THE TIME SCHEDULE DESCRIBED BELOW:

	DATE
1. EQUIPMENT ORDERED	December 1995
2. COMMENCE CONSTRUCTION	March 1996
3. STARTUP	May 1996
4. PERFORMANCE TESTING	None

For Official Use Only

Premise No. / / /
Source No. /
Application No. /

OEPA NO. 1431110128 P28
A-
FEMP ID NO. 11-00

APPENDIX A, PROCESS

PROCESS DATA

1. Name of process Respirator Washing Facility

2. End product of this process Cleaned Respirators

3. Primary process equipment See supplemental page A-1A

Your identification See supplemental page A-1A Year installed Pg A-1A

4. Manufacturer See supplemental page A-1A Make or Model See supplemental page A-1A

5. Capacity of equipment (lbs./hr): Rated 2000 Respirators/day Max. 3000 Respirators/day

6. Method of exhaust ventilation: [X] Stack [ ] Window fan [ ] Roof vent
[ ] Other, describe

Are there multiple exhausts? [ ] Yes [X] No

OPERATING DATA

7. Normal operating schedule: 24 hrs./day, 5 days/wk., 52 wks./year.

8. Percent annual production (finished units) by season:
Winter 25 Spring 25 Summer 25 Fall 25

9. Hourly production rates (lbs.): Average 83 Respirators/hr Maximum 125 Respirators/hr

10. Annual production (indicate units) 520,000 Respirators
Projected percent annual increase in production 5

11. Type of operation: [ ] Continuous [X] Batch

12. If batch, indicate: Minutes per cycle 90 Min. Minutes between cycles 30 Min.

13. Materials used in process:

List of Raw Materials	Principal Use	Amount (lbs./hr.)
Water	Wash Water	1133
Chlorine Bleach	Sanitizer	2.73
Liquid Detergent	Cleaning Agent	3.91
Soap Cleanser	Cleaning Agent	0.080
Respirators	Items to be cleaned	83 Respirators/hr

14. A PROCESS FLOW DIAGRAM MUST BE INCLUDED WITH THIS APPENDIX. Show entry and exit poin all raw materials, intermediate products, by products and finished products. Label all materials inclu airborne contaminants and other waste materials. Label the process equipment.

See attached Process Flow Diagram

8

Answers to questions #3 and #4.

QUESTION #3			QUESTION #4	
Primary Process Equipment	**Identification**	**Year Installed**	**Manufacturer**	**Make or Model**
Unloading Station	Unloading Station	1994	Langdon	N/A
High pressure Spray Decontamination Glovebox	Glovebox	1996	Kelly Klosure Systems	N/A
Sink	Sink	1994	General Dynamics	RDM 1000R
Automatic Washer	Respirator Cleaning Module	1994	General Dynamics	RDM 1000R
Wet Vacuum Unit	Wet Vacuum	1994	unknown	unknown
Respirator Dryer #1	Dryer #1	1994	NFS-RPS	RCM-502
Respirator Dryer #2	Dryer #2	1996	NFS-RPS	PQ40-B4450
Washer/Dryer #1	Washer/Dryer #1	1994	NFS-RPS	RCM-501
Washer/Dryer #2	Washer/Dryer #2	1996	NFS-RPS	RCM-501

CONTROL EQUIPMENT

OEPA NO. 1431110128 P2
FEMP ID NO. 11-0

Control Equipment Code:

(A) Settling Chamber
(B) Cyclone
(C) Multiple Cyclone
(D) Electrostatic Precipitator
(E) Fabric Filter
(F) Spray Chamber
(G) Cyclonic Scrubber
(H) Impingement Scrubber
(I) Orifice Scrubber
(J) Venturi Scrubber
(K) Plate or Tray Tower
(L) Packing Tower
(M) Adsorber
(N) Condenser
(O) Afterburner - Catalytic
(P) Afterburner - Thermal
(Q) Other. Describe MEPA/HEPA filters

15. Control Equipment Data:

Item	Primary Collector	Secondary Collector
(a) Type (See above Code)	Q - MEPA Filter	Q - HEPA Filter
(b) Manufacturer	NFS-RPS or equivalent	NFS-RPS or equivalent
(c) Model No.	AK-03	AK-04
(d) Year Installed	1994	1994
(e) Your Identification	None	None
(f) Pollutant Controlled	Particulate/Uranium	Particulate/Uranium
(g) Controlled pollutant emission rate (if known)	Unknown	PM - 6.96E-04 lb/hr U - 6.96E-07 lb/hr
(h) Pressure Drop	Unknown	1" w.g.
(i) Design efficiency	70-75% @ 1.0 microns	99.97% @ 0.3 Microns
(j) Operating efficiency	70%	99.9%

STACK DATA

16. Your Stack Identification EP11-004

17. Are other sources vented to this stack? [ ] Yes [X] No
If yes, identify sources

18. Type: [ ] Round, top inside diameter dimension 8 inches
[ ] Rectangular, top inside dimensions (L)____ x (W)____

19. Height: Above roof N/A ft., above ground 16 ft.

20. Exit gas: Temp. 120max. °F. Volume 2000 ACFM. Velocity 5730 ft./min.

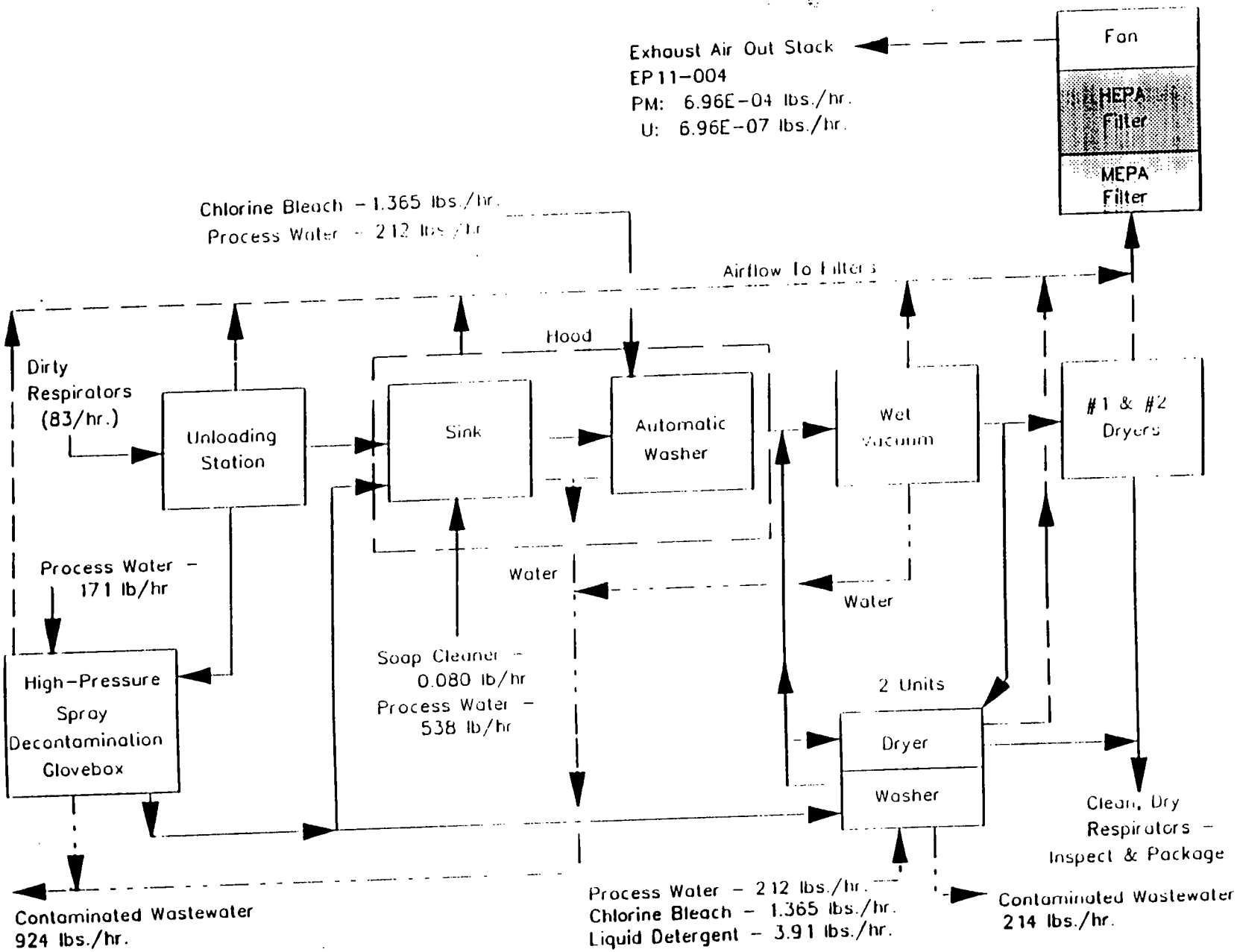
21. Continuous monitoring equipment: [ ] Yes [X] No
If yes, indicate : Type ____, Manufacturer ____

Make or Model ____, Pollutant(s) monitored ____

22. Emission data: Emissions from this source have been determined and such data is included with this appendix: [X] Yes [ ] No

If yes, check method: [ ] Stack Test [X] Emission Factor [ ] Material Balance

Completed by Kip Klee, Date 11-28-95



PROCESS FLOW DIAGRAM
RESPIRATOR WASHING FACILITY

FILE:FLOW 1.DWG
Rev 4 11/28/95

EMISSION CALCULATIONS

A. SUMMARY OF EMISSION ESTIMATES - Total emissions from the RWF.

	Particulate		Uranium	
	Hourly (lbs/hr)	Annual (tons/yr)	Hourly (lbs/hr)	Annual (tons/yr)
Actual Emissions	6.96E-04	2.17E-03	6.96E-07	2.17E-06
Potential Emissions	1.04E-03	4.57E-03	1.04E-06	4.57E-06
Uncontrolled Potential Emissions	9.19E-03	4.02E-02	9.19E-06	4.02E-05
Allowable Emissions	1.04E-03	4.57E-03	1.04E-06	4.57E-06

B. ASSUMPTIONS, PROCESS INFORMATION AND TEST DATA

Stack emissions of respirator washing activities were sampled using continuous stack monitors. The strear entering and leaving the HEPA filter were sampled continuously (the sampler was in operation while respirat were being cleaned) for a period of eight weeks. The following data were obtained from the stack test:

	Sample time	Before HEPA mg U	After HEPA mg U
	2 weeks	<0.01	<0.01
	2 weeks	<0.01	<0.01
	2 weeks	<0.01	<0.01
	2 weeks	<0.01	<0.01
TOTALS =	8 weeks	0.04 mg U	0.04 mg U

The stack test results were used with the information and assumptions listed below to develop emission fact for the Respirator Washing Facility.

1. The normal production rate is 2000 respirators/day (260x2000 = 520,000 respirators/year).
2. The potential production rate is 3000 respirators/day (365x3000 = 1,095,000 respirators/year).
3. The particulate emissions are comprised of 0.1% uranium.
4. Stack test data was collected during processing runs of approximately 11 respirators per hour.
5. Where the analytical results showed samples less than the minimum detection limit (0.01 mg for U) minimum detection limit was used (All analyses were less than 0.01 mg U).
6. Stack conversion factors (CF)- Before HEPA = 2.2 kg/g
   After HEPA = 0.25 kg/g

where

$$CF = \frac{[\text{Stack area (ft}^2)][\text{Average Stack Velocity (ft/min)}][1\ \text{kg}/1000\ \text{g}]}{[\text{Sample nozzle area (ft}^2)][\text{Sample nozzle velocity (ft/min)}]}$$

C. CALCULATION OF EMISSION FACTORS

$$\frac{0.04\ \text{mg U}}{8\text{wks}} \cdot \frac{\text{wk}}{30\ \text{hrs}} \cdot \frac{\text{hr}}{11\ \text{respirators}} \cdot \frac{1\text{g}}{1000\ \text{mg}} \cdot \frac{2.2\ \text{kg}}{\text{g}} \cdot \frac{2.205\ \text{lb}}{\text{kg}} = 7.3500\text{E-08 lb U/respirator (Before HEPA)}$$

$$\frac{7.3500\text{E-08 lb U}}{\text{respirator}} \cdot \frac{100}{0.1} = 7.3500\text{E-05 lb PM/respirator (Before HEPA)}$$

$$\frac{0.04\ \text{mg U}}{8\text{wks}} \cdot \frac{\text{wk}}{30\ \text{hrs}} \cdot \frac{\text{hr}}{11\ \text{respirators}} \cdot \frac{1\text{g}}{1000\ \text{mg}} \cdot \frac{0.25\ \text{kg}}{\text{g}} \cdot \frac{2.205\ \text{lb}}{\text{kg}} = 8.3523\text{E-09 lb U/respirator (After HEPA)}$$

$$\frac{8.3523\text{E-09 lb U}}{\text{respirator}} \cdot \frac{100}{0.1} = 8.3523\text{E-06 lb PM/respirator (after HEPA)}$$

D. CALCULATION OF URANIUM EMISSIONS

1. Actual:

$$\frac{2000 \text{ resp.}}{\text{day}} \cdot \frac{\text{day}}{24 \text{ hrs}} \cdot \frac{8.3523\text{E-}09 \text{ lb U}}{\text{respirator}} = 6.96\text{E-}07 \text{ lb U/hr}$$

$$\frac{520{,}000 \text{ resp.}}{\text{year}} \cdot \frac{8.3523\text{E-}09 \text{ lb U}}{\text{respirator}} \cdot \frac{1 \text{ ton}}{2000 \text{ lb}} = 2.17\text{E-}06 \text{ tons U/year}$$

2. Potential:

$$\frac{3000 \text{ resp.}}{\text{day}} \cdot \frac{\text{day}}{24 \text{ hrs}} \cdot \frac{8.3523\text{E-}09 \text{ lb U}}{\text{respirator}} = 1.04\text{E-}06 \text{ lb U/hr}$$

$$\frac{1{,}095{,}000 \text{ resp.}}{\text{year}} \cdot \frac{8.3523\text{E-}09 \text{ lb U}}{\text{respirator}} \cdot \frac{1 \text{ ton}}{2000 \text{ lb}} = 4.57\text{E-}06 \text{ tons U/year}$$

3. Uncontrolled Potential:

$$\frac{3000 \text{ resp.}}{\text{day}} \cdot \frac{\text{day}}{24 \text{ hrs}} \cdot \frac{7.3500\text{E-}08 \text{ lb U}}{\text{respirator}} = 9.19\text{E-}06 \text{ lb U/hr}$$

$$\frac{1{,}095{,}000 \text{ resp.}}{\text{year}} \cdot \frac{7.3500\text{E-}08 \text{ lb U}}{\text{respirator}} \cdot \frac{1 \text{ ton}}{2000 \text{ lb}} = 4.02\text{E-}05 \text{ tons U/year}$$

4. Allowable: New sources are required to use BAT to control process emissions. Since this process uses BAT, th allowable emissions for uranium are equal to the potential uranium emissions from the process.

E. CALCULATION OF PARTICULATE EMISSIONS

1. Actual:

$$\frac{2000 \text{ resp.}}{\text{day}} \cdot \frac{\text{day}}{24 \text{ hrs}} \cdot \frac{8.3523\text{E-}06 \text{ lb PM}}{\text{respirator}} = 6.96\text{E-}04 \text{ lb PM/hr}$$

$$\frac{520{,}000 \text{ resp.}}{\text{year}} \cdot \frac{8.3523\text{E-}06 \text{ lb PM}}{\text{respirator}} \cdot \frac{1 \text{ ton}}{2000 \text{ lb}} = 2.17\text{E-}03 \text{ tons PM/year}$$

2. Potential:

$$\frac{3000 \text{ resp.}}{\text{day}} \cdot \frac{\text{day}}{24 \text{ hrs}} \cdot \frac{8.3523\text{E-}06 \text{ lb PM}}{\text{respirator}} = 1.04\text{E-}03 \text{ lb PM/hr}$$

$$\frac{1{,}095{,}000 \text{ resp.}}{\text{year}} \cdot \frac{8.3523\text{E-}06 \text{ lb PM}}{\text{respirator}} \cdot \frac{1 \text{ ton}}{2000 \text{ lb}} = 4.57\text{E-}03 \text{ tons PM/year}$$

3. Uncontrolled Potential:

$$\frac{3000 \text{ resp.}}{\text{day}} \cdot \frac{\text{day}}{24 \text{ hrs}} \cdot \frac{7.3500\text{E-}05 \text{ lb PM}}{\text{respirator}} = 9.19\text{E-}03 \text{ lb PM/hr}$$

$$\frac{1{,}095{,}000 \text{ resp.}}{\text{year}} \cdot \frac{7.3500\text{E-}05 \text{ lb PM}}{\text{respirator}} \cdot \frac{1 \text{ ton}}{2000 \text{ lb}} = 4.02\text{E-}02 \text{ tons PM/year}$$

4. Allowable: New sources are required to use BAT to control process emissions. Since this process uses BAT, allowable emissions for particulate are equal to the potential particulate emissions from the proce

NESHAP SUBPART H COMPLIANCE DEMONSTRATION

The CAP88-PC computer code was used to evaluate stack monitoring/sampling requirements and application submittal requirements for the proposed Respirator Washing Facility modifications.

The CAP88-PC code requires the source terms for the radionuclides to be input in terms of Ci/year/radionuclide. To convert the estimates of kg U/year to Ci/year/radionuclide, the FEMP has developed a table of radionuclide emissions from past stack sample analyses. The table contains a list of radionuclides and the relative amounts of radionuclide in Curies of radionuclide per kg of total U (Ci/kg U). The source terms for the CAP88-PC runs were developed by multiplying the annual release rate of kg U/year for each radionuclide times the ratio of Ci of radionuclide per kg of total uranium. Two different methods are used in developing the annual release rates of uranium from the process.

To determine whether a release point is subject to the continuous monitoring/sampling requirements, radionuclide releases are evaluated based on the discharge of the effluent stream that would result if all pollution control equipment did not exist, but the facilities operations were otherwise normal. For this situation, the hourly, uncontrolled potential emissions for uranium are multiplied by the normal operating schedule to determine the potential annual uranium release rate. NESHAP Subpart H requires continuous monitoring or sampling of release points which have the potential to discharge radionuclides into the air in quantities which could cause an effective dose equivalent in excess of 0.1 mrem/year.

An application for approval or notification of startup is not required if the effective dose equivalent is less than 0.1 mrem/year. For this situation, the effective dose equivalent is calculated using the source term derived using Appendix D to 40 CFR Part 61.

These release rates were input into a CAP88-PC data set as a source term. The data set used the stack height and velocity represented in this application. The model was run using a meteorological file based on 5 years of records from the site's weather station. The dose impact was modeled to the site fence line in each of the 16 wind directions utilized by CAP88-PC.

The results of the CAP88-PC runs are attached. The CAP88-PC program calculates sixteen doses for each distance entered in the program. Sixteen distances corresponding to the closest identified receptor in each of sixteen directions were entered into the CAP88-PC program. Since a receptor resides at only one out of the sixteen identified locations per distance, the calculated dose in the INDIVIDUAL EFFECTIVE DOSE EQUIVALENT RATE (mrem/y) tables in the **DOSE AND RISK EQUIVALENT SUMMARIES** report corresponding to the location of an identified receptor have been highlighted. The results indicate that neither an application for approval nor a continuous monitor/sampler are required for this process.

FOR THE CAP88-PC RUN TO DETERMINE MONITORING/SAMPLING REQUIREMENTS

A. Uranium emission factor for uncontrolled emissions at normal process rates.

Uranium emissions: $\frac{520{,}000 \text{ resp.}}{\text{year}} \cdot \frac{7.35\text{E-}08 \text{ lb U}}{\text{resp.}} \cdot \frac{\text{kg}}{2.205 \text{ lb}} = 0.0173 \frac{\text{kg U}}{\text{year}}$

B. Estimated radionuclide release rates in Curies per year
(Radionuclide list and Curies/kg U is based on site data):

Example of a typical conversion:

$$\frac{0.0173 \text{ kg U}}{\text{year}} \cdot \frac{0.212 \ \mu\text{Ci Ra-226}}{\text{kg U}} \cdot \frac{1 \text{ Ci}}{1.0\text{E+}06 \ \mu\text{Ci}} = 3.67\text{E-}09 \frac{\text{Ci Ra-226}}{\text{year}}$$

ISOTOPE	µCi/Kg U	Curies/year
Ra-226	0.212	3.67E-09
Ra-228	0.85	1.47E-08
Th-228	8.97	1.55E-07
Th-230	26.4	4.58E-07
Th-232	1.41	2.44E-08
U-234	298.6	5.18E-06
U-235	15.8	2.74E-07
U-236	11.6	2.01E-07
U-238	333.6	5.78E-06
Ac-228	0.85	1.47E-08
Ra-224	8.97	1.55E-07
Th-231	15.8	2.74E-07
Th-234	333.6	5.78E-06

FOR THE CAP88-PC RUN TO DETERMINE APPLICATION REQUIREMENTS

A. Amount of uranium entering the process:

The amount of uranium entering is equal to the sum of the amounts of uranium leaving through the wastewater stream and the air emission stream. At maximum throughput:

Water usage: $\frac{1699 \text{ lb } H_2O}{\text{hour}} \cdot \frac{24 \text{ hrs}}{\text{day}} \cdot \frac{365 \text{ days}}{\text{year}} \cdot \frac{\text{gallon}}{8.33 \text{ lbs}} = 1{,}786.703 \frac{\text{gallons}}{\text{year}}$

Conversion factor: 9.00E-05 lb U/gal. H_2O per ppm U
Uranium concentration in Respirator Washing Facility wastewater: 6.3 ppb

Annual uranium in wastewater:

$\frac{6.3 \text{ ppb U}}{} \cdot \frac{1 \text{ppm U}}{1000 \text{ ppb U}} \cdot \frac{9.00\text{E-05 lb U/gal } H_2O}{\text{ppm U}} \cdot \frac{1{,}786.703 \text{ gal } H_2O}{\text{year}} \cdot \frac{\text{kg}}{2.205 \text{ lb}} = 4.59\text{E-01} \frac{\text{kg U}}{\text{year}}$

Annual uranium in air emissions:

$\frac{1{,}095{,}000 \text{ resp.}}{\text{year}} \cdot \frac{7.35\text{E-08 lb U}}{\text{resp.}} \cdot \frac{\text{kg}}{2.205 \text{ lb}} = 3.65\text{E-02} \frac{\text{kg U}}{\text{year}}$

B. Uranium emission factor for CAP88-PC run

Per Appendix D. multiply each throughput by 0.001 (for liquids or particulate matter) and multiply the air emissions by 0.01 (for use of a HEPA filter):

$\frac{4.59\text{E-01 kg U}}{\text{year}} \cdot 0.001 = 4.59\text{E-04} \frac{\text{kg U}}{\text{year}}$ and,

$\frac{3.65\text{E-02 kg U}}{\text{year}} \cdot 0.001 \cdot 0.01 = 3.65\text{E-07}$ year

Total of source term: 4.59E-04 + 3.65E-07 = 4.59365E-04 kg U/year

C. Estimated radionuclide release rates in Curies per year
(Radionuclide list and Curies/kg U is based on site data):

Example of a typical conversion:

$\frac{4.59365\text{E-04 kg U}}{\text{year}} \cdot \frac{0.212 \text{ µCi Ra-226}}{\text{kg U}} \cdot \frac{1 \text{ Ci}}{1.0\text{E+06 µCi}} = 9.74\text{E-11} \frac{\text{Ci Ra-226}}{\text{year}}$

ISOTOPE	µCi/Kg U	Curies/year
Ra-226	0.212	9.74E-11
Ra-228	0.85	3.90E-10
Th-228	8.97	4.12E-09
Th-230	26.4	1.21E-08
Th-232	1.41	6.48E-10
U-234	298.6	1.37E-07
U-235	15.8	7.26E-09
U-236	11.6	5.33E-09
U-238	333.6	1.53E-07
Ac-228	0.85	3.90E-10
Ra-224	8.97	4.12E-09
Th-231	15.8	7.26E-09
Th-234	333.6	1.53E-07

CAP88-PC
Version 1.00
Clean Air Act Assessment Package - 1988

SYNOPSIS REPORT

Non-Radon Individual Assessment
Dec 7, 1995 8:36 am

Facility: FERNALD ENVIRONMENTAL MANAGEMENT PROJECT
Address: P.O. BOX 538704
7400 WILLEY ROAD
City: CINCINNATI
State: OH Zip: 45253-8704

Effective Dose Equivalent (mrem/year)
1.68E-05

At This Location: 1017 Meters North Northeast
Source Category: REMEDIATION SITE
Source Type: Stack
Emission Year: 1996

Comments: RWF run to determine monitoring requirements
For PTI application 11/28/95

Dataset Name: RWF APPLICATIONH
Dataset Date: Dec 7, 1995 8:35 am
Wind File: WNDFILES\FEMPSTD.WND

MAXIMALLY EXPOSED INDIVIDUAL

Location Of The Individual: 1017 Meters North Northeast
Lifetime Fatal Cancer Risk: 2.16E-10

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Dose Equivalent (mrem/y)
GONADS	3.34E-08
BREAST	3.78E-08
RED MAR	1.85E-06
LUNGS	1.30E-04
THYROID	3.26E-08
ENDOST	2.41E-05
RMNDR	8.07E-07
EFFEC	1.68E-05

RADIONUCLIDE EMISSIONS DURING THE YEAR 1994

Nuclide	Class	Size	Source #1 Ci/y	TOTAL Ci/y
RA-226	W	0.30	9.7E-11	9.7E-11
RA-228	W	0.30	3.9E-10	3.9E-10
TH-228	Y	0.30	4.1E-09	4.1E-09
TH-230	Y	0.30	1.2E-08	1.2E-08
TH-232	Y	0.30	6.5E-10	6.5E-10
U-234	Y	0.30	1.4E-07	1.4E-07
U-235	Y	1.00	7.3E-09	7.3E-09
U-236	Y	1.00	5.3E-09	5.3E-09
U-238	Y	0.30	1.5E-07	1.5E-07
AC-228	Y	0.30	3.9E-10	3.9E-10
RA-224	W	0.30	4.1E-09	4.1E-09
TH-231	Y	1.00	7.3E-09	7.3E-09
TH-234	Y	0.30	1.5E-07	1.5E-07

SITE INFORMATION

Temperature:	12 degrees C
Precipitation:	98 cm/y
Mixing Height:	950 m

SOURCE INFORMATION

Source Number:	1
Stack Height (m):	5.00
Diameter (m):	0.20
Plume Rise Momentum (m/s): (Exit Velocity)	1.00E-03

AGRICULTURAL DATA

	Vegetable	Milk	Meat
Fraction Home Produced:	0.700	0.399	0.442
Fraction From Assessment Area:	0.300	0.601	0.558
Fraction Imported:	0.000	0.000	0.000

Food Arrays were not generated for this run.
Default Values used.

DISTANCES USED FOR MAXIMUM INDIVIDUAL ASSESSMENT

1301	1736	1677	1375	2342	1017	1061	1252	1132	1735
1264	1094	1095	2250	1724	1330				

CAP88-PC

Version 1.00

Clean Air Act Assessment Package - 1988

DOSE AND RISK EQUIVALENT SUMMARIES

Non-Radon Individual Assessment
Dec 7, 1995 8:36 am

Facility: FERNALD ENVIRONMENTAL MANAGEMENT PROJECT
Address: P.O. BOX 538704
7400 WILLEY ROAD
City: CINCINNATI
State: OH Zip: 45253-8704

Source Category: REMEDIATION SITE
Source Type: Stack
Emission Year: 1994

Comments: RWF run to determine monitoring requirements
For PTI application 11/28/95

Dataset Name: RWF APPLICATIONH
Dataset Date: Dec 7, 1995 8:35 am
Wind File: WNDFILES\FEMPSTD.WND

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Selected Individual (mrem/y)
GONADS	3.34E-08
BREAST	3.78E-08
R MAR	1.85E-06
LUNGS	1.30E-04
THYROID	3.26E-08
ENDOST	2.41E-05
RMNDR	3.07E-07
EFFEC	1.68E-05

PATHWAY EFFECTIVE DOSE EQUIVALENT SUMMARY

Pathway	Selected Individual (mrem/y)
INGESTION	5.75E-07
INHALATION	1.62E-05
AIR IMMERSION	3.91E-13
GROUND SURFACE	6.14E-09
INTERNAL	1.67E-05
EXTERNAL	6.14E-09
TOTAL	1.68E-05

NUCLIDE EFFECTIVE DOSE EQUIVALENT SUMMARY

Nuclide	Selected Individual (mrem/y)
RA-226	5.44E-10
RA-228	7.96E-10
TH-228	4.10E-07
TH-230	1.17E-06
TH-232	9.10E-08
U-234	7.37E-06
U-235	2.20E-07
U-236	1.61E-07
U-238	7.32E-06
AC-228	1.31E-11
RA-224	4.94E-09
TH-231	1.68E-12
TH-234	3.53E-09
TOTAL	1.68E-05

CANCER RISK SUMMARY

Cancer	Selected Individual Total Lifetime Fatal Cancer Risk
LEUKEMIA	1.75E-12
BONE	1.16E-12
THYROID	7.34E-15
BREAST	8.18E-14
LUNG	2.11E-10
STOMACH	5.07E-14
BOWEL	8.73E-14
LIVER	7.79E-14
PANCREAS	3.25E-14
URINARY	1.70E-12
OTHER	3.98E-14
TOTAL	2.16E-10

PATHWAY RISK SUMMARY

Pathway	Selected Individual Total Lifetime Fatal Cancer Risk
INGESTION	3.02E-12
INHALATION	2.13E-10
AIR IMMERSION	8.92E-18
GROUND SURFACE	1.41E-13
INTERNAL	2.16E-10
EXTERNAL	1.41E-13
TOTAL	2.16E-10

NUCLIDE RISK SUMMARY

Nuclide	Selected Individual Total Lifetime Fatal Cancer Risk
RA-226	8.70E-15
RA-228	9.28E-15
TH-228	8.28E-12
TH-230	9.81E-12
TH-232	5.18E-13
U-234	9.61E-11
U-235	2.88E-12
U-236	2.06E-12
U-238	9.63E-11
AC-228	2.67E-16
RA-224	1.29E-13
TH-231	4.90E-17
TH-234	1.41E-13
TOTAL	2.16E-10

INDIVIDUAL EFFECTIVE DOSE EQUIVALENT RATE (mrem/y)
(All Radionuclides and Pathways)

	Distance (m)						
Direction	1301	1736	1677	1375	2342	1017	1061
N	5.7E-06	3.6E-06	3.8E-06	5.2E-06	2.2E-06	3.5E-06	7.9E-06
NNW	2.4E-06	1.5E-06	1.6E-06	2.2E-06	9.6E-07	3.6E-06	3.4E-06
NW	2.1E-06	1.3E-06	1.4E-06	1.9E-06	8.5E-07	3.0E-06	2.8E-06
WNW	1.8E-06	1.1E-06	1.2E-06	1.6E-06	7.3E-07	2.6E-06	2.5E-06
W	2.6E-06	1.7E-06	1.8E-06	2.4E-06	1.1E-06	3.9E-06	3.6E-06
WSW	7.1E-06	4.4E-06	4.7E-06	6.4E-06	2.7E-06	1.1E-05	9.8E-06
SW	4.6E-06	2.9E-06	3.1E-06	4.2E-06	1.8E-06	6.9E-06	6.4E-06
SSW	6.1E-06	3.8E-06	4.0E-06	5.6E-06	2.3E-06	9.2E-06	8.6E-06
S	5.8E-06	3.6E-06	3.8E-06	5.3E-06	2.2E-06	8.6E-06	8.0E-06
SSE	5.5E-06	3.4E-06	3.6E-06	5.0E-06	2.1E-06	8.3E-06	7.7E-06
SE	5.1E-06	3.3E-06	3.4E-06	4.7E-06	2.0E-06	7.5E-06	7.0E-06
ESE	7.2E-06	4.5E-06	4.8E-06	6.6E-06	2.8E-06	1.1E-05	1.0E-05
E	5.0E-06	3.2E-06	3.4E-06	4.6E-06	2.0E-06	7.5E-06	7.0E-06
ENE	5.5E-06	3.5E-06	3.7E-06	5.0E-06	2.1E-06	8.2E-06	7.7E-06
NE	6.1E-06	3.8E-06	4.0E-06	5.6E-06	2.3E-06	9.1E-06	8.5E-06
NNE	1.1E-05	7.2E-06	7.6E-06	1.0E-05	4.4E-06	1.7E-05	1.6E-05

	Distance (m)						
Direction	1252	1132	1735	1264	1094	1095	2250
N	6.1E-06	7.1E-06	3.6E-06	6.0E-06	7.6E-06	7.5E-06	2.4E-06
NNW	2.6E-06	3.0E-06	1.5E-06	2.5E-06	3.2E-06	3.2E-06	1.0E-06
NW	2.2E-06	2.6E-06	1.3E-06	2.2E-06	2.7E-06	2.7E-06	9.0E-07
WNW	1.9E-06	2.2E-06	1.1E-06	1.9E-06	2.4E-06	2.4E-06	7.7E-07
W	2.8E-06	3.3E-06	1.7E-06	2.8E-06	3.5E-06	3.5E-06	1.1E-06
WSW	7.5E-06	8.8E-06	4.4E-06	7.4E-06	9.3E-06	9.3E-06	2.9E-06
SW	4.9E-06	5.8E-06	2.9E-06	4.8E-06	6.1E-06	6.1E-06	1.9E-06
SSW	6.5E-06	7.7E-06	3.8E-06	6.4E-06	8.2E-06	8.1E-06	2.5E-06
S	6.1E-06	7.2E-06	3.6E-06	6.0E-06	7.6E-06	7.6E-06	2.4E-06
SSE	5.9E-06	6.9E-06	3.4E-06	5.8E-06	7.3E-06	7.3E-06	2.2E-06
SE	5.4E-06	6.3E-06	3.3E-06	5.4E-06	6.7E-06	6.7E-06	2.2E-06
ESE	7.7E-06	9.1E-06	4.5E-06	7.6E-06	9.6E-06	9.6E-06	3.0E-06
E	5.4E-06	6.3E-06	3.2E-06	5.3E-06	6.7E-06	6.6E-06	2.1E-06
ENE	5.9E-06	6.9E-06	3.5E-06	5.8E-06	7.3E-06	7.3E-06	2.3E-06
NE	6.5E-06	7.7E-06	3.8E-06	6.4E-06	8.1E-06	8.1E-06	2.5E-06
NNE	1.2E-05	1.4E-05	7.2E-06	1.2E-05	1.5E-05	1.5E-05	4.7E-06

INDIVIDUAL EFFECTIVE DOSE EQUIVALENT RATE (mrem/y)
(All Radionuclides and Pathways)

	Distance (m)	
Direction	1724	1330
N	3.6E-06	5.5E-06
NNW	1.6E-06	2.3E-06
NW	1.3E-06	2.0E-06
WNW	1.2E-06	1.7E-06
W	1.7E-06	2.6E-06
WSW	4.5E-06	6.8E-06
SW	2.9E-06	4.5E-06
SSW	3.8E-06	5.9E-06
S	3.6E-06	5.6E-06
SSE	3.4E-06	5.3E-06
SE	3.3E-06	4.9E-06
ESE	4.6E-06	7.0E-06
E	3.2E-06	4.9E-06
ENE	3.5E-06	5.3E-06
NE	3.8E-06	5.9E-06
NNE	7.2E-06	1.1E-05

INDIVIDUAL LIFETIME RISK (deaths)
(All Radionuclides and Pathways)

Direction	Distance (m) 1301	1736	1677	1375	2342	1017	1061
N	7.3E-11	4.6E-11	4.8E-11	6.7E-11	2.8E-11	1.1E-10	1.0E-10
NNW	3.1E-11	1.9E-11	2.0E-11	2.8E-11	1.2E-11	4.6E-11	4.3E-11
NW	2.6E-11	1.7E-11	1.8E-11	2.4E-11	1.0E-11	3.9E-11	3.6E-11
WNW	2.3E-11	1.4E-11	1.5E-11	2.1E-11	8.8E-12	3.4E-11	3.1E-11
W	3.4E-11	2.1E-11	2.2E-11	3.1E-11	1.3E-11	5.0E-11	4.6E-11
WSW	9.1E-11	5.6E-11	6.0E-11	8.3E-11	3.4E-11	1.4E-10	1.3E-10
SW	5.9E-11	3.7E-11	3.9E-11	5.4E-11	2.3E-11	8.8E-11	8.2E-11
SSW	7.8E-11	4.8E-11	5.1E-11	7.2E-11	2.9E-11	1.2E-10	1.1E-10
S	7.4E-11	4.6E-11	4.9E-11	6.8E-11	2.8E-11	1.1E-10	1.0E-10
SSE	7.0E-11	4.3E-11	4.6E-11	6.4E-11	2.6E-11	1.1E-10	9.9E-11
SE	6.6E-11	4.2E-11	4.4E-11	6.0E-11	2.6E-11	9.6E-11	9.0E-11
ESE	9.3E-11	5.8E-11	6.1E-11	8.5E-11	3.5E-11	1.4E-10	1.3E-10
E	6.5E-11	4.0E-11	4.3E-11	5.9E-11	2.5E-11	9.6E-11	9.0E-11
ENE	7.1E-11	4.4E-11	4.7E-11	6.5E-11	2.7E-11	1.1E-10	9.9E-11
NE	7.8E-11	4.9E-11	5.1E-11	7.1E-11	3.0E-11	1.2E-10	1.1E-10
NNE	1.5E-10	9.2E-11	9.7E-11	1.3E-10	5.7E-11	2.2E-10	2.0E-10

Direction	Distance (m) 1252	1132	1735	1264	1094	1095	2250
N	7.8E-11	9.2E-11	4.6E-11	7.7E-11	9.7E-11	9.7E-11	3.0E-11
NNW	3.3E-11	3.9E-11	1.9E-11	3.2E-11	4.1E-11	4.1E-11	1.3E-11
NW	2.8E-11	3.3E-11	1.7E-11	2.8E-11	3.5E-11	3.5E-11	1.1E-11
WNW	2.4E-11	2.8E-11	1.4E-11	2.4E-11	3.0E-11	3.0E-11	9.4E-12
W	3.6E-11	4.2E-11	2.1E-11	3.5E-11	4.4E-11	4.4E-11	1.4E-11
WSW	9.7E-11	1.1E-10	5.6E-11	9.5E-11	1.2E-10	1.2E-10	3.7E-11
SW	6.3E-11	7.4E-11	3.7E-11	6.2E-11	7.8E-11	7.8E-11	2.4E-11
SSW	8.4E-11	9.9E-11	4.9E-11	8.2E-11	1.0E-10	1.0E-10	3.1E-11
S	7.9E-11	9.3E-11	4.6E-11	7.8E-11	9.8E-11	9.8E-11	3.0E-11
SSE	7.5E-11	8.9E-11	4.3E-11	7.4E-11	9.4E-11	9.4E-11	2.8E-11
SE	7.0E-11	8.1E-11	4.2E-11	6.9E-11	8.6E-11	8.6E-11	2.7E-11
ESE	9.9E-11	1.2E-10	5.8E-11	9.7E-11	1.2E-10	1.2E-10	3.8E-11
E	6.9E-11	8.1E-11	4.0E-11	6.8E-11	8.5E-11	8.5E-11	2.6E-11
ENE	7.5E-11	8.9E-11	4.4E-11	7.4E-11	9.4E-11	9.4E-11	2.9E-11
NE	8.3E-11	9.8E-11	4.9E-11	8.2E-11	1.0E-10	1.0E-10	3.2E-11
NNE	1.6E-10	1.8E-10	9.2E-11	1.5E-10	1.9E-10	1.9E-10	6.0E-11

INDIVIDUAL LIFETIME RISK (deaths)
(All Radionuclides and Pathways)

	Distance (m)	
Direction	1724	1330
N	4.6E-11	7.1E-11
NNW	1.9E-11	3.0E-11
NW	1.7E-11	2.6E-11
WNW	1.4E-11	2.2E-11
W	2.1E-11	3.2E-11
WSW	5.7E-11	8.7E-11
SW	3.8E-11	5.7E-11
SSW	4.9E-11	7.6E-11
S	4.7E-11	7.1E-11
SSE	4.4E-11	6.8E-11
SE	4.2E-11	6.3E-11
ESE	5.9E-11	9.0E-11
E	4.1E-11	6.2E-11
ENE	4.5E-11	6.8E-11
NE	4.9E-11	7.5E-11
NNE	9.3E-11	1.4E-10

CAP88-PC
Version 1.00
Clean Air Act Assessment Package - 1988

SYNOPSIS REPORT

Non-Radon Individual Assessment
Dec 7, 1995 8:36 am

Facility: FERNALD ENVIRONMENTAL MANAGEMENT PROJECT
Address: P.O. BOX 538704
7400 WILLEY ROAD
City: CINCINNATI
State: OH Zip: 45253-8704

Effective Dose Equivalent (mrem/year)
3.81E-04

At This Location: 1017 Meters North Northeast
Source Category: REMEDIATION SITE
Source Type: Stack
Emission Year: 1996

Comments: RWF run to determine monitoring requirements
For PTI application 11/28/95

Dataset Name: RWF MONITOR - H
Dataset Date: Dec 7, 1995 8:36 am
Wind File: WNDFILES\FEMPSTD.WND

MAXIMALLY EXPOSED INDIVIDUAL

Location Of The Individual: 1017 Meters North Northeast
Lifetime Fatal Cancer Risk: 4.84E-09

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Dose Equivalent (mrem/y)
GONADS	1.18E-06
BREAST	1.35E-06
R MAR	5.22E-05
LUNGS	2.87E-03
THYROID	1.15E-06
ENDOST	6.90E-04
RMNDR	2.98E-05
EFFEC	3.81E-04

RADIONUCLIDE EMISSIONS DURING THE YEAR 1996

Nuclide	Class	Size	Source #1 Ci/y	TOTAL Ci/y
RA-226	W	1.00	3.7E-09	3.7E-09
RA-228	W	1.00	1.5E-08	1.5E-08
TH-228	Y	1.00	1.5E-07	1.5E-07
TH-230	Y	1.00	4.6E-07	4.6E-07
TH-232	Y	1.00	2.4E-08	2.4E-08
U-234	Y	1.00	5.2E-06	5.2E-06
U-235	Y	1.00	1.7E-07	1.7E-07
U-236	Y	1.00	2.0E-07	2.0E-07
U-238	Y	1.00	5.8E-06	5.8E-06
AC-228	Y	1.00	1.5E-08	1.5E-08
RA-224	W	1.00	1.5E-07	1.5E-07
TH-231	Y	1.00	2.7E-07	2.7E-07
TH-234	Y	1.00	5.8E-06	5.8E-06

SITE INFORMATION

Temperature: 12 degrees C
Precipitation: 98 cm/y
Mixing Height: 950 m

SOURCE INFORMATION

Source Number:	1
Stack Height (m):	5.00
Diameter (m):	0.20
Plume Rise Momentum (m/s): (Exit Velocity)	1.00E-03

AGRICULTURAL DATA

	Vegetable	Milk	Meat
Fraction Home Produced:	0.700	0.399	0.442
Fraction From Assessment Area:	0.300	0.601	0.558
Fraction Imported:	0.000	0.000	0.000

Food Arrays were not generated for this run.
Default Values used.

DISTANCES USED FOR MAXIMUM INDIVIDUAL ASSESSMENT

1301	1736	1677	1375	2342	1017	1061	1252	1132	1735
1264	1094	1095	2250	1724	1330				

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Version 1.00

Clean Air Act Assessment Package - 1988

D O S E A N D R I S K E Q U I V A L E N T S U M M A R I E S

Non-Radon Individual Assessment
Dec 7, 1995 8:36 am

Facility: FERNALD ENVIRONMENTAL MANAGEMENT PROJECT
Address: P.O. BOX 538704
7400 WILLEY ROAD
City: CINCINNATI
State: OH Zip: 45253-8704

Source Category: REMEDIATION SITE
Source Type: Stack
Emission Year: 1996

Comments: RWF run to determine monitoring requirements
For PTI application 11/28/95

Dataset Name: RWF MONITOR - H
Dataset Date: Dec 7, 1995 8:36 am
Wind File: WNDFILES\FEMPSTD.WND

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Selected Individual (mrem/y)
GONADS	1.18E-06
BREAST	1.35E-06
R MAR	5.22E-05
LUNGS	2.87E-03
THYROID	1.15E-06
ENDOST	6.90E-04
RMNDR	2.98E-05
EFFEC	3.81E-04

PATHWAY EFFECTIVE DOSE EQUIVALENT SUMMARY

Pathway	Selected Individual (mrem/y)
INGESTION	2.17E-05
INHALATION	3.59E-04
AIR IMMERSION	1.48E-11
GROUND SURFACE	2.32E-07
INTERNAL	3.81E-04
EXTERNAL	2.32E-07
TOTAL	3.81E-04

NUCLIDE EFFECTIVE DOSE EQUIVALENT SUMMARY

Nuclide	Selected Individual (mrem/y)
RA-226	1.61E-08
RA-228	2.59E-08
TH-228	8.98E-06
TH-230	2.65E-05
TH-232	2.02E-06
U-234	1.65E-04
U-235	8.29E-06
U-236	6.06E-06
U-238	1.64E-04
AC-228	2.91E-10
RA-224	1.26E-07
TH-231	6.34E-11
TH-234	1.10E-07
TOTAL	3.81E-04

CANCER RISK SUMMARY

Cancer	Selected Individual Total Lifetime Fatal Cancer Risk
LEUKEMIA	5.12E-11
BONE	3.39E-11
THYROID	2.64E-13
BREAST	2.99E-12
LUNG	4.68E-09
STOMACH	1.81E-12
BOWEL	3.11E-12
LIVER	2.42E-12
PANCREAS	1.16E-12
URINARY	6.34E-11
OTHER	1.42E-12
TOTAL	4.84E-09

PATHWAY RISK SUMMARY

Pathway	Selected Individual Total Lifetime Fatal Cancer Risk
INGESTION	1.14E-10
INHALATION	4.72E-09
AIR IMMERSION	3.37E-16
GROUND SURFACE	5.33E-12
INTERNAL	4.83E-09
EXTERNAL	5.33E-12
TOTAL	4.84E-09

NUCLIDE RISK SUMMARY

Nuclide	Selected Individual Total Lifetime Fatal Cancer Risk
RA-226	2.11E-13
RA-228	2.63E-13
TH-228	1.80E-10
TH-230	2.17E-10
TH-232	1.14E-11
U-234	2.12E-09
U-235	1.09E-10
U-236	7.77E-11
U-238	2.12E-09
AC-228	5.87E-15
RA-224	2.83E-12
TH-231	1.85E-15
TH-234	3.44E-12
TOTAL	4.84E-09

INDIVIDUAL EFFECTIVE DOSE EQUIVALENT RATE (mrem)
(All Radionuclides and Pathways)

	Distance (m)						
Direction	1301	1736	1677	1375	2342	1117	1061
N	1.3E-04	8.2E-05	8.7E-05	1.2E-04	5.1E-05	1.3E-04	1.8E-04
NNW	5.6E-05	3.6E-05	3.8E-05	5.2E-05	2.3E-05	8.3E-05	7.8E-05
NW	4.8E-05	3.1E-05	3.3E-05	4.4E-05	2.0E-05	7.0E-05	6.6E-05
WNW	4.2E-05	2.7E-05	2.9E-05	3.9E-05	1.8E-05	6.1E-05	5.7E-05
W	6.1E-05	3.9E-05	4.2E-05	5.6E-05	2.5E-05	8.9E-05	8.3E-05
WSW	1.6E-04	1.0E-04	1.1E-04	1.5E-04	6.3E-05	2.1E-04	2.2E-04
SW	1.1E-04	6.7E-05	7.1E-05	9.7E-05	4.2E-05	1.4E-04	1.5E-04
SSW	1.4E-04	8.8E-05	9.3E-05	1.3E-04	5.4E-05	1.8E-04	2.0E-04
S	1.3E-04	8.3E-05	8.8E-05	1.2E-04	5.2E-05	2.0E-04	1.8E-04
SSE	1.3E-04	7.9E-05	8.3E-05	1.2E-04	4.9E-05	1.9E-04	1.8E-04
SE	1.2E-04	7.5E-05	7.9E-05	1.1E-04	4.7E-05	1.7E-04	1.6E-04
ESE	1.7E-04	1.0E-04	1.1E-04	1.5E-04	6.5E-05	2.5E-04	2.3E-04
E	1.2E-04	7.3E-05	7.7E-05	1.1E-04	4.6E-05	1.7E-04	1.6E-04
ENE	1.3E-04	8.0E-05	8.4E-05	1.2E-04	5.0E-05	1.9E-04	1.8E-04
NE	1.4E-04	8.8E-05	9.3E-05	1.3E-04	5.4E-05	2.1E-04	1.9E-04
NNE	2.6E-04	1.6E-04	1.7E-04	2.4E-04	1.0E-04	3.6E-04	3.6E-04

	Distance (m)						
Direction	1252	1132	1735	1264	1094	[illegible]	2250
N	1.4E-04	1.6E-04	8.2E-05	1.4E-04	1.7E-04	1.7E-04	5.5E-05
NNW	6.0E-05	7.0E-05	3.6E-05	6.9E-05	7.4E-05	7.4E-05	2.4E-05
NW	5.1E-05	6.0E-05	3.1E-05	5.0E-05	6.3E-05	6.3E-05	2.2E-05
WNW	4.4E-05	5.2E-05	2.7E-05	4.4E-05	5.5E-05	5.5E-05	1.9E-05
W	6.5E-05	7.6E-05	3.9E-05	6.4E-05	8.0E-05	8.0E-05	2.7E-05
WSW	1.7E-04	2.0E-04	1.0E-04	1.7E-04	2.1E-04	2.1E-04	6.7E-05
SW	1.1E-04	1.3E-04	6.7E-05	1.1E-04	1.4E-04	1.4E-04	4.5E-05
SSW	1.5E-04	1.8E-04	8.8E-05	1.5E-04	1.9E-04	1.9E-04	5.8E-05
S	1.4E-04	1.7E-04	8.3E-05	1.4E-04	1.7E-04	1.7E-04	5.5E-05
SSE	1.3E-04	1.6E-04	7.9E-05	1.3E-04	1.7E-04	1.7E-04	5.2E-05
SE	1.2E-04	1.4E-04	7.5E-05	1.2E-04	1.5E-04	1.5E-04	5.0E-05
ESE	1.8E-04	2.1E-04	1.0E-04	1.7E-04	2.2E-04	2.2E-04	6.9E-05
E	1.2E-04	1.4E-04	7.3E-05	1.2E-04	1.5E-04	1.5E-04	4.9E-05
ENE	1.3E-04	1.6E-04	8.0E-05	1.3E-04	1.7E-04	1.7E-04	5.3E-05
NE	1.5E-04	1.8E-04	8.8E-05	1.5E-04	1.8E-04	1.8E-04	5.8E-05
NNE	2.7E-04	3.2E-04	1.6E-04	2.7E-04	3.4E-04	3.4E-04	1.1E-04

INDIVIDUAL EFFECTIVE DOSE EQUIVALENT RATE (mrem/y
(All Radionuclides and Pathways)

	Distance (m)	
Direction	1724	1330
N	8.3E-05	1.3E-04
NNW	3.6E-05	5.4E-05
NW	3.2E-05	4.7E-05
WNW	2.7E-05	4.1E-05
W	4.0E-05	5.9E-05
WSW	1.0E-04	1.6E-04
SW	6.8E-05	1.0E-04
SSW	8.8E-05	1.4E-04
S	8.4E-05	1.3E-04
SSE	8.0E-05	1.2E-04
SE	7.6E-05	1.1E-04
ESE	1.1E-04	1.6E-04
E	7.4E-05	1.1E-04
ENE	8.1E-05	1.2E-04
NE	8.9E-05	1.3E-04
NNE	1.7E-04	2.5E-04

INDIVIDUAL LIFETIME RISK (deaths)
(All Radionuclides and Pathways)

Direction	Distance (m) 1301	1736	1677	1375	2342	1017	1061
N	1.6E-09	1.0E-09	1.1E-09	1.5E-09	6.3E-10	2.6E-09	2.3E-09
NNW	7.0E-10	4.4E-10	4.6E-10	6.4E-10	2.7E-10	1.0E-09	9.7E-10
NW	5.9E-10	3.8E-10	4.0E-10	5.5E-10	2.4E-10	8.7E-10	8.2E-10
WNW	5.1E-10	3.2E-10	3.4E-10	4.7E-10	2.0E-10	7.0E-10	7.1E-10
W	7.6E-10	4.6E-10	5.1E-10	6.9E-10	3.0E-10	1.1E-09	1.0E-09
WSW	2.0E-09	1.2E-09	1.3E-09	1.9E-09	7.8E-10	3.0E-09	2.8E-09
SW	1.3E-09	8.4E-10	8.8E-10	1.2E-09	5.2E-10	2.0E-09	1.8E-09
SSW	1.8E-09	1.1E-09	1.2E-09	1.6E-09	6.6E-10	2.7E-09	2.5E-09
S	1.7E-09	1.0E-09	1.1E-09	1.5E-09	6.3E-10	2.5E-09	2.3E-09
SSE	1.6E-09	9.8E-10	1.0E-09	1.4E-09	5.9E-10	2.4E-09	2.2E-09
SE	1.5E-09	9.4E-10	9.9E-10	1.4E-09	5.8E-10	2.2E-09	2.0E-09
ESE	2.1E-09	1.3E-09	1.4E-09	1.9E-09	8.0E-10	3.1E-09	2.9E-09
E	1.4E-09	9.1E-10	9.6E-10	1.3E-09	5.6E-10	2.2E-09	2.0E-09
ENE	1.6E-09	9.9E-10	1.0E-09	1.5E-09	6.1E-10	2.4E-09	2.2E-09
NE	1.8E-09	1.1E-09	1.2E-09	1.6E-09	6.7E-10	2.6E-09	2.5E-09
NNE	3.3E-09	2.1E-09	2.2E-09	3.0E-09	1.3E-09	4.8E-09	4.5E-09

Direction	Distance (m) 1252	1133	1735	1264	1094	1195	2250
N	1.7E-09	2.1E-09	1.0E-09	1.7E-09	2.2E-09	2.2E-09	6.7E-10
NNW	7.4E-10	8.7E-10	4.4E-10	7.3E-10	9.2E-10	9.2E-10	2.9E-10
NW	6.3E-10	7.4E-10	3.8E-10	6.2E-10	7.8E-10	7.8E-10	2.5E-10
WNW	5.5E-10	6.4E-10	3.3E-10	5.4E-10	6.8E-10	6.7E-10	2.2E-10
W	8.0E-10	9.4E-10	4.8E-10	7.9E-10	9.9E-10	9.9E-10	3.2E-10
WSW	2.2E-09	2.5E-09	1.3E-09	2.1E-09	2.7E-09	2.7E-09	8.3E-10
SW	1.4E-09	1.7E-09	8.4E-10	1.4E-09	1.8E-09	1.8E-09	5.5E-10
SSW	1.9E-09	2.2E-09	1.1E-09	1.8E-09	2.3E-09	2.3E-09	7.1E-10
S	1.8E-09	2.1E-09	1.0E-09	1.7E-09	2.2E-09	2.2E-09	6.8E-10
SSE	1.7E-09	2.0E-09	9.8E-10	1.7E-09	2.1E-09	2.1E-09	6.3E-10
SE	1.6E-09	1.8E-09	9.4E-10	1.5E-09	1.9E-09	1.9E-09	6.2E-10
ESE	2.2E-09	2.6E-09	1.3E-09	2.2E-09	2.8E-09	2.8E-09	8.5E-10
E	1.5E-09	1.8E-09	9.1E-10	1.5E-09	1.9E-09	1.9E-09	6.0E-10
ENE	1.7E-09	2.0E-09	9.9E-10	1.7E-09	2.1E-09	2.1E-09	6.5E-10
NE	1.9E-09	2.2E-09	1.1E-09	1.8E-09	2.3E-09	2.3E-09	7.1E-10
NNE	3.5E-09	4.1E-09	2.1E-09	3.4E-09	4.3E-09	4.3E-09	1.4E-09

INDIVIDUAL LIFETIME RISK (deaths)
(All Radionuclides and Pathways)

	Distance (m)	
Direction	1724	1330
N	1.0E-09	1.6E-09
NNW	4.4E-10	6.7E-10
NW	3.8E-10	5.7E-10
WNW	3.3E-10	5.0E-10
W	4.9E-10	7.3E-10
WSW	1.3E-09	2.0E-09
SW	8.4E-10	1.3E-09
SSW	1.1E-09	1.7E-09
S	1.0E-09	1.6E-09
SSE	9.9E-10	1.5E-09
SE	9.5E-10	1.4E-09
ESE	1.3E-09	2.0E-09
E	9.2E-10	1.4E-09
ENE	1.0E-09	1.5E-09
NE	1.1E-09	1.7E-09
NNE	2.1E-09	3.2E-09

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1.0 **PURPOSE**

1.1 The purpose of this document is to establish procedures for Cleaning, Reconditioning, and Inspecting for reuse of Respirators.

2.0 **SCOPE**

2.1 This procedure is applicable to personnel operating the Respirator Wash Facility (RWF).

3.0 **APPLICABLE DOCUMENTS**

3.1 Source Documents

3.1.1 D10-00-020, "Remediation Support Operations Division Document System"

3.2 Reference Documents

3.2.1 None

4.0 **DEFINITIONS**

4.1 None

5.0 **RESPONSIBILITIES**

5.1 **Respirator Reconditioning Supervisors** are responsible for the following:

5.1.1 Ensuring that personnel are qualified per the established training requirements identified by the Department/Staff Manager.

5.1.2 Contacting Industrial Hygiene (IH) or Radiological Safety to determine the appropriate respiratory protection.

5.1.3 Providing Operators with the required respiratory protection.

5.1.4 Reviewing applicable Material Safety Data Sheets (MSDSs) with Operators.

5.2. **Operators** are responsible for the following:

5.2.1 Complying with this procedure.

5.2.2 Contacting the Laundry Services Supervisor when supplies and/or respirator parts are required.

5.3 **Laundry Services Supervisor** is responsible for ensuring a supply of cleaning materials and respirator parts is available.

5.4 **Radiological Control Technicians (RCTs)** are responsible to check for radioactive contamination.

6.0 **GENERAL**

6.1 Warnings, Cautions, and Notes shall precede the Item, Step, Sub-Step, Section, or Sub-Section to which they apply.

6.0 **GENERAL** (cont.)

6.2 Respirators cleaned by Support Services are one (1) of three (3) types as follows:

A. MSA
B. NORTH
C. SURVIVAIR.

6.3 The AUTO 300 automatically monitors each cycle by providing red lights on the control panel that switch on as each step of the three (3) cycles operates. For a full cycle, the monitoring lights will switch on as each of the three (3) cycles, CLEANING CYCLE, DISINFECTANT CYCLE, and RINSE CYCLE, steps through its operations. As a half cycle operates, the monitoring lights only under the CLEANING CYCLE.

6.4 The respirator cleaning drum is a stainless steel drum with a finger-lock latching lid for a tight fit during operation of the AUTO 300.

6.5 The drum is loaded with respirators and placed into the cleaning reservoir. The drum revolves as the unit operates, so that any trapped air in the equipment is pushed out, and the water in the reservoir contacts with all surfaces of the equipment.

7.0 **HEALTH AND SAFETY REQUIREMENTS**

7.1 A defined safety system is not involved.

7.2 Safety glasses shall be worn unless additional eye/face protection is specified by the Supervisor, S&H, or posted signs.

7.3 Respiratory protection provided by the Supervisor shall be worn when required by S&H.

7.4 Neoprene or nitrile (Solvex) rubber gloves shall be worn when using MDS CLEANER-SANITIZER® (or equivalent).

7.5 Rubber gloves shall be leak checked prior to use. Leaking gloves shall be discarded.

7.6 Gloves worn to remove racks from the dryer shall be uncontaminated.

7.7 Personnel shall have reviewed, and be familiar with, the MSDSs for chemical/hazardous materials that may be used or encountered.

7.8 Repair of respirators shall be limited to replacement of parts.

7.9 Bags with a lead warning label contain respirators potentially contaminat with lead. Contact IH before processing.

7.0 **HEALTH AND SAFETY REQUIREMENTS** (cont.)

7.10 Any circumstance which could have resulted in an intake of radioactive materials by inhalation, ingestion, or absorption shall immediately be reported to a Supervisor. The Supervisor shall immediately report the circumstance of possible radioactive materials intake to S&H Radiological Control Department for evaluation. When the suspect isotope is uranium, the involved personnel shall report to the Urine Sampling Station at the end of their shift to complete an Incident Investigation Report (IIR) (Form No. FS-F-1458), and submit an incident urine sample. The involved personnel shall also report to the Urine Sampling Station at the start of their next shift to submit a follow up urine sample. When the suspect isotope is other than uranium, the involved personnel shall report to the Dosimetry Section of the Radiological Control Department for further determination of actions. Employees are responsible for complying with additional requirements as specified by the Radiological Control Department.

7.11 Any situation which could have resulted in the inhalation, ingestion, or absorption of a hazardous material shall immediately be reported to a Supervisor or to the Assistant Emergency Duty Officer (AEDO), who will immediately report the circumstances to Medical and Industrial Hygiene. The involved personnel shall be directed by the Supervisor or AEDO as to when and where to report for medical evaluation, completion of an Incident Investigation Report (IIR) (Form No. FS-F-1458), and submitting bioassay samples (e.g. blood, urine). Employees are responsible for complying with any additional requirements as specified by S&H.

8.0 **PROCEDURE**

OPERATOR

8.1 Daily Pre-Start Check

NOTE: The facility is maintained in operating condition at all times unless a full shutdown has occurred. Checks shall be performed to confirm the status.

8.1.1 Ensure that HEPA unit fan is turned ON.

8.1.2 Note and record Magnehelic reading.

8.1.3 Ensure all slide gates are open to the HEPA unit and the Magnehelic reading is in acceptable range (1.5 inches W.G. - 4.9 inches W.G.).

8.1.4 IF the HEPA fan alarm sounds and Magnehelic readings show that the fan is off,
THEN shut down all equipment used in washing/drying until after the HEPA filter is checked and fan is restarted.

3.0 **PROCEDURE** (cont.)

3.2 New Respirator Washer

NOTE 1: The machine runs through the wash portion of the cycle and then drains. During the wash cycle, detergent and sanitizer are injected into the wash water.

NOTE 2: The tank and pump are automatically flushed. The machine fills and the pumped rinse portion of the cycle takes place. Indicator lights display machine sequence.

3.2.2 **Sequence of Operation** (Refer to "New Respirator Washer" (See Figure 1))

A. Start
B. Pumped wash (with detergent and sanitizer)
C. Drain opens
D. Flush
E. Drain closes
F. Machine fills
G. Pumped rinse
H. Stop.

3.2.3 **Washer Start-Up**

A. Turn on water supply to the machine.

B. Place STOP-RUN-HOLD Switch in STOP Position.

C. Turn electric power supply switch to the ON Position.

D. Fill the machine to approximately 1/2 inch below the overflow tube by pressing the FILL Toggle Switch to the left.

NOTE 1: The sanitizer is standard household bleach (CLOROX®). An injection rate of 7-8 ml of this bleach into 2-gallons of water is used.

NOTE 2: The amount of detergent injected will depend upon the type of detergent selected. Only non-to-low foaming detergents can be used in this machine due to a high speed pump impeller. Too much detergent will cause the pump to cavitate, thus reducing spray pressure and subsequent loss of cleansing ability. Experimentation with the amount and type of detergent may be necessary.

E. Fill both the detergent and sanitizer gallon carboy containers.

F. Set detergent pump to 15 - 17 ml for Maskienze MK-1 detergent.

G. Prime the detergent and sanitizer injector pumps by actuating the prime switch in the DETER direction as required until detergent and sanitizer are entering the mixing chamber on the machine.

3.0 **PROCEDURE** (cont.)

3.2 New Respirator Washer (cont.)

3.2.3 **Washer Start-Up** (cont.)

NOTE: This step is performed only on initial start-up and when a detergent or sanitizer bottle is emptied and is replaced.

H. Close machine door if open.

I. Place the STOP-RUN-HOLD Switch in the RUN Position.

NOTE 1: Sequence lights will Indicate what portion of the cycle is being performed. Ready light (green) indicates entire cycle is over and ready for the next cycle. If the door is opened during the cycle, the machine will stop. (See CAUTION). When the door is closed the machine will start at the beginning of the wash cycle. At the end of the wash cycle, the water drains from the machine and the machine is automatically refilled with a fresh supply for the rinse cycle. The water in the machine from the rinse does not drain; it is used for the next wash cycle.

NOTE 2: When water level and detergent and sanitizer injection rates are satisfactory, the washer is ready for normal operation. The control switch should be in the RUN Position. The washer will automatically cycle with each opening and closing of the door as racks are placed in and removed from the machine. If the control panel switch is placed in the HOLD Position, the washer will enter the wash cycle and stay in that condition until the switch is returned to the RUN Position whereby automatic sequencing will continue.

J. Place the control switch in the STOP Position when washing operations are complete.

K. Drain the washer sump tank by activating and holding the control panel switch in the DRAIN Position.

NOTE: Clean the strainer basket and spray nozzles periodically.

CAUTION

Do not open door during first machine cycle. The automatic door stop switch will only function after one (1) complete cycle.

L. Set the washer cycle-timer to 10-minutes. (The cycle timer can later be set to an optimum (shortest cycle for clean respirators).

M. Remove tray and replace with another tray to be washed to repeat the washer cycle.

3.0 **PROCEDURE** (cont.)

3.2 New Respirator Washer (cont.)

3.2.3 **Washer Start-Up** (cont.)

N. Place two (2) trays of washed respirator components into the dryer.

O. Close the dryer door.

3.3 New Respirator Dryer

3.3.1 **Dryer Function**

A. The function of the respirator dryer is to remove all traces of moisture from the washed respirators after all excess water has been removed by the use of a wet vacuum.

B. The dryer maintains maximum temperature at 120°F to prevent damage to the respirators.

3.3.2 **Dryer Description**

A. The respirator dryer removes moisture from the respirators by utilizing high velocity low temperature in a drying chamber. Air circulates via a blower and is heated by heating elements.

B. Moisture laden air exits the drying chamber by the port on top of the dryer.

C. The dryer chamber will accommodate two (2) loaded respirator racks. Normal drying time for respirators which have had excess water thoroughly vacuumed off is 30-minutes with the temperature set point at 120°F.

3.3.3 **Dryer Operation**

A. Set the indicating temperature controller to 120°F.

B. Dryer Startup

1. Place two (2) loaded respirator racks inside for drying.

2. Energize the unit by setting the timer pointer knob to the number of minutes of desired operation.

3.0 **PROCEDURE** (cont.)

3.3 New Respirator Dryer (cont.)

3.3.3 **Dryer Operation** (cont.)

CAUTION

Do not attempt to turn the knob past "0" from either direction.

NOTE 1: The dryer will turn off automatically at the end of the set time period. If desired, the set can be readjusted before the timer cycle is completed.

NOTE 2: Drying time for respirators which have had excess water removed will be about 30-minutes.

3. Remove the racks.

4. Load the dryer with two (2) more loaded racks.

NOTE 1: Keep the dryer door open for as little time as practicable to conserve heat.

NOTE 2: Initially, set the drying time to 30-minutes. Later, the drying time can be reset as experience is acquired with this dryer.

C. Remove racks of dried respirators and components.

D. Replace with two (2) racks of washed components for drying.

E. Return dried reconditioned respirators for reuse after inspection and tests.

3.4 AUTO 300 Ultrasonic Washer

3.4.1 **Front Panel Controls**

A. The AUTO 300 contains control switches, function indicators and monitoring lights on the control panel which operate and monitor the unit's cycles.

3.4.2 **Operating Control Switches**

A. "Operating Controls for the AUTO 300" (See Table 1) provides the description and explanation for each operating control and its function.

8.0 **PROCEDURE** (cont.)

8.4 AUTO 300 Ultrasonic Washer (cont.)

8.4.2 **Operating Control Switches** (cont.)

B. Also contained on the control panel of the AUTO 300 are "AC Function Indicating Lights and Monitoring Lights" (See Table 2). These green lights switch on as the AC functions operate during each cycle step of the AUTO 300. The indicators located and labeled on the control panel are:

1. BASKET DRIVE
2. DISINFECTANT RETURN VALVE
3. DRAIN VALVE
4. DRAIN PUMP
5. DISINFECTANT PUMP/VALVE
6. FRESH WATER VALVE
7. ULTRASONICS.

8.4.3 **Loading Half-Face Piece Respirators**

A. Remove the lid from the respirator cleaning drum by lifting the finger-lock latch.

B. Remove the filters from the respirators.

C. Place the respirators face down into the drum until the drum is filled.

D. Place the lid on the respirator cleaning drum, holding the latch open until the lid is firmly seated on the drum.

NOTE: The lid of the drum containing the large gear should be facing the disinfectant reservoir.

E. Release the latch and place the drum inside the cleaning reservoir, using the drain holes on the side to hold the drum.

NOTE: The gears on the drum must engage with the slides in the cleaning reservoir.

F. Use the plastic basket slides on the sides of the cleaning reservoir to guide the drum into the cleaning reservoir.

8.4.4 **Loading Full-Face Piece Respirators**

A. Remove the lid from the respirator cleaning drum, in accordance with 8.4.3.A.

B. Place the lid on the drum in accordance with 8.4.3.D.

C. Install the drum into the cleaning reservoir in accordance with 8.4.3.F.

8.0 **PROCEDURE** (cont.)

8.4 AUTO 300 Ultrasonic Washer (cont.)

8.4.5 Half-Cycle Operation

A. Set the MAIN POWER Button in the OFF Position.

B. Set the HALF/FULL CYCLE Button in the HALF Position.

C. Set the PURGE/AUTO Button in the AUTO Position.

D. Lift the lid of the disinfectant reservoir.

E. Fill the reservoir with water up to the level mark on the inside back panel of the reservoir.

F. Load the respirators into the respirator cleaning drum, in accordance with 8.4.3.C.

G. Install the drum into the cleaning reservoir in accordance with 8.4.3.F.

H. Ensure the AC electrical power line is connected into the wall outlet.

I. Depress the MAIN POWER Button.
THEN release the button.
THEN depress again until the button engages.

J. Press the CYCLE START Button.

K. Pour approximately two (2) ounces of detergent into the cleaning reservoir.

L. Close the hinged lid.

3.0 **PROCEDURE** (cont.)

3.4 AUTO 300 Ultrasonic Washer (cont.)

3.4.5 **Half-Cycle Operation** (cont.)

NOTE 1: The AUTO 300 will automatically cycle in the half-cycle cleaning cycle. The red monitoring lights will switch on as each step is performed, and the green AC function lights will indicate the unit's function.

NOTE 2: The red CLEANING CYCLE monitoring light will switch on, followed by the FILL light as the reservoir starts to fill. The ULTRASONIC WASH light will switch on as the respirator is cleaned, the cycle time factory-set on the timer.

NOTE 3: When the ULTRASONIC WASH is complete, the EMPTY monitoring light will switch on, indicating that the chamber is being pump-drained into the unit's waste system. After the first drain, there will be a thirty second time delay and a second pump drain of the reservoir so that any trapped water in the respirator equipment is removed. This thirty second delay follows all drain steps.

NOTE 4: The cleaning reservoir will then fill with rinse water as the RINSE monitoring light switches on. This rinse will remove any remaining contaminants and/or detergent. In the RINSE phase, the reservoir will fill with water completely. Following this RINSE phase, the reservoir will be pump-drained, there will be a second pump-drain, and when completed, the CYCLE END monitoring light will switch on.

M. WHEN finished with washing,
THEN place the MAIN POWER Button in the OFF Position.

3.4.6 **Full-Cycle Operation**

A. Set the MAIN POWER Button in the OFF Position.

B. Set the HALF FULL CYCLE Button in the FULL Position.

C. Set the PURGE/AUTO Button in the AUTO Position.

D. Lift the lid of the disinfectant reservoir.

E. Fill with water up to the level mark inside the reservoir.

F. Load the respirators into the respirator cleaning drum.

G. Install drum into the cleaning reservoir.

3.0 **PROCEDURE** (cont.)

3.4 AUTO 300 Ultrasonic Washer (cont.)

3.4.6 **Full-Cycle Operation** (cont.)

H. Depress the MAIN POWER Button.
THEN release the button.
THEN and depress again until the button engages.

I. Press the CYCLE START Button.

NOTE 1: The AUTO 300 will automatically cycle in the FULL-CYCLE mode, performing all three cycles: CLEANING, DISINFECTING/STERILIZING, and RINSE.

NOTE 2: The AUTO 300 will start operating in the CLEANING CYCLE phase when this cycle is finished, the red DISINFECTING CYCLE monitoring light will switch on, followed by the FILL light. At this step, the water in the disinfecting reservoir will be pumped into the cleaning reservoir, and the DISINFECTANT IMMERSION monitoring light will switch on. The IMMERSION and the ULTRASONIC times have been preset at the factory.

NOTE 3: When the DISINFECTANT and IMMERSION steps are completed, the water will be returned to the disinfectant reservoir through an in-line filter contained in the cabinet again during this pump drain, there will be a time delay and a second drain as in the CLEANING CYCLE operation previously explained.

NOTE 4: The RINSE CYCLE monitoring light will switch on. This cycle contains a double rinse to remove any chemical residue remaining on the respirators after disinfection. When the rinse is finished, the CYCLE END monitoring light will appear.

J. Remove the respirator cleaning drum and unload the respirators.

3.4.7 **System Purge**

NOTE: After the initial test operation of the AUTO 300's half cycle and full cycle, the unit can be automatically run. However, it is necessary to empty the water out of the disinfectant reservoir, and replace it with the disinfectant. The process, a system purge, should be performed every 30 days.

A. Place the PURGE/AUTO Button in the PURGE Position.

B. Place the MAIN POWER Button in the ON Position.

C. Insert the key (provided) into the SYSTEM PURGE lock.

3.0 **PROCEDURE** (cont.)

3.4 AUTO 300 Ultrasonic Washer (cont.)

3.4.7 **System Purge** (cont.)

NOTE: It may be necessary to turn the key again and hold until the draining process is completed.

D. Turn the key to the right, and release.

NOTE 1: The disinfectant reservoir and the cleaning reservoir will now be purged. Open the lids to both reservoirs and observe. If the unit stops purging before both reservoirs are completely empty, turn the SYSTEM PURGE key to the right again, and if necessary, turn the key a third time.

E. When the reservoirs are completely empty, put the PURGE/AUTO Button in the AUTO Position.
THEN put the MAIN POWER Button in the OFF Position.

NOTE: The unit will not AUTOMATICALLY CYCLE if the AUTO/PURGE Button is in the PURGE Position.

8.4.8 **Automatic Operation**

WARNING

Wear a rubber apron and gloves, cover goggles and a face shield when pouring disinfectant into the reservoir.

CAUTION

Do not use CLOROX® as disinfectant in this washer. Use BRULIN UNICIDE 128®.

NOTE 1: To automatically operate the AUTO 300, the disinfectant must be added to the disinfectant reservoir.

NOTE 2: This level should be checked and maintained. Disinfectan must be changed according to the manufacturers instructions.

NOTE 3: This disinfecting solution is made up of 16 ounces of BRULIN UNICIDE 128® sanitizer plus 16-gallons of water.

A. Pour approximately 16-gallons of the disinfectant solution into th disinfectant reservoir, up to the fill-level mark on the inside of the reservoir.

NOTE: With the disinfectant reservoir containing the disinfectant, the unit can automatically clean and disinfect the respirator equipment. To cycle the unit, perform the same steps as in the testing procedures.

B. Place the MAIN POWER Button in the ON Position.

3.0 **PROCEDURE** (cont.)

3.4 AUTO 300 Ultrasonic Washer (cont.)

3.4.3 **Automatic Operation** (cont.)

C. Select a FULL CYCLE or HALF CYCLE operation.

D. Place the PURGE/AUTO Button in the AUTO Position.

E. Load the respirators into the respirator cleaning drum in accordance with 8.4.3.C.

F. Place the drum into the cleaning reservoir in accordance with 8.4.3.F.

G. Press the CYCLE START Button once.

H. Put three (3) ounces of detergent into the cleaning reservoir. This is done automatically by the detergent injector pump.

CAUTION

Do not use CLOROX® as the sanitizer in this washer.

NOTE 1: The AUTO 300 will automatically cycle. The washing and rinsing times have been preset at the factory.

NOTE 2: The ultrasonic washer will be used in conjunction with the wet vacuum drying and towel drying until the existing multi-tray dryer has been installed in the new facility to dry the washed, sanitized components from this ultrasonic washer.

NOTE 3: Use the FULL CYCLE operation unless instructed otherwise by the Supervisor.

I. Load 30 half-face or 10 full-face respirators and hoses (with cartridges removed) into the rotating drum of this ultrasonic washer.

J. Remove the drum and unload the cleaned batch when all the cycles are finished (CYCLE END light goes on).

K. The drum can be reloaded with the next batch to be washed.

L. Dry the wet clean respirators removed from the ultrasonic washer by wet-vacuuming followed by towel drying.

M. Hang the cleaned hoses vertically to drain the water inside each hose.

N. Stretch and corrugated hoses until the corrugations are smooth to allow all water to drain completely.

3.0 **PROCEDURE** (cont.)

3.4 AUTO 300 Ultrasonic Washer (cont.)

3.4.8 **Automatic Operation** (cont.)

O. Depress the MAIN POWER Button if this washer is to be out of service for any reason. Check with the Supervisor to ensure liquids do not need to be drained.

P. The hoses can be finish dried in one of the dryers.

3.5 Old Washer/Dryer Operation

3.5.1 Ensure that circuit breakers and the POWER Switch are ON.

3.5.2 Ensure that the breakdown hood duct slide gate is OPEN.

3.5.3 Ensure that the breakdown hood and dryer blowers are ON.

NOTE: In the RUN Mode, the washer automatically starts a wash cycle when the doors are lowered.

3.5.4 Ensure that the SANITIZER SELECTOR Switch is set to RUN.

NOTE: The maximum time is eight (8) minutes when the dial is turned completely clockwise.

3.5.5 Ensure that the washer cycle time dial is set at mark on dial.

3.5.6 **Preparation**

NOTE: The used cleaning solution shall be replaced at the start of each shift. Additional changes may be required if the water becomes dirty.

A. Drain the liquid from the respirator breakdown hood sink.

B. Open the breakdown hood sink hot water valve.

NOTE: The sink holds approximately two (2) gallons of water.

C. WHEN the sink is full,
THEN close the water valve.

NOTE 1: The cleaning solution requires three (3) packets of MSA CLEANER-SANITIZER® per sink of water.

NOTE 2: The MSA CLEANER-SANITIZER® uses a water/chlorine solution that is replaced as needed.

D. Set and hold the Sanitizer FILL Switch in the FILL position.

3.0 **PROCEDURE** (cont.)

3.5 Old Washer/Dryer Operation (cont.)

3.5.6 **Preparation** (cont.)

E. Release the FILL Switch when the sanitizer basin reaches the mark on the drain stop.

NOTE: Running wash cycles displaces the cold water in the sanitizer lines to be displaced by hot water and also bleeds air from the CLOROX® injection line.

F. Run a wash cycle.

G. WHEN the wash cycle is complete,
THEN test the free chlorine level as follows:

1. Start a wash cycle.

2. Set the HOLD Switch to HOLD, in the middle of the cycle.

3. Dip a piece of chlorine test paper into the chlorinated water solution.

4. WHEN a color change occurs,
THEN remove the test paper from the solution.

NOTE: A graduated color chart is provided to determine free chlorine ppm. The test paper should change color to match No. 3 (50 ppm) on the chart.

5. Compare the paper color with the color chart.

H. IF the chlorine is below 50 ppm,
THEN proceed as follows:

1. Momentarily set the DETERGENT Switch to DETERGENT.

2. Repeat 3.5.6 F.

3. Inform the Laundry Supervisor that the CLOROX® injection system requires adjustment.

CAUTION

Do not wash respirators if temperature is low.

NOTE 1: Water temperature shall be 95°F to 120°F.

NOTE 2: If the water temperature is low, notify the Supervisor.

I. After water is drawn into the sink, use the thermometer located at the top rear of the washer to check the water temperature.

3.0 **PROCEDURE** (cont.)

3.5 Old Washer/Dryer Operation (cont.)

3.5.7 Cleaning

A. Obtain respirators to be cleaned.

B. Transfer respirators into the cleaning facility onto the receiving table.

C. Record the number of bags of dirty respirators on a "Respirator Reconditioning Report" (See Figure 2).

D. IF the respirators are individually bagged.
THEN remove the respirators.

E. Dispose of the large and individual plastic bags in a container that is approved for contaminated waste.

F. Break down respirators for washing as follows:

NOTE: Removed parts (except for cartridges, canisters, flow control valves, and exhalation valve covers) shall be placed in the sink containing the MSA CLEANER-SANITIZER® solution.

1. Remove cartridges/canisters from the respirators.

2. Dispose of cartridges/canisters into an approved container.

3. Remove and set aside nosecups and wash separately.

NOTE: All tubing is to be washed in ultrasonic washer.

4. Unscrew corrugated breathing tubes on MSA airline respirators (if any).

5. Remove the flow control valves from MSA airline respirators.

NOTE: Do not run the valves through the washer.

6. Hand wipe and set aside the flow control valves.

7. Remove the spectacle and black spring (kit) from full face respirators.

8. Turn in the spectacle/springs to the Supervisor.

G. Use a soft brush to wash the respirator part in the breakdown sink.

H. Using the spray, rinse the respirator parts over the sink.

I. Remove the respirator parts from the sink.

8.0 **PROCEDURE** (cont.)

8.5 Old Washer/Dryer Operation (cont.)

8.5.7 **Cleaning** (cont.)

NOTE 1: Each lowerator rack holds six (6) full face respirators or 12 half mask respirators.

NOTE 2: Facepieces shall be placed with the concave side down to allow water to drain.

J. Place the respirator parts in a lowerator wash rack.

NOTE: Multiple loaded racks may be stacked on the lowerator while the sanitizer is in operation.

K. Push the loaded rack into the sanitizer.

L. Close the sanitizer doors.

M. WHEN the wash and rinse cycles are complete.
THEN open the sanitizer doors.

N. Transfer the rack from the sanitizer to the right side drain board.

O. WHEN additional respirators are to be washed.
THEN start another rack through the sanitizer.

P. Turn on the vacuum unit using the foot pedals.

Q. Use the vacuum to remove water from the respirators.

R. With the exception of nosecups, assemble the washed respirators.

S. Place nosecups in a separate rack.

T. Place assembled respirators in a rack.

U. WHEN the rack is full or washing is completed.
THEN set the rack on a dolly.

NOTE 1: Each dolly will hold six (6) racks of respirators.

NOTE 2: Repeat 8.5.7 T thru 8.5.7 W as required until washing is complete or two (2) dollies are loaded.

V. Roll the full dolly (or dollies) to the dryer.

NOTE: The dryer will hold two (2) full dollies.

W. Place the loaded dolly or dollies in the dryer.

X. Close the dryer door.

8.0 **PROCEDURE** (cont.)

8.5 Old Washer/Dryer Operation (cont.)

8.5.7 **Cleaning** (cont.)

NOTE 1: Maximum dryer temp is 120°F and minimum is 100°F.

NOTE 2: If the temperature is out-of-specification, notify the Supervisor.

Y. Check that dryer temperature is 110°, acceptable range is 100°F to 120°F.

Z. Press the dryer START Button and the two (2) toggle switches.

AA. WHEN drying is completed.
THEN remove respirators/parts from the dryer.

AB. IF additional respirators/parts are ready for drying,
THEN start the rack or racks through the dryer.

AC. Move the dry respirators/parts to the buffer zone table.

NOTE: Fabric parts (such as web belts and elastic woven headbands) tend to concentrate and retain contamination.

RADIOLOGICAL CONTROL TECHNICIANS

NOTE: All radiological monitoring is to be done only by Radiological Control Technicians (RCTs). Contact Radiological Safety to resurvey for radioactive contamination. Approval for release of clean respirators from buffer zone table is by RCTs.

AD. Monitor the dry respirators/parts, using a pancake beta-gamma geiger counter.

AE. IF the geiger counter reads 100 cpm, or more, over background,
THEN proceed as follows:

1. IF the respirator has been washed once,
THEN set the respirator aside for washing.

2. IF the respirator has been washed twice,
THEN set the respirator aside for discard or additional decontamination as specified by the Supervisor.

OPERATOR

AF. Repeat 8.5.7.U through 8.5.7.AF to wash respirator parts.

AG. Pass the washed/sanitized respirators and parts through the buffer zone table into the inspection area.

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3.0 **PROCEDURE** (cont.)

3.6 Inspection

3.6.1 Separate the respirators by type and size per "Respirator Types/Sizes" (See Table 3).

3.6.2 Inspect north (black half-mask) air purifying per "North (Black Half-Mask) Air Purifying Inspection" (See Table 4).

3.6.3 Inspect MSA Comfo II (yellow or black half-mask) per "MSA Comfo II Half-Mask Inspection" (See Table 5).

3.6.4 Inspect MSA Comfo II (half-mask) continuous flow airline per "MSA Continuous Flow Airline Half-Mask Inspection" (See Table 6).

3.6.5 Inspect MSA ultra-twin (yellow or black full face) per "MSA Ultra-Twin Full Face Inspection" (See Table 7).

3.6.6 Inspect MSA ultra-vue (yellow or black full face) per "MSA Ultra-Vue Full Face Inspection" (See Table 8).

3.6.7 Inspect north papr (full face) per "North Papr Full Face Inspection" (See Table 9).

3.6.8 Inspect survivair papr (full face) per "Survivair Papr Full Face Inspection" (See Table 10).

3.6.9 Inspect MSA ultra-vue continuous flow airline full face per "MSA Ultra-Vue Continuous Flow Airline Full Face Inspection" (See Table 11).

3.6.10 Inspect MSA Comfo II belt mounted half mask per "MSA Comfo II Belt Mounted Half-Mask" (See Table 12).

3.6.11 Set dirty respirators aside for washing/sanitizing.

NOTE: Nosecups shall be inspected and packaged individually.

3.6.12 Contact the laundry and obtain replacements for missing/damaged parts.

3.6.13 Fill out applicable portions of Figure 2.

3.7 Disposition

3.7.1 Fill out a "Reconditioned Respirator Tag" (See Figure 3) for each respirator as follows:

A. Enter the stores stock number per Table 3.

B. Enter the respirator size.

C. Enter the date respirator cleaned.

D. Enter the "Cleaner's Initials".

8.0 **PROCEDURE** (cont.)

8.7 Disposition (cont.)

NOTE: Respirators shall not be individually bagged.

8.7.2 Place respirators of the same type and size in a clean large plastic bag.

8.7.3 Place Figure 3 in the bag for each respirator.

8.7.4 Place a small, individual respirator bag and tie, for each respirator, in the large plastic bag.

8.7.5 Fold the top of the large bag closed.

8.7.6 Seal the plastic bag in a cardboard respirator box.

8.7.7 Tape the box closed.

NOTE 1: The Operators will have boxed respirators delivered to the inspection area for S&H inspection.

NOTE 2: S&H shall inspect and individually bag the respirators and then send the respirators to Stores for placement in inventory or return to the Respirator Cleaning Facility for additional cleaning.

8.7.8 The Operator will transport boxes to the inspection area for S&H inspection.

8.8 Documentation

8.8.1 Complete Figure 2.

8.8.2 Give the completed form to the Supervisor.

OPERATING CONTROLS FOR THE AUTO 300

CONTROL SWITCH	FUNCTION	USE	DESCRIPTION
MAIN POWER (Button)	1. Turns on and off electrical power to Unit.	a. To turn on electrical power to Unit, depress the MAIN POWER button completely. When the button is depressed, electrical power to unit will start.	a. ON POSITION
		b. To turn off electrical power to Unit, again depress the MAIN POWER button. The button will release and electrical power to Unit will stop.	b. OFF POSITION
AUTOMATIC CYCLE	1. Selects half-cleaning cycle or full-cleaning cycle for unit.		
	a. In HALF CYCLE, Unit operates in one mode: Cleaning Cycle. Unit will fill, Ultrasonically wash, empty and rinse.	a. To start a HALF CYCLE, depress the AUTOMATIC CYCLE button completely. When the button depressed, the Cleaning Cycle will start. Time: 15 minutes.	a. HALF CYCLE POSITION
	b. In FULL CYCLE Unit operates in three modes: Cleaning Cycle, Disinfecting Cycle, and Rinse Cycle. These three cycles are the complete operating cycles of the Unit.	b. To start a FULL CYCLE, again depress the AUTOMATIC CYCLE button completely. The button will release and the Unit will automatically operate in all three operating modes. Time: 55 minutes.	b. FULL CYCLE POSITION

OPERATING CONTROLS FOR THE AUTO 300
Table 1 (Sheet 1 of 2)

OPERATING CONTROLS FOR THE AUTO 300 (cont.)

CONTROL SWITCH	FUNCTION	USE	DESCRIPTION
PURGE/AUTO* (Button)	1. Drains water from reservoirs during initial testing of the Unit: cleans and maintains disinfectant in Disinfectant Reservoir.	a. To start a PURGE CYCLE, depress the PURGE/AUTO button completely. When the button is depressed, the PURGE CYCLE is ready to start. b. PURGE/AUTO button should remain in AUTO position during operation of AUTO 300. To start AUTO CYCLE again depress the PURGE/AUTO button completely. When the button releases the unit is in AUTO CYCLE.	a. PURGE CYCLE POSITION b. AUTO CYCLE POSITION
SYSTEM PURGE (Key)	1. Operates with the PURGE CYCLE to drain the reservoirs after initial testing and for maintenance.	a. Insert key (provided) into the SYSTEM PURGE turn the key to the right and release. **NOTE**: PURGE/AUTO button is in PURGE CYCLE position and MAIN POWER button is in ON position.	
CYCLE START (Button)	1. Starts the operation of AUTO 300's cycles.	a. To start cycling the Unit, depress the CYCLE Start button once. The button will not stay depressed, the button will release and the Unit will start cycle operation.	

OPERATING CONTROLS FOR THE AUTO 300
Table 1 (Sheet 2 of 2)

AC FUNCTION INDICATING LIGHTS AND MONITORING LIGHTS

AS FUNCTION INDICATING LIGHTS	FUNCTION
BASKET DRIVE	Rotating drum with respirators is revolving and being cleaned.
DISINFECTANT RETURN VALVE	Disinfectant is being returned to Disinfectant Reservoir.
DRAIN VALVE	Cleaning Reservoir draining; double drain.
DISINFECTANT PUMP/VALVE	Disinfectant pumping into reservoir for cleaning; Disinfectant valve open.
	Cleaning Reservoir filling with fresh water.
FRESH WATER VALVE	Respirator equipment being disinfected.
ULTRASONIC	
MONITORING LIGHTS	**FUNCTION**
ULTRASONIC WASH	Respirator equipment is being cleaned.
EMPTY	Reservoir is being pump drained into waste system.
RINSE	Respirator equipment is being rinsed.
	Disinfectant is being pumped into Cleaning tank.
DISINFECTANT IMMERSION	Cleaning cycle is finished.
CYCLE END	

AC FUNCTION INDICATING LIGHTS AND MONITORING LIGHTS
Table 2

RESPIRATOR TYPES/SIZES

Respirator	Small	Medium	Large
North Model 7700 Black Silicone Half-mask	M-594	M-593	M-595
MSA Comfo II Yellow or Black Silicone Half-mask	M-616	M-615	M-614
MSA Ultra-Twin Yellow or Black Silicon Full-face	M-636	M-637	M-638
MSA Ultra-Vue Yellow or Black Silicone Full-face	M-610	M-611	M-612
MSA Continuous Flow Airline Half-mask	M-782	M-549	M-783
Bullard Airline Continuous Flow Hoods	.....	..M619.	.....
North 9800-30A PAPR Full-face	.....	..RUST.	.....
Survivair 5100/5200 PAPR Full-face	.....	..RUST.	
MSA Ultra-Vue Continuous Flow Airline Full-face	M-764	M-765	M-766
MSA Comfo II Belt-Mounted Half Mask	M-706	M-707	M-708

RESPIRATOR TYPES/SIZES
Table 3

NORTH (Black Half Mask) AIR PURIFYING INSPECTION

Item No.	Inspection	Corrective Action
1	Mask and attached parts are dry inside and out	Use a clean, dry, rag and wipe
2	Exhalation Valve is in good condition	Replace valve
3	Dirt on inside of Valve Cover	Wash/sanitize the cover
4	Valve Cover installed	Install the cover
5	Foreign material (such as hair, paper, plastic, or threads) between exhalation valve and valve seat	Remove and wash/sanitize the exhalation valve
6	Exhalation valve is flat	Adjust or replace
7	Central mouse tail pulled fully into the valve seat	Adjust mouse tail as required
8	Headbands frayed/worn/damaged*	Replace if excessively frayed/worn or damaged
9	Foreign material and/or soap scum on the inside or outside of the mask, attached parts, or the crease inside the mask sealing lip	Wash/sanitize the respirator
10	Headstrap right side up	Reverse headstrap
11	Inhalation Valves are present, flat, and not stuck to valve seats	Obtain replacement valves if missing, adjust as required, free up if necessary
12	Word TOP on plastic yoke is at mask nose crease	Adjust as required
13	Plastic yoke is fully installed on both facepiate nibs	Adjust as required
14	Threads on Inhalation Valve Receptacle are damaged	Replace the receptacle

* On the NORTH, some fraying is unavoidable and acceptable

NORTH (Black Half Mask) AIR PURIFYING INSPECTION
Table 4

MSA COMFO II HALF-MASK INSPECTION

Item No.	Inspection	Corrective Action
1	Perform Items 1 thru 11, Table 4	As appropriate
2	Headstrap harness metal bent/damaged	Straighten or replace as required
3	Cartridge receptacle threads damaged or rusty	Replace
4	Cartridge Sealing Gasket present in receptacles	Obtain new gasket(s)
5	Flat side of Cartridge Sealing Gasket faces out	Remove and install correctly

MSA COMFO II HALF-MASK INSPECTION
Table 5

MSA CONTINUOUS FLOW AIRLINE HALF-MASK INSPECTION

Item No.	Inspection	Corrective Action
1	Perform Items 1 thru 10. Table 4	As appropriate
2	Headstrap harness metal bent/damaged	Straighten/replace as required
3	Breathing hose screw fittings to facepiece tight	Tighten or replace screw/facepiece if stripped
4	Breathing hose screw fittings to Flow Control Valve tight	Tighten or replace screw/valve if stripped
5	Belt attached	Attach belt

MSA CONTINUOUS FLOW AIRLINE HALF-MASK INSPECTION
Table 6

MSA ULTRA-TWIN FULL FACE INSPECTION

Item No.	Inspection	Corrective Action
1	Mask and attached parts are dry inside and out	Use a clean, dry, rag and wipe
2	Headstrap harness straps fully extended through buckles	Adjust straps as required
3	Speaking diaphragm is tight	A. Remove the loose diaphragm B. Check for O-ring under diaphragm B1. Replace O-ring if required C. Ensure O-ring is correctly seated D. Install the diaphragm E. Using the flat bar wrench, tighten the diaphragm
4	Facepiece, visor clamp, bottom inside facepiece, crease behind sealing lip clean	Wash/sanitize dirty respirators
5	Exhalation Valve is flat and tucked into the valve seat	Adjust position as required
6	Exhalation Valve mouse tail is pulled completely into the valve seat	Adjust mouse tail as required
7	Foreign material (such as hair, paper, plastic, threads) between valve and valve seat or inside valve cover	Remove material and wash/sanitize the valve and/or cover
8	Inside of Exhalation Valve Cover clean	Wash/sanitize dirty covers
9	Exhalation Valve in good shape	Replace the valve
10	Exhalation Valve Cover installed	Install the cover
11	Headstrap harness buckles condition	Replace rusty buckles
12	Visor locknuts condition	Replace rusty buckles
13	Bottom hoseclamp is correctly tightened (bead of yellow/black rubber visible between clamp and black plastic)	Tighten as required Replace parts with stripped threads

MSA ULTRA-TWIN FULL FACE INSPECTION
Table 7 (Sheet 1 of 2)

MSA ULTRA-TWIN FULL FACE INSPECTION (cont.)

Item No.	Inspection	Corrective Action
14	Visor undamaged	Replace scratched/cracked visor
15	Disposable mylar tear sheet on visor	Install mylar sheet
16	Visor clamp tightened evenly on both sides (even rubber bead between clamp and visor)	Tighten as required. Replace parts with stripped threads
17	Visor and facepiece centerlines aligned	Adjust as required
18	Visor clamp undamaged	Replace clamp
19	Visor clamp is correct color for facepiece size *	Replace clamp
20	Both Inhalation Valves are present	Replace missing valves
21	Inhalation Valves flat	Adjust valve installation as required
22	Inhalation Valves free of valve seats	Release stuck valves
23	Cartridge receptacle threads undamaged	Replace receptacles with rusty/damaged threads
24	Cartridge sealing gasket installed and flat side faces out	Install missing gasket or correct the installation of the existing gasket

Facepiece size is indicated on the flap behind the visor.

Large size is indicated by orange, medium by black, and small by gray

MSA ULTRA-TWIN FULL FACE INSPECTION
Table 7 (Sheet 2 of 2)

MSA ULTRA-VUE FULL FACE INSPECTION

Item No.	Inspection	Corrective Action
1	Perform Items 1 thru 19, Table 7	As appropriate
2	Inhalation Valve Assembly is intact per the following:	Replace assemblies with damaged or defective parts
	Remove and disassemble the Valve Assembly	
	Spider gasket vanes intact	Replace gasket
	Flapper Valve is flat	Position as required
	Flapper Valve is installed beyond the round gasket sealing flange	Adjust valve position
	Assembly is free of foreign material (such as paper, plastic, hair)	Clean as required
	Reassemble the valve and gasket	

MSA ULTRA-VUE FULL FACE INSPECTION
Table 8

NORTH PAPR FULL FACE INSPECTION

Item No.	Inspection	Corrective Action
1	Perform Items 1 thru 10. Table 7	As appropriate
2	Visor locknuts in good condition	Replace rusted/damaged locknuts
3	Exhalation valve clean	Wash/sanitize as required
4	Exhalation valve condition acceptable	Replace damaged valve
5	Exhalation Valve cover installed	Install valve cover using spanner wrench
6	Speaking diaphragm locknut tight	Tighten loose locknuts
7	Visor condition acceptable	Replace cracked/scratched/broken visors

NORTH PAPR FULL FACE INSPECTION
Table 9

SURVIVAIR PAPR FULL FACE INSPECTION

Item No.	Inspection	Corrective Action
1	Perform Items 1 thru 7, Table 7	As appropriate
2	Visor locknuts in acceptable condition	Replace rusted/damaged locknuts
3	Visor locknuts tight	Tighten loose locknuts[1]
4	Visor clamp is tightened evenly at both sides[2]	Tighten clamp as required
5	Visor clamp condition acceptable	Replace damaged/rusted clamps
6	Screw caps are installed on unused Inhalation Valve ports	Install caps when missing
7	Speaking diaphragm in acceptable condition[3]	Replace punctured diaphragms

[1] Use the appropriate size Allen Wrench.

[2] Indicated by equal gaps between the metal clamp halves and an even bead of blue rubber between the clamp and outside edge of the visor.

[3] The Exhalation Valve and Speaking Diaphragm are accessed by unclipping the valve guard at the facepiece chin area.

SURVIVAIR PAPR FULL FACE INSPECTION
Table 10

MSA ULTRA-VUE CONTINUOUS FLOW AIRLINE FULL FACE INSPECTION

Item No.	Inspection	Corrective Action
1	Perform Items 1 thru 19. Table 7	As appropriate
2	Inhalation Valve Assembly is intact per the following: Remove and disassemble the Valve Assembly Spider gasket vanes intact Flapper Valve is flat Flapper Valve is installed beyond the round basket sealing flange Assembly is free of foreign material (such as paper. plastic. hair) Reassemble the valve and gasket	Replace assemblies with damaged or defective parts
3	Headstrap harness metal bent/damaged	Straighten/replace as required
4	Breathing hose screw fittings to facepiece tight	Tighten or replace screw/facepiece if stripped
5	Breathing hose screw fittings to Flow Control Valve tight	Tighten or replace screw/valve if stripped
6	Belt attached	Attach belt

MSA ULTRA-VUE CONTINUOUS FLOW AIRLINE FULL FACE INSPECTION
Table 11

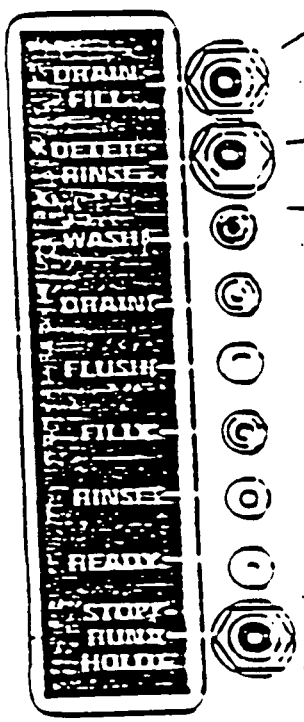
MSA COMFO II BELT MOUNTED HALF-MASK

Item No.	Inspection	Corrective Action
1	Perform Items 1 thru 11, Table 4	As appropriate
2	Headstrap harness metal bent/damaged	Straighten or replace as required
3	Cartridge receptacle threads damaged or rusty	Replace
4	Cartridge Sealing Gasket present in receptacles	Obtain new gasket(s)
5	Flat side of Cartridge Sealing Gasket face out	Remove and install correctly
6	Breathing hose screw fittings to facepiece tight	Tighten or replace screw/facepiece if stripped
7	Breathing hose screw fittings to Flow Control Valve tight	Tighten or replace screw/valve if stripped
8	Belt attached	Attach belt

MSA COMFO II BELT MOUNTED HALF-MASK
Table 12

NEW RESPIRATOR WASHER

MACHINE CONTROL PANEL



SWITCH:

To "RIGHT" drains water from machine. To "LEFT" fills machine sump tank. Manually hold in position till drained or till full to overflow.

PRIME SWITCH:

To "Left" function not used. To "Right" activates Detergent and Sanitizer Pumps. Used to prime pumps and check injection rate.

CYCLE SEQUENCE INDICATOR LIGHTS

SWITCH:

To "RIGHT" stops machine "CENTER", normal operating position - RUN. To "LEFT" Hold - wash cycle only - when in "HOLD" position machine automatic timing cycle is deactivated and wash cycle will continue until switch is returned to "RUN" (for extended wash time).

NEW RESPIRATOR WASHER
Figure 1

FEMP
RESPIRATOR RECONDITIONING REPORT

OPERATOR: | BADGE NUMBER: | DATE:

BAGS OF DIRTY RESPIRATORS RECEIVED: | NUMBER OF RESPIRATORS FOR CLEANING:

CLEANING

RESPIRATOR TYPE	SIZE	MODEL NUMBER	QUANTITY CONTAMINATED & PREWASHED	QUANTITY CLEANED		QUANTITY REWASHED	QUANTITY REJECTED BY ESH
				NORMAL	OVERTIME		
NORTH Half Mask	S	M-684					
	M	M-683					
	L	M-685					
MSA Half Mask	S	M-616					
	M	M-615					
	L	M-614					
MSA ULTRA-TWIN Full Mask	S	M-636					
	M	M-637					
	L	M-638					
MSA ULTRA-VUE Full Mask	S	M-614					
	M	M-693					
	L	M-692					
MSA Continuous Flow Airline Half Mask	S	M-782					
	M	M-649					
	L	M-783					
MSA ULTRA-VUE Continuous Flow Airline Half Mask	S	M-784					
	M	M-686					
	L	M-768					
MSA COMFO II Belt Mounted, Half Mask	S	M-706					
	M	M-707					
	L	M-708					
BULLARD Airline Hood Components	M	M-619					
NORTH PAPR Full Face		RUST					
SURVIVAIR PAPR Full Face		RUST					
Headgear							

PARTS REPLACED

PART	RESPIRATOR TYPE AND SIZE	REASON

OVERTIME REPORT

OPERATOR SIGNATURE: | SUPERVISOR SIGNATURE:

COMMENTS

FS-F-3521 (REV. 01/06/95)

RESPIRATOR RECONDITIONING REPORT
Form FS-F-3521
Figure 2

Stores No.:	M-
Size (circle):	S M L
Date Cleaned:	
Cleaner Initials:	
IH Inspector Initials:	
Radiation Smear No.:	

RECONDITIONING RESPIRATOR TAG
Form FS-IRS&T-3446
Figure 3

RECORD OF ISSUE/REVISIONS

DATE	REV. NO.	DESCRIPTION AND AUTHORITY
06-09-92	0	Procedure for Cleaning/Repairing Respirators required per Request No. P92-022. initiated by B.L. Krupa.
02-06-95	0	Reissued procedure for Respirator Wash Facility per Request No. P95-0005. initiated by D.B. Katz.
Draft	0	Procedure reissued to conform to current program requirements per Request No. P95-0228. initiated by W.C. Adams.