

1215R

717274

MARTIN M. YOUNG
Richard E. Revellman
Mark W. Nader
Mark R. Weissert
Of Counsel
James Roy Williams
M. W. Young (1906-1977)

Martin M. Young
& ASSOCIATES CO., L.P.A.

Attorneys at Law

Sixth Floor / 130 East Sixth Street / Cincinnati, Ohio 45202
(513) 721-1079

Other Offices
Brentwood-Finneytown
Northgate-Colerain
Tri-County
Clermont County

Please refer to file number

BEST COPY AVAILABLE

January 30, 1986

Wayne Range
Freedom of Information Officer
Department of Energy
Oak Ridge Operations
P.O. Box E
Oak Ridge, Tennessee 37831

RE: Freedom of Information Request

Dear Mr. Range:

Under the provisions of the Freedom of Information Act, 5 U.S.C. 552, I am requesting copies of records relating to the Feed Materials Production Center in Fernald, Ohio and also information held by the Department of Energy regarding the health risk of cancer from exposure to uranium, uranium compounds, or other radioactive sources encountered by workers at the FMPC.

The specific records that I request are as follows:

1. Toxicology, clinical, occupational, or epidemiological studies or research conducted by the AEC, ERDA, or DOE regarding the health risk of cancer from exposure to uranium, uranium compounds, or other radioactive sources encountered by workers at the FMPC.
2. Research, reports, memorandum, correspondence, or other information provided by the AEC, ERDA, or DOE to NLO, Inc. or NL Industries as the past operators of the FMPC regarding the health risk of cancer from exposure to uranium, uranium compounds, or other radioactive sources encountered by workers at DOE facilities.
3. Health and safety complaints received by the AEC, ERDA, or DOE from workers or their representatives regarding exposure to uranium at the FMPC.

86 FEB 12 14:43
FIELD OFFICE
INFORMATION OFFICE
USDOE ORO

REPOSITORY
Oak Ridge Operations
Records Building Area
Collection
4-15-8 37 of 46
8-9-71 37 of 46
Box No.
714-4
Folder
1 of 2
649

1114461

Wynn
Principal Information Officer
Department of Energy
January 30, 1986
Page Two

4. Annual, periodic, or special health physics appraisals, reports, or investigations conducted by the AEC, ERDA, or DOE of the FMPC during the period 1955 through 1985.
5. Violations by NLO, Inc. of any federal regulations, statutes, or rules applicable to NLO, Inc.'s operation of the FMPC.

Please consider this letter an assurance of our willingness to pay fees in this matter. Please inform me, however, of the expected cost before filling my request if the total expected cost exceeds \$600.00.

If all or any part of this request is denied, please state the specific exemption that you believe justifies your refusal to release the information and also please inform me of the appeal procedures available to me.

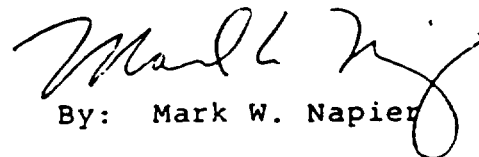
As you may recall, a partly similar request was submitted by me previously in a letter dated April 5, 1985. Our request in that letter for waiver of fees was eventually denied. You may wish to refer to your letter dated June 12, 1985 when responding to my request for information regarding the estimated costs.

I would appreciate your prompt handling of this request and look forward to hearing from you within ten days.

Thank you for your assistance.

Very truly yours,

MARTIN M. YOUNG
& ASSOCIATES CO., L.P.A.


By: Mark W. Napier

MWN/jj

1114462

649

1986

PS Form 3811, July 1983 447-845

DOMESTIC RETURN RECEIPT

SENDER: Complete items 1, 2, 3 and 4.

Put your address in the "RETURN TO" space on the reverse side. Failure to do this will prevent this card from being returned to you. The return receipt fee will provide you the name of the person delivered to and the date of delivery. For additional fees the following services are available. Consult postmaster for fees and check boxes for service(s) requested.

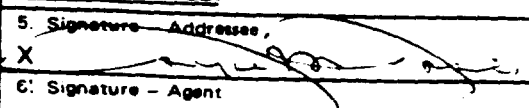
1. ☒ Show to whom, date and address of delivery

2. ☐ Restricted Delivery.

3. Article Addressed to:
 Mark W. Napier, Esquire
 Martin M. Young & Associates Co., LPA
 Sixth Floor
 130 East Sixth Street
 Cincinnati, Ohio 45202

4. Type of Service: Article Number
☐ Registered ☐ Insured
☒ Certified ☐ COD P 165 873 817
☐ Express Mail

Always obtain signature of addressee or agent and **DATE DELIVERED.**

5. Signature - Addressee,
 X 

6. Signature - Agent
 X

7. Date of Delivery

8. Addressee's Address (ONLY if requested and fee paid)

RECEIVED
 JUL 17 1983
 POST OFFICE
 CINCINNATI, OHIO

P 165 873 817

RECEIPT FOR RETURNED MAIL

See Reverse

U.S.G.P.O. 1984 446-014

U.S. Form 3800, Feb. 1982

Mark W. Napier, Esquire

Street and No.
 130 East Sixth Street

P.O., State and ZIP Code
 Cincinnati, Ohio 45202

Postage \$

Certified Fee

Special Delivery Fee

Registered Delivery Fee

Return Receipt Showing to Addressee and Date Delivered

Return Receipt Showing to Whom Date and Address of Delivery

TOTAL Postage and Fees \$

Postmark or Date

1114463

APR 2 1986

Mark W. Napier, Esquire
Martin M. Young & Associates
Co., L.P.A.
130 East Sixth Street
Cincinnati, Ohio 45202

Dear Mr. Napier:

This letter supplements our April 1, 1986, response to your January 30, 1986, Freedom of Information Act (FOIA) request.

In response to item 3 of your request, enclosed are five (5) complaints from workers at the FMPC that may directly or indirectly involve exposure to uranium. Followup investigations of these complaints which were conducted or authorized by the Department of Energy (DOE) are attached to the complaints and respond, in part, to that portion of item 4 of your request concerning "investigations conducted by the AEC, ERDA, or DOE of the FMPC during the period 1955 through 1985."

As noted, names, home addresses, and other personal identifiers have been deleted from each of the complaints and the accompanying investigation reports. These deletions were made in order to protect the personal privacy of the individuals to whom the complaints pertain. Release of these names would constitute a clearly unwarranted invasion of those individuals' privacy as there is no public benefit to be derived from such release. Release could also lead to unsolicited contact of the individuals. Therefore, this information is exempt from disclosure in accordance with the provisions of 5 U.S.C. §552(b)(6) of the FOIA and 10 C.F.R. §1004.10(b)(6) of DOE's implementing regulations which exempt from mandatory public disclosure "personnel and medical files and similar files the disclosure of which would constitute a clearly unwarranted invasion of personal privacy."

Also enclosed in response to item 3 are the following documents:

1. Letter from a former NLO, Inc., employee to Dr. Thomas H. Mancuso, dated June 12, 1976, and a copy of Dr. Mancuso's response dated July 7, 1976. Also attached is a copy of a letter dated March 28, 1977, from S. F. Audia, NLO, Inc., to H. Doran Fletcher concerning a Workmen's

DOE FORM AD-8 (12-77)
CERTIFIED MAIL

OFFICIAL FILE COPY

RETURN RECEIPT REQUESTED

CONCURREN
RTG SYMBOL
INITIALS/SIG
DATE
RTG SYMBOL
INITIALS/SIG
DATE
RTG SYMBOL
INITIALS/SIG
DATE
RTG SYMBOL
INITIALS/SIG
DATE
RTG SYMBOL
INITIALS/SIG
DATE
RTG SYMBOL
INITIALS/SIG
DATE
RTG SYMBOL
INITIALS/SIG
DATE

1114464

APR 2 1986

Compensation Claim filed by the above NLO, Inc., former employee. The name and home address of this former NLO, Inc., employee have been deleted for the same reasons outlined above.

2. A formal complaint filed in the Court of Common Pleas, Hamilton County, Ohio, by Ms. Diane T. Hicks, alleging that her husband was exposed to uranium oxides while employed by NLO, Inc.

Although the above two documents are not formal occupational, safety, or health complaints received by DOE directly from workers, they are, however, complaints in the sense that they allege exposure to uranium as a result of employment at NLO, Inc.

In response to item 4 of your request, enclosed are copies of investigation reports and documentation related to reported overexposures of radiation at the FMPC. These investigations were conducted in accordance with DOE Order 5484.1, Environmental Protection, Safety, and Health Protection Information Reporting Requirements. Below is a listing of the enclosed documents:

1. April 11, 1980, letter from S. F. Audia to H. D. Hickman, with enclosed report dated April 9, 1980.
2. April 22, 1980, memorandum from William H. Travis to George P. Dix.
3. July 1, 1980, letter from H. D. Hickman to Samuel F. Audia.
4. July 30, 1980, letter from S. F. Audia to H. D. Hickman.
5. November 10, 1983, memorandum from M. W. Boback to R. M. Spenceley.
6. November 11, 1983, memorandum from R. M. Spenceley to Distribution.
7. November 14, 1983, Incident Report.
8. December 8, 1983, DOE Contact Report.
9. December 16, 1983, memorandum from G. L. Stukenbroeker to R. M. Spenceley.
10. February 28, 1984, memorandum from William H. Travis to David E. Patterson.
11. March 6, 1984, letter from M. R. Theisen to R. M. Spenceley.

CONCURRENC
RTG. SYMBOL
INITIALS/SIG
DATE
RTG. SYMBOL
INITIALS/SIG
DATE
RTG. SYMBOL
INITIALS/SIG
DATE
RTG. SYMBOL
INITIALS/SIG
DATE
RTG. SYMBOL
INITIALS/SIG
DATE
RTG. SYMBOL
INITIALS/SIG
DATE
RTG. SYMBOL
INITIALS/SIG
DATE

1114465

APR 2 1986

12. December 3, 1984, memorandum from David B. Howard to David E. Patterson.
13. February 6, 1986, Report Number ORO-855, Investigation of September-December 1984 Plant 9 Excessive Uranium Emissions, Feed Materials Production Center.
14. January 30, 1986, memorandum from R. L. Egli to Robert W. Barber.
15. February 24, 1986, memorandum from James A. Reafsnyder to David Howard, with attachments.

As noted, names, social security numbers, and other personal identifiers have been deleted from items, 1, 2, 5, 8, 9, 10, 12, 14, and 15, above. These deletions were made in order to protect the personal privacy of the individuals who were exposed to radiation in excess of quarterly limits. Release of the exposed individuals' names would constitute a clearly unwarranted invasion of those individuals' personal privacy as there is no public benefit to be derived from such release. Release could also lead to unsolicited contact of the individuals. Therefore, this information is exempt from disclosure in accordance with the provisions of 5 U.S.C. §552(b)(6) of the FOIA and 10 C.F.R. §1004.10(b)(6) of DOE's implementing regulations which exempt from mandatory public disclosure "personnel and medical files and similar files the disclosure of which would constitute a clearly unwarranted invasion of personal privacy."

The enclosure consists of 220 pages. When combined with the 29 pages provided you on April 1, 1986, the total number of pages transmitted to date is 249. When we complete our response and a final cost determination has been made, we will notify you of the full amount due. At that time, we will also advise you of your right to appeal.

The health physics appraisal reports responsive to item 4 and all documents responsive to item 5 of your request will be forwarded to you by April 11, 1986.

Sincerely,

P. T. Marquess
 Authorizing Official
 Assistant Manager
 for Administration

CC-10:RSS

Enclosures:
 As stated

DOE FORM AD-9 (12-77)

OFFICIAL FILE COPY

CONCURRENT
RTG. SYMBOL
INITIALS/SIG
DATE
RTG. SYMBOL
INITIALS/SIG
DATE
RTG. SYMBOL
INITIALS/SIG
DATE
RTG. SYMBOL
INITIALS/SIG
DATE
RTG. SYMBOL
INITIALS/SIG
DATE
RTG. SYMBOL
INITIALS/SIG
DATE

1114466

Mark W. Napier, Esquire

-4-

APR 2 1986

bcc: Wayne Range, M-4
Tom Jelinek, SE-33
Marcia Thomas, SE-33

CONCURRENC
RTG SYMBOL
CC-10
INITIALS/SIG
SE-33
DATE
4/2/86
RTG SYMBOL
SE-33
INITIALS/SIG
JELINEK
DATE
4/2/86
RTG SYMBOL
AD-40
INITIALS/SIG
MARQUIS
DATE
4/2/86
RTG SYMBOL
INITIALS/SIG
DATE
RTG SYMBOL
INITIALS/SIG
DATE
RTG SYMBOL
INITIALS/SIG
DATE
RTG SYMBOL
INITIALS/SIG
DATE
RTG SYMBOL
INITIALS/SIG
DATE

CC-10:RSanders:6-1216:4/2/86

1114467

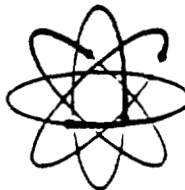
~~OFFICIAL USE ONLY~~

716

NATIONAL LEAD COMPANY OF OHIO

A SUBSIDIARY OF NL INDUSTRIES, INC.

P. O. BOX 39158



CINCINNATI, OHIO 45239

PHONE: AREA CODE: 513-738-1151

APR 11 1980

Mr. H. D. Hickman, Director
Manufacturing Division
Oak Ridge Operations
Department of Energy
P. O. Box E
Oak Ridge, Tennessee 37830

Dear Mr. Hickman:

BETA RADIATION DOSE IN EXCESS OF DOE QUARTERLY LIMIT

Reference: Letter, K. N. Ross and E. Schonegg to W. J. Adams and
R. C. Heatherton, 4/9/80, "Investigation of High Radiation
Exposure" (Official Use Only)

During the first quarter of CY-1980, an employee of the National Lead Company of Ohio received a radiation dose to the skin of the whole body of 8.7 rems. The quarterly limit specified in Manual Chapter 0524 is 5 rems.

Information required for a Type C investigation, as required in Manual Chapter 0502, is given below in sections (1), (2) and (3). Additional information is given in section (4) and in the enclosed investigation report (reference).

(1) How the Exposure Occurred

During the dosimetry badge use period from January 2, 1980 to February 6, 1980, a chemical operator at the FMPC received a dose of 7.8 rems to the skin of the whole body. Most of this exposure was received while he worked at the station in Plant 5 where graphite crucibles are loaded with about 1400 pounds of uranium metal scrap for remelting. Principal sources of beta radiation were crucibles being loaded which contain, imbedded in the graphite, uranium daughter products from previous melts; the crucible lids which also contain daughter products; and scrap ingot crop ends which contain daughter products in above-equilibrium concentrations.

*Response to
item 4*

*Same as
1194*

1114468

(2) Personal Information

- (a) Name:
(b) Date of Birth:
(c) Place of Birth:
(d) Sex:
(e) Social Security Number:

(3) Radiation Exposure Information

<u>Exposure Periods</u>	<u>Radiation Dose, Rems</u>			
	<u>Skin of the Whole Body</u>	<u>Whole Body</u>	<u>Hands</u>	<u>Forearms</u>
1/2/80-2/6/80	7.79	0.50	22.2	7.4
2/6/80-3/5/80	0.37	0.05	1.5	0.5
3/5/80-4/2/80	0.53	0.06	0.6	0.2
Quarterly Totals	8.69	0.61	24.3	8.1

(4) Additional Information

Several contributing causes for this overexposure are given in the investigation report (reference). There is, however, no single major reason for the high exposure to have occurred at this time. The work being done was the same type of work done for years at the crucible loading station. The materials being handled were similar to those handled in the past. [REDACTED], the chemical operator who received the high exposure, is a long-time Plant 5 employee who had worked at this station many times.

While there is no single apparent reason for the high exposure, there is no justification for rejecting the exposure as invalid.

[REDACTED] was first told about his high exposure when he was transferred from crucible loading in early February. During the investigation he was questioned several times about his work practices and he was aware of the reason for the questioning. On April 9, 1980, [REDACTED] was informed that a report would be sent to DOE-OR as the official notification that his quarterly dose to the skin of the whole body exceeded the DOE standard. He was also informed of the investigation findings and the steps being taken to prevent a recurrence. [REDACTED] expressed no concern about the overexposure.

Two actions have been taken to reduce the charge operator's exposure. These are crucible aging and the use of a protective apron. Other changes are being considered.

"Primary" ingots are made from the crop ends of previous ingots. These crop ends usually contain a significant level of uranium daughter products which tend to migrate into the crucible walls from the molten metal. Thus, the used crucible itself is a significant radiation source if it is quickly reused. These crucibles will be placed in storage after each use and another crucible withdrawn for the next "primary" charge. With the present supply of these crucibles a holding period of four-six weeks is possible. Since the uranium beta-emitting daughters decay with a 24-day half-life, this delay in reuse will reduce the crucible beta radiation level by at least 50%.

Crucible graphite lids also absorb the beta-emitting uranium daughter products and become radiation sources. These lids must be handled for 5-15 seconds for each crucible charged. Operators now wear a leaded-vinyl apron while handling the lids.

Sincerely yours,
Original Signed By
S. F. AUDIA
Manager
S. F. Audia
Manager

MWB/fb

Enc.

cc: W. J. Adams
M. W. Boback
R. C. Heatherton
/H. D. Hickman - 2
A. J. Mangold
K. N. Ross
G. C. Smith

Central Files

OFFICIAL USE ONLY

1114470

~~CONFIDENTIAL~~

NATIONAL LEAD COMPANY OF OHIO

A SUBSIDIARY OF THE LEAD INDUSTRIES INC.

CINCINNATI, OHIO 45239

April 9, 1980

SUBJECT INVESTIGATION OF HIGH RADIATION EXPOSURE

TO W. J. Adams and R. C. Heatherton

FROM K. N. Ross and E. Schonegg

REFERENCE

1. Letter, Adams and Heatherton to Ross and Schonegg, "Investigation of High Radiation Exposure," 2/27/80
2. Letter, Heatherton to Adams, "Reduction of Extremity Dose, [REDACTED]," 2/7/80
3. Letter, Schonegg to Mangold, "Recent Exposure To Operators at Remelt Charging Station," 3/20/80

Background

On February 14, 1980, the film dosimeter worn by [REDACTED], badge # [REDACTED], during the January, 1980 film badge period, showed an exposure of 7790 mrad beta plus gamma. This is greater than the quarterly permissible dose of 5000 mrad. A complete investigation of the exposure was requested. (1)

Conclusions

1. The exposure to the January, 1980 chest dosimeter film worn by [REDACTED] was a legitimate occupational exposure. The beta plus gamma exposure shown by this film, 7790 mrad, represents the exposure to the skin of the head, arms, and front of the upper part of his torso, with only minor exceptions. A small part of the dose to the film occurred when the badge was exposed closer to the radiation source than his skin. This dose difference is smaller than the deviation in the film reading and calculation.
2. The high exposure was not caused by any single factor. During this investigation several contributing causes were found. The fact that [REDACTED] chest dosimeter exposure during both November and December, 1979, were a little above average is due to his working habits. The high exposure in January, 1980, is due also to the

OFFICIAL USE ONLY

1114471

Investigation of High Radiation Exposure
W. J. Adams and R. C. Heatherton
April 9, 1980

Page 2

above-mentioned work habits plus an unknown factor. This factor was probably the charging during January, 1980 of a lot or several lots of remelt scrap containing large amounts of uranium daughters in regular product charges. These daughters being buried in the uranium would give only a slightly increased dose during the actual charging. During subsequent reuse of the crucibles and lids they were charged into, they would give a large dose since they would be on the surface and without the shielding of the uranium metal. This factor by itself would probably not have caused the exposure received by [REDACTED], but with the contributing factors, it did.

Recommendations

1. Continue to emphasize administrative controls and verify they are being followed. (3)
2. Request Engineering Division to redesign the method of lidding charged crucibles.
3. Devise a method to keep the crucible to be loaded next on the conveyor out of the charge station.
4. Determine if it is necessary for the operator to watch the loaded crucible move to the lidding station on the conveyor. If it is necessary, provide a better way to do so.
5. Train operators to stay away from the crucible being charged. Use the hoist instead of hands.

Investigation

When the film was read on February 13-14, 1980, it was examined closely by both the technician and supervisor of Bioassay Department. No indication of misuse was found. The pattern on the film caused by the shields was good. There was no indication of x-ray exposure or chemical damage.

[REDACTED] keeps his film badge in his pocket or on a bedside table when he is not at work. He could remember no time when he had temporarily lost or misplaced his badge during January 1980. He wears his badge on the

right collar point of his coveralls and normally wears sleeveless coveralls. He had no x-rays taken during January.

██████████ height and arm length are such that when he reaches into the crucible to load pieces his badge frequently dangles into the crucible. This could cause a slightly higher reading in the badge than the real exposure to his skin. This is believed to be a small difference and would have only minor effect on his dose.

██████████ states that he did not use the crucible shield. He said it interfered with charging the crucibles. The only different type of material he remembers charging during January was some old crushed tubes. He remembers because he had to pour them out of the box into a can and hand load them into the crucibles. They were heavily oxidized.

During the months of November and December, 1979, and January, 1980, ██████████ had been assigned to the Plant 5 east crucible charging station. He was removed from this job on February 6, 1980 because of his January wrist dosimeters indicating he had received (2) about 75% of the forearm quarterly permissible dose.

The crucible charging operation is well known to be a potential source of high radiation exposure to the operators. During the past, operators have frequently been removed from it to lower exposure jobs when their monthly wrist or chest dosimeters showed they might exceed the quarterly permissible dose if allowed to continue on this job. The average monthly beta plus gamma chest dosimeter exposure during the past year was 1026 mrad. The highest monthly exposure was 1632 mrad. The average wrist dosimeter monthly beta plus gamma exposure during 1979 was 2426 mrad. The highest last year was 4460 mrad per month.

During the month of January, 1980, ██████████ chest dosimeter received an exposure of 7790 mrad while working 147 hours at the charging station. The dose rate averaged 53 mrad per working hour. This is three times the dose rate he received during November and December 1979 on the same job. It is about five times the dose rate received by other operators during 1979.

OFFICIAL USE ONLY

1114473

Investigation of High Radiation Exposure
W. J. Adams and R. C. Heatherton
April 9, 1980

Page 4

During the month of February, 1980, [REDACTED] replacement at the crucible charge station had an exposure of 4177 mrad. He worked 128 hours at the charge station, which corresponds to a dose rate of 33 mrad/hr or about three times the average rate.

Contributing Factors

1. Poor material handling methods.

During the January film badge period [REDACTED] charged 290 crucibles. Thirty of these were primary charges. These charges are usually made in used crucibles. The crucibles are stored on pallets in the area. They are brought to the charge platform by a handstacker. To put these crucibles into the charge station the operator puts a cable sling around them and hoists them to the charge station. This involves manhandling a crucible to get the sling in place and guiding it into the charge station and removing the sling. The radiation received by the operator during this operation is considerable since the crucibles are used and well saturated with uranium daughters. The operator is nearly in contact with the crucible during the entire operation. Gloves are worn to protect his hands. Radiation measurements one foot from these crucibles on March 4, 1980 were 200 mrad/hr or more. Contact measurements range from 800 to 3000 mrad/hr.

Product charges are made up of one to three derbies plus other solid metal. The radiation exposure received from the charge varies with the age of the metal after its last melting and the method used to put it in the crucible. Derbies are usually not aged. Contact radiation measurements of derbies on the remelt platform ranged from 120 up to 150 mrad/hr. Derbies are put into the crucible with a hoist. The operator is not in direct contact with the derbies and so receives less radiation.

Radiation from other remelt solid metal ranges from 120 to 200 mrad/hr, except that top crops and spill metal are usually much higher.

Investigation of High Radiation Exposure
W. J. Adams and R. C. Heatherton
April 9, 1980

Page 5

This material may be put in the crucible manually or if too heavy by use of the hoist. The preferred method is to manually place each piece in the crucible. This involves picking up one or more small pieces, carrying them less than 6 ft to the charge station, and putting them into the crucible. These pieces are rather carefully positioned in the crucible to get maximum weight in minimum space. The operator leans over the crucible with one or both arms extending into it to position the pieces. During this time his badge is dangling inside the top of the crucible. This is the location where the highest radiation levels are found.

Carrying the heavier pieces to the crucible close to the chest, and the badge, also contributes to the high exposure to the badge and upper body. Smaller pieces are usually carried in each hand with the hands below waist level. Larger pieces like top crops and large tubes require both hands and are usually carried near the upper chest and badge.

When the crucible is charged it is moved into the furnace loading station and a lid is put on it. These lids are kept in a 30-gallon drum on the platform nearby. Radiation from these lids is the highest that occurs in the production of uranium. Measurements of 3000 mrad/hr are common and measurements of 10,000 mrad/hr have been made.

To put the lid on the crucible the operator leans over the drum, inserts both arms in the drum and picks up a lid. The lid is then carried about four feet to the lidding station. The operator carries the lid in both hands directly in front of his chest. When he reaches the station he slides the lid on top of the crucible. If radiation from the crucible lids averaged 3000 mrad/hr at the operator's chest, he would be receiving 50 mrad/minute. The time needed to lid the crucible is about 3 to 5 seconds, so he would receive 724 to 1208 mrad from this operation for 290 charges. The rubber apron now being used at this station reduces the exposure to 32 mrad for the 290 charges.

Radiation measurements on the charge platform range from 2 to 50 mrad/hr. The lowest exposure is near

Investigation of High Radiation Exposure
W. J. Adams and R. C. Heatherton
April 9, 1980

Page 6

the desk. The highest is in front of the charge station. A crucible in the charge station raises the radiation at 1 ft from the charge station at chest height to 75-150 mrad/hr until the shield is in place.

2. Infrequent use of crucible shield.

On March 18, 1980, seven crucibles were monitored with and without the shield in use. The radiation was reduced by 80 to 95 percent when the shield was in use.

Other things observed at this time that would increase exposure to the charge operator were: (a) The crucible on the conveyor behind the crucible being loaded sticks too far into the charging station. Radiation measurements at the operator's chest with the charge station empty were about 40 mrad/hr. (b) The operator puts his head in the charge station to watch the loaded crucible roll from the station on the conveyor. This exposes his head, chest, and badge to the radiation from the crucible next to be loaded at a very short distance.

3. Length of film badge period.

The extended working period during which the January film badge was worn increased the monthly dose received. Had the film badge been exposed for only 20 working days the exposure would have been about 6000 mrad. This is still well above the permissible quarterly limit of 5000 mrad.

4. Other factors.

Other factors to be considered include the method of charging used. [REDACTED] prefers to charge by hand loading as much as he can. This keeps him nearer the sources of radiation than is necessary when using the hoist. The radiation from the material charged was not measured. The type of material making up the charges appears to be the same as used during previous months. The past history of the charging operation during 1979 can be seen in Table 2. This shows that except for the radiation dose, January 1980 was an average month. It appears probable that during January

some material containing a large amount of uranium daughters was used. This would slightly increase the exposure to the charge operator while it was being charged. When it was melted the uranium daughters would collect on the top of the crucibles and on the lid to cause more exposure as they were reused.

Table 1 shows the types of ingots made, the percent primary ingots made, the beta plus gamma dose of the operator who had most time at the charging station, and the hours worked at the charging station during each month of 1979 and January and February, 1980. During April and September too many people worked at the charge station for their dose to have any significance. During several other months two or more employees worked at the station. The dose and time shown on the table are those with the most hours worked at the charge station during the month.

Table 1. Beta plus Gamma Dose Rates, Crucible Charge Station

	Dose Rate At Chest Height mrad/hr
Center of lidding platform lid on lid drum	20-25
Aisle between scale and derbies	8-10
At desk	2-3
Center of charge platform over sawed ingots	8-10
Empty charge station	10-20
Next crucible half visible	40-50
Empty crucible in place without crucible shield	75-150
Empty crucible in place with crucible shield	40-50

OFFICIAL USE ONLY

1114477

OFFICIAL USE ONLY

Investigation of High Radiation Exposure
W. J. Adams and R. C. Heatherton
April 9, 1980

Page 8

Table 2. Remelt Charges, January 1979 to February 1980

Date	Mark 31	Number of Remelt Charges				B + γ Dose mrad	Hrs. Worked	Dose Rate mrad/hr worked
		Primaries	Total	Primaries	Flats & Ti's			
Jan. 1979	281	39	320	12.2	0	1632	174	9.3
Feb. 1979	139	21	160	13.1	0	589	71	8.3
Mar. 1979	235	35	270	13.0	0	822	119	6.9
Apr. 1979	207	35	242	14.5	30	X	X	---
May 1979	187	23	210	11.0	4	647	99.5	6.5
June 1979	121	37	158	23.4	8	883	88	10
July 1979	68	13	81	16.0	0	670	72	9.3
Aug. 1979	193	15	208	7.2	1	1041	129.5	8.0
Sept. 1979	137	6	143	4.2	0	X	X	---
Oct. 1979	276	23	299	7.7	2	1200	83.5	14
Nov. 1979	219	13	232	5.6	9	1452	78	19
Dec. 1979	123	10	133	7.5	10	1302	78	17
Jan. 1980	260	30	290	10.3	5	7790	147	53
Feb. 1980	143	28	171	16.4	5	4177	128	33

Footnotes:

In 1979 there were a total of 2456 charges made of which 270 or 11% were primaries.

X = several people worked short periods. No definite radiation exposure assigned.

OFFICIAL USE ONLY

1114478

~~CONFIDENTIAL~~
Investigation of High Radiation Exposure
W. J. Adams and R. C. Heatherton
April 9, 1980

Page 9

K. N. Ross
K. N. Ross

E. Schonegg
E. Schonegg

KVR:ES/vvs

cc: S. F. Audia
M. W. Boback
L. E. Green
A. J. Mangold
G. C. Smith

OFFICIAL USE ONLY

1114479

April 22, 1980

George P. Dix, Director, Operational and Environmental Safety Division
(EV-12), DOE-HQ

**QUARTERLY REPORT OF RADIATION EXPOSURES - DOSE TO SKIN OF WHOLE BODY
IN EXCESS OF THE QUARTERLY LIMIT**

During the first quarter of CY 1980, an employee at the Feed Materials Production Center (FMPC), Fernald, Ohio, received a radiation dose to the skin of the whole body of 8.69 rems which is in excess of the DOE quarterly limit of 5 rems. The FMPC is operated by the National Lead Company of Ohio for DOE under Contract Number DE-AC05-76OR01156.

The following information is provided in accordance with DOEM Appendix 0502, Part I, D.2.a.:

1. Description of How Exposure Occurred

During the period of January 2, 1980 - April 2, 1980, a chemical operator at the FMPC received a dose of 8.69 rems to the skin of the whole body. The majority of this dose was received while working at a station in FMPC Plant 5 where graphite crucibles are loaded with ~1400 pounds of uranium metal scrap for remelting. The principal sources of beta radiation include the crucibles which contain, embedded in the graphite, uranium daughter products from previous remelts, the crucible lids which also contain daughter products, and scrap ingot crop ends which contain daughter products in above equilibrium concentrations. There has been no single apparent reason for the high exposure identified as the work being conducted was of the same type which has been performed at this station for a number of years. The principal contributing factors appear to be poor material handling methods and an unusual number of remelts involving ingot crop ends.

April 22, 1980

2. Personal Information

- a. Name: [REDACTED]
- b. Date of Birth: [REDACTED]
- c. Place of Birth: [REDACTED]
- d. Sex: Male
- e. Social Security Number: [REDACTED]

- 3. a. Exposure period: 1/2/80 - 4/2/80
- b. Types of radiation: beta and gamma
- c. Dose to skin of whole body: 8.69 rems

MS-334:BJD

William H. Travis
William H. Travis, Director
Safety and Environmental Control Division

cc: C. A. Keller, MS-30
H. D. Hickman, MS-31
R. Handler, MS-333

1114481

July 1, 1980

National Lead Company of Ohio
ATTN: Mr. Samuel F. Audia
Manager
Post Office Box 39158
Cincinnati, Ohio 45239

Gentlemen:

BETA RADIATION DOSE IN EXCESS OF DOE QUARTERLY LIMIT

Reference: Letter from S. F. Audia, NLO, to H. D. Hickman, DOE, dated April 11, 1980, regarding the above subject.

Based upon our review of the investigation report on the above subject, we find the report's recommendations to cover items which an aggressive exposure reduction program should identify as a matter of routine. This leads to the conclusion that strong, additional emphasis needs to be placed on exposure reduction efforts.

We believe a detailed analysis of the depleted stream directed toward exposure reduction and involving operations, engineering, and health physics personnel to be necessary. Such an analysis should consider external (whole body, skin, and extremities) as well as internal exposure sources and identify administrative procedural, and engineering controls which can be employed to reduce such exposures. This should be done with an objective of minimizing integrated person-rem as well as individual exposures and should identify incremental improvements expected for various available options. It should also include estimates of cost and programmatic impacts as appropriate. The analysis should include information covering reductions in exposures to levels 20% of the applicable exposure standards.

1114482

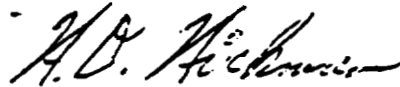
National Lead Company of
Ohio

2

July 1, 1980

Please provide me by July 18, 1980, with a schedule for completion of such an analysis. Completion of the analysis by phases with priority given to areas of the potential high exposure is acceptable.

Sincerely,


H. D. Hickman, Director
Manufacturing Division

MS-334:BJD

cc: C. A. Keller, MS-30
W. H. Travis, MS-33

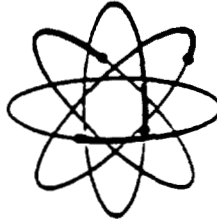
1114483

Official Copy
③ New File -
I, D. 4. Oie...

NATIONAL LEAD COMPANY OF OHIO

A SUBSIDIARY OF N.L. INDUSTRIES, INC.

P. O. BOX 39158



CINCINNATI, OHIO 45239

PHONE: AREA CODE: 513-738-1151

July 30, 1980

Mr. H. D. Hickman, Director
Manufacturing Division
Oak Ridge Operations
Department of Energy
P. O. Box E
Oak Ridge, Tennessee 37830

Dear Mr. Hickman:

PLAN FOR RADIATION EXPOSURE REDUCTION

Reference: Letter, H. D. Hickman to S. F. Audia, 7/1/80, "Beta Radiation Dose in Excess of DOE Quarterly Limit"

Enclosed is our plan for making a detailed analysis of the depleted uranium operation with the purpose of reduction in radiation exposure. The plan includes all the requirements which you outlined in your July 1, 1980 letter referenced above. Also included is the expected completion date for each step of the plan.

An ad hoc committee of engineering, production, and health physics personnel has been formed for coordination of effort in making this analysis. The Director of Health & Safety is chairing this committee which will meet periodically as required for the purpose of reviewing the progress of the investigation and to provide guidance for the project. The chairperson will report to me monthly until the project is completed and I will keep you informed of the status of the work.

Priority will be given to the areas and jobs with potential for highest exposure. For example, it is known that the crucible loading and ingot sawing operations are the sources of highest external exposure. The possible engineering controls for these operations were looked at in considerable detail about a year ago. Extension of this work will require that we engage an Architect-Engineer Firm and funds for this activity have not been budgeted. The completion dates for items 7 and 9 are our best estimates based on authorization for expenditure of interim funds which will be requested for the engineering study, bid award to the A-E and the A-E study and estimate.

1045

103 1 18

1114484

In this analysis most of the effort will be directed at reduction of individual exposures. It is believed this will also result in the greatest reduction in the integrated person-rem dose. However, both goals will be kept in mind throughout the study.

If you have any questions or suggestions regarding our approach to this problem please let us know. Mr. B. J. Davis of your Safety & Environmental Control Division could contact Mr. R. C. Heatherton, our Director of Health & Safety, for that purpose.

Sincerely yours,



S. F. Audia
Manager

RCH/fb

Enc.

cc: W. J. Adams
R. C. Heatherton
✓H. D. Hickman - 2
W. C. Hill
G. C. Smith
N. R. Leist
Central Files

1114485

PLAN FOR EXPOSURE REDUCTION ANALYSIS - DEPLETED URANIUM PROCESSING STREAM

1. List all operations in the depleted U process from receipt of UF_4 to metal shipment. Completion Date - 8/1/80
2. List all personnel exposures exceeding 20% of the permissible exposure in each of the following categories: External exposure - (a) whole body, (b) skin of the body, (c) extremities. Internal exposure - (a) lung burden determined by in vivo monitoring. Completion Date - 8/15/80
3. Using cost centers and information gained from work records and interviews with supervisor, determine operation parts contributing to exposure. Completion Date - 9/1/80
4. Where necessary, investigate more thoroughly the methods of doing the work and the resulting exposures. Through observation of work methods, external radiation surveys, and airborne radiation surveys, determine the causes of exposure. Completion Date - 10/15/80
5. Evaluate degree of exposure from various jobs and assign priority for evaluating exposure reduction methods. Completion Date - 11/15/80
6. Giving highest priority to those operations which contribute to greater than 50% of the permissible exposure, determine what can be done to reduce exposure by administrative or procedural control. Estimate percent reduction that can be achieved, the cost of effecting this reduction, and the programmatic impact. Completion Date - 12/15/80
7. For these same operations determine the engineering controls which can be implemented, the expected reduction, the cost, and the programmatic impact for each of these controls. Completion Date - 5/1/81
8. Extend the investigation outlined in step 6 to operations contributing 20 to 50% of the permissible exposure. Completion Date - 5/1/81
9. Extend the investigation outlined in step 7 to operations contributing 20 to 50% of the permissible exposure. Completion Date - 9/1/81

NLO, Inc.

A SUBSIDIARY OF NL INDUSTRIES, INC.

CINCINNATI, OHIO 45239

November 10, 1983

SUBJECT BETA DOSES ABOVE DOE GUIDE LIMITS

TO R. M. Spenceley

FROM M. W. Boback

REFERENCE

Three chemical operators in Plant 5 have beta radiation exposure totals which exceed the DOE quarterly limit. Year-to-date (January-October) totals for two of these operators also exceed the DOE annual limit for beta radiation:

Radiation Dose to the Skin of the Whole Body, Millirems

Name	CY-1983 Quarter			Oct.	Jan.-Oct. Total
	<u>1</u>	<u>2</u>	<u>3</u>		
[REDACTED]	4972	4532	5377*	1229	16110**
[REDACTED]	4148	4984	5549*	493	15174**
[REDACTED]	1456	5780*	3597	2386	13219

*Exceeds DOE quarterly limit of 5000 millirems.

**Exceeds DOE annual limit of 15000 millirems.

The delay in reporting is due to uncertainties about the calibration of the TLD system. A serious deficiency was discovered in the calibration work done at the University of Michigan and it first appeared that correction of this error would cause a significant reduction in the estimated doses. Although additional work remains, it is apparent the change, if any, will be slight.

This information will be reported today by R. B. Weidner to the DOE-OR Safety & Environmental Control Division.

M. W. Boback
M. W. Boback

MWB/fb

OFFICIAL USE ONLY

A PRIME CONTRACTOR FOR THE DEPARTMENT OF ENERGY

1114487

Overexposed

NLO, Inc.

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

November 11, 1983

SUBJECT INVESTIGATION OF OVEREXPOSURE AMONG PLANT 5 CHEMICAL OPERATORS

TO Distribution

FROM R. M. Spenceley

REFERENCE Letter, M. Boback to R. M. Spenceley dated November 10, 1983 entitled
"Beta Doses Above DOE Guide Limits"

The following are appointed to perform a Class C type of investigation of recently disclosed overexposures to the skin of the whole body of three Plant 5 Chemical Operators:

G. L. Stukenbroeker - Chairperson
C. H. Handel
C. E. Polson

It is requested that the report of the Investigating Committee be complete by December 16, 1983.

R. M. SPENCELEY
Manager

R. M. Spenceley

RMS:rb

Distribution:

C. H. Handel
C. E. Polson
G. L. Stukenbroeker
M. W. Boback
M. R. Theisen
✓ Bobby Joe Davis

1114488

A PRIME CONTRACTOR FOR THE DEPARTMENT OF ENERGY

2274
NOV 16 1983

INCIDENT REPORT

cc: *P. W. Kasper, SE-30*
Wayne Range, M-4
W. H. Travis, SE-33
J. G. Mullins, SE-33
E. W. Bailey, SE-34
H. D. Hickman, DP-80

X Initial Report
 Followup Report
 Final Report

Type of Incident

Radiation Doses Exceeding DOE Limits

Division Member Receiving Report:

B. J. Davis

Location, Date, and
Time of Incident:

NLO, Inc., Accumulated dose during
CY-1983

Date and Time Received by S&EC:

2:20 p. m., 11/10/83

Reported by:

R. Cross

Date and Time Received by ORO
(if different from above):

Discussion:

NLO, Inc., reported that three employees have received radiation doses to the skin in excess of either the quarterly limit of 5 Rem and/or the annual limit of 15 Rem as follows:

Employee #1- 5.377 Rem during the second quarter of CY-83

Employee #2- 5.549 Rem during the third quarter of CY-83
15.174 Rem during the first ten months of CY-83

Employee #3- 5.377 Rem during the third quarter of CY-83
16.110 Rem during the first ten months of CY-83.

The employees all have work assignments in Plant 5 involving activities that require radiation exposures (skin is controlling) to be controlled by administrative controls. Due to a change a new personal monitoring system in January 1983, the results obtained, which are higher than with the old system, were apparently considered biased and insufficient attention was given to the control of exposures while the new system was being evaluated. Employees #2 and #3 have been moved to non-exposure positions. NLO, Inc., is investigating. These are considered Type C occurrences. NLO, Inc., is taking action to assure no other employees exceed the limits.

→ If the monitoring techniques are in question,
should all worker doses be recalculated?

CONTACT FOR ADDITIONAL INFORMATION:

Name: B. J. Davis

Number: 6-0856

PK

1114489

DOE CONTACT REPORT

DATE: 12/8/83	ORIGINATOR: R. B. Weidner <i>JSU NWB</i>	TALKED TO: Marsha Leppert
SUBJECT:		

BETA DOSES ABOVE DOE GUIDE LIMITS

SUMMARY OF DISCUSSION:

I contacted DOE-ORO at 4:10 PM on Wednesday, December 7, 1983 and was informed that B. J. Davis was at a training seminar and would not be back in the office until Friday. I asked for Marcia Leppert but she had already left the office for the day. I asked the secretary to have her call me in the morning.

She didn't call by 10:00 AM so I called her. I relayed the following information:

1. [REDACTED] received 2384 millirems (October) and 3589 millirems (November) to the skin of the whole body which exceeds the DOE quarterly limit of 5,000 millirems. That her year-to-date total through November, 1983 is 16,242 millirems, which exceeds the DOE ~~quarterly~~ limit of 15,000 millirems.
Annual
2. [REDACTED] October and November work schedules did not include any jobs which were under administrative controls (i.e., time limits imposed) at that time. Her October reading (received by IH&R on 11/10/83) was the result of 85.5 hours at the burnout station and the remainder at low exposure jobs in the "A" area of Plant 5. Other workers' exposures also appeared to be higher than expected when working at the burnout, so it was decided to add this work station to the administrative control list. Production Division was instructed verbally on 11/10/83 to move [REDACTED] to low exposure jobs for the remainder of the year. A written follow-up was issued on the above on 11/11/83.
3. [REDACTED] November exposure consisted of 48 hours at the burnout (11/1-10/83) and the balance at the lowest exposure jobs in Plant 5. Yet her November exposure record indicates that it was almost twice as much as October's. Based on past studies conducted by L. E. Green the maximum readings expected, based on jobs performed, would be 1716 and 795 millirems for October and November, respectively.
4. Studies are underway in an effort to determine if there are problems with the TLD badges, what they might be, and what must be done to correct them. Preliminary results from a study conducted with 20 badges has shown that there is some question as to the values received. Four badges were attached to a wheel which rotated slowly so that each badge would be equally exposed. These badges were set up at five different locations with results as shown below:

INSTRUCTIONS:

1. Complete this form in sufficient detail to make Division Director and Manager generally aware of what transpired.
2. Forward two copies to Division Director who in turn will send one copy to the Manager.

1114190

DOE CONTACT REPORT

DATE:	ORIGINATOR:	TALKED TO:
12/8/83	R. B. Weidner	Marsha Leppert

SUBJECT:

BETA DOSES ABOVE DOE GUIDE LIMITS

SUMMARY OF DISCUSSION:

Group No.	Location	Badge Readings (skin/whole body)			
		Millirems			
A	Charge station	221/8	155/7	413/9	140/7
B	Burnout delidding station	4624/87	6478/90	7139/86	8838/88
C	Graphite crucible	7443/168	3238/155	*	2590/150
D	Burnout replugging station	883/13	780/18	723/13	922/14
E	Building 65	354/354	359/359	350/350	373/373

The badges were then exposed at a different station as shown below:

E	Graphite crucible	3223/37	2634/33	2519/39	2339/38
D	Burnout delidding	1996/26	2185/37	1724/27	3194/28

*The badge fell into a crucible.

5. Additional questions have arisen concerning Dr. Plato's work. The methods used to establish correction factors for each of the TLD elements is being checked. Early results indicate some errors. This work is being expanded.
 6. The TLD's from September were re-read before being issued in November. There were some badges which had a residual reading (cause unknown at this time). Additional work is ongoing in an effort to determine the cause and to quantify the values.
- M. Leppert said she would relay the information to B. J. Davis as soon as he returns. She discussed some of the problems that Y-12 experienced and thought they might be able to provide some assistance. I told her that we have been in contact with Y-12 and would continue to do so as needed. She was pleased with the efforts we were making and agreed that there is sufficient data to warrant further investigation into it, and that the exposures reported for 1983 are questionable.

I told her that we had discussed the exposure records with [REDACTED] at 8:00 AM this morning. We told [REDACTED] that she exceeded DOE Guide Limits for the 4th quarter and annually, and that, in our professional opinion, there were problems with the TLD's and the numbers were probably higher than the actual exposures, but that we have to accept the values shown until it can be proven that they are in error. Until that can be done, [REDACTED] has been moved from Plant 5 to a job in Receiving where there are no exposures.

I told M. Leppert that we were continuing with our intercomparison study with Battelle Pacific and EG&G. The first round is scheduled to begin this month.

cc: ✓ G. L. Stukenbroeker

INSTRUCTIONS:

Complete this form in sufficient detail to make Division Director and Manager generally aware of what transpired. Forward two copies to Division Director, who in turn will send one copy to the Manager.

1114491

OFFICIAL USE ONLYD&D #2572
08-255**NLO, Inc.**A SUBSIDIARY OF NL INDUSTRIES, INC.
CINCINNATI, OHIO 45239

December 16, 1983

SUBJECT INVESTIGATION OF BETA DOSE EXPOSURE - PLANT 5 CHEMICAL OPERATORS**R. M. Spenceley****FROM** G. L. Stukenbroeker

REFERENCE ¹ Letter. M. Boback to R. M. Spenceley, Beta Doses Above DOE Guide Limits, November 10, 1983.

² Memo. R. M. Spenceley, Investigation of Overexposure Among Plant 5 Chemical Operators, November 11, 1983.

In reference 1, above, the beta dose which three NLO, Inc. employees received in CY-83 while working in plants 5 and 9, was reported to your office. These NLO, Inc. personnel and their accumulated whole body beta dose for CY-83 are shown below in Table 1.

TABLE 1

Radiation Dose to the Skin of the Whole Body, Millirems***
CY-1983 Quarter

<u>Name</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>Oct.</u>	<u>Jan.-Oct. Total</u>
████████████████████	4972	4532	5377*	1229	16110**
████████████████████	4148	4984	5549*	493	15174**
████████████████████	1456	5780*	3597	2384	13219

*Exceeds DOE quarterly limit of 5000 millirems.

**Exceeds DOE annual limit of 15000 millirems.

***Final dose adjustments shown in Table 5, Page 7 of this report.

Reference 2, above, established a committee to perform a Class C type investigation of factors contributing to the recently reported whole body beta dose exposure to the three NLO, Inc. personnel listed in Table 1.

1. DESCRIPTION OF HOW EXPOSURE OCCURRED:

A wide variety of chemical and metallurgical process steps are utilized at the Feed Materials Production Center (FMPC) for the conversion of uranium oxides and recycle materials to uranium

1114492

trioxide for shipment to the green salt plant or machined uranium ingots and billets for extrusion into tubular form for fabricating fuel cores, target fuel elements and other shapes used in the defense programs of the Department of Energy.

The function at the FMPC which is of interest in this investigation is the reduction and casting of uranium metal. Figures 1 and 1A show the flow diagram used in the manufacture of uranium ingots and slabs.

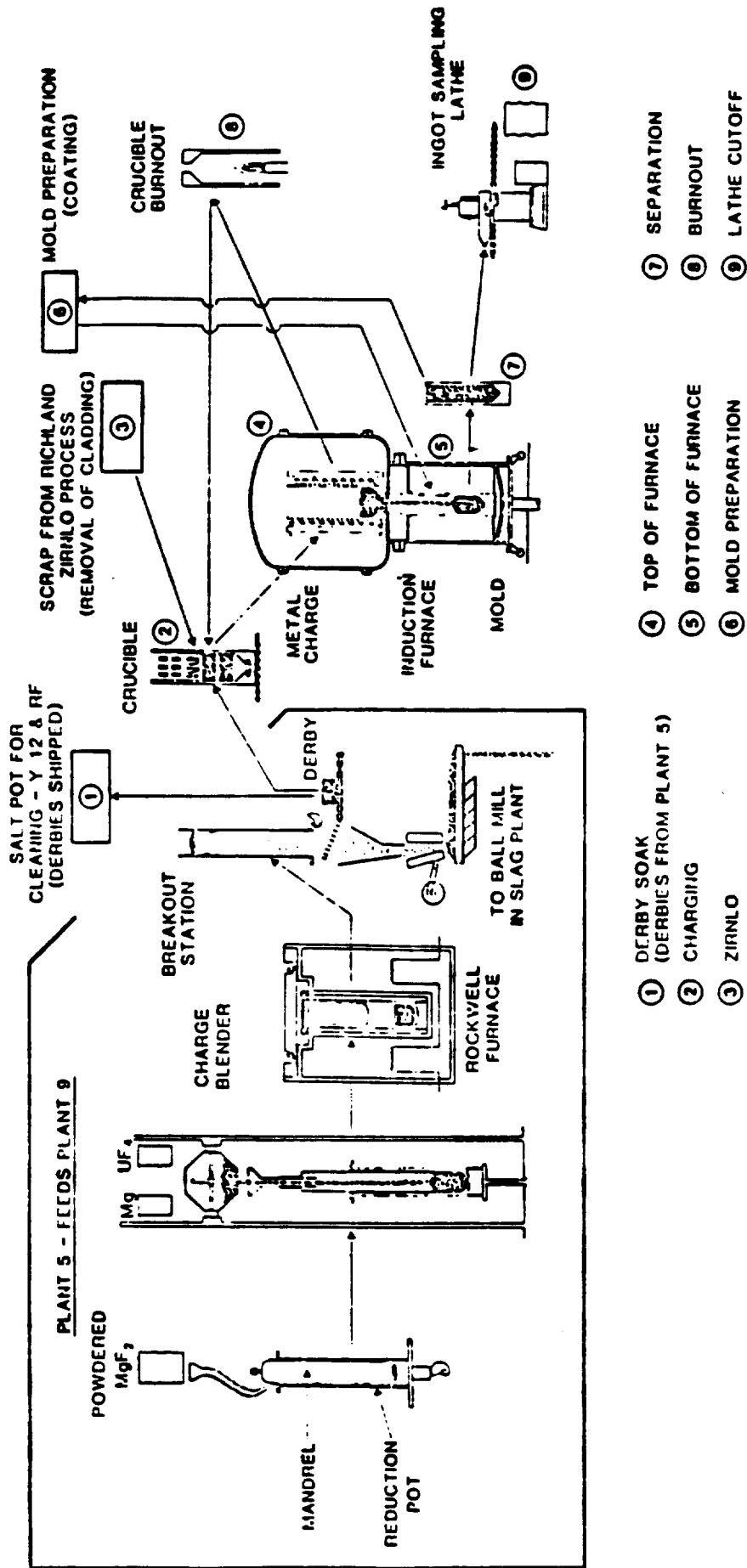
Uranium metal is produced from UF_4 in a thermite-type reaction with magnesium. UF_4 and magnesium granules are blended and charged into a slag-lined pot, see #1, #2, and #3, Figure 1. The pot is capped with slag, fitted with a steel cover and heated in a resistance furnace until the contents react spontaneously, see #4, #5, Figure 1. After cooling, the contents are removed and the uranium mass, called a derby, is separated and cleaned by slag chipping hammers and by blasting with uranium shot metal, if necessary, see #6, Figure 1.

Some derbies are transferred to the casting area, others to another building (Plant 9) casting area, and still others to other DOE sites for use in related research and development programs.

In the casting process, cleaned derbies, together with uranium recycle metals are charged into a graphite crucible - see #9, Figure 1. The loaded crucible is placed in a vacuum induction furnace and heated to approximately 2700° F, at which temperature the uranium metal is ready to pour - see #10, Figure 1. A shear plug in the bottom of the crucible is then broken to permit the molten metal to flow into a heated graphite mold located directly under the crucible - See #11, Figure 1. After appropriate cooling, the mold is separated from the ingot, see #12, Figure 1, cleaned and prepared for re-use by "burning" the inside to oxidize any residual uranium - see #15, Figure 1. Molds are reconditioned and coated before re-use - see #13-14, Figure 1.

As-cast ingots are cropped and an analytical sample is taken by sawing about two inches from the top section to remove shrinkage cavities and impurities which rose to the top of the melt during

PLANT 9



solidification after pour - see #16, Figure 1. Also, "flats" are cast into molds and processed in much the same manner as ingots. Metal sizing is accomplished by sawing - see #16, Figure 1.

The three NLO, Inc. personnel listed in Table 1 are assigned to metal production at the FMPC - especially in the casting phase of the operation. During CY-83 the three NLO, Inc. personnel, who have received beta whole body exposures near DOE criteria limits, had the major work assignments shown in Table 2. Listed also are the approximate hours spent at each station in the uranium metal process - see Figure 1. Only those work assignments which have been evaluated to have "above average" beta dose rates are included in the summary in Table 2.

TABLE 2

CY-83 - Major Work Assignments of [REDACTED], [REDACTED], and [REDACTED]
Plants 5 and 9

	<u>See Figure 1</u> <u>Work Station</u>	<u>[REDACTED]</u> (10 Mos.)	<u>[REDACTED]</u> (8 Mos.)	<u>[REDACTED]</u> (10 Mos.)
Charging	9	98 Hrs.	67 Hrs.	
Burnout	15	33 "	140 "	
Bottom "F"	3	1024 "	7 "	
Jolter	3	53 "		
Saw	16	310 "		
Capping	4	42 "	164 "	
Top Furnace	10		565 "	
Breakout	6		7 "	
5L Gisholt Lathe	16			<u>1220 Hrs.</u>
Approximate Total Exposure Hours		1560 Hrs.	950 Hrs.	1220 Hrs.

Table 3 is a dose exposure classification of the work assignments in the areas that [REDACTED], [REDACTED] and [REDACTED] have worked during CY-83.

The exposure being investigated by this committee was apparently accumulated by [REDACTED], [REDACTED], and [REDACTED] at the work assignments cited in Table 2. The correctness of dosimeter, which may affect the reported doses to these three employees, will be discussed later.

2. PERSONAL INFORMATION:

Table 4 lists the pertinent information required for a type C investigation for the three NLO, Inc. employees listed in reference 1.

RADIATION DOSE RATES

Job	Estimated Range,* mrem/hour		
	Skin (Beta + Gamma)	Whole-Body (Gamma)	Wrist
Plant 5 Reduction:			
Jolter	1 - 2.5	0.2 - 0.3	1.5 - 2.5
Top 'F' Machine	1.5 - 2.5	0.3 - 0.4	1.5 - 3.0
Bottom 'F' Machine	2.5 - 4	0.2 - 0.4	3.0 - 4.5
Capping, Lidding	1 - 3	0.2 - 0.4	1.5 - 3.0
Rockwell	0.8 - 1.5	0.2 - 0.3	0.8 - 1.5
Breakout	1 - 4	0.2 - 0.3	1.0 - 5.0
Residue	1 - 3	0.2 - 0.3	2 - 3
Building 55	0.5 - 2	0.1 - 0.2	0.5 - 2
Plant 5 Remelt:			
Charging	7 - 15	0.5 - 1.0	10 - 20
Top Furnace	2 - 4	0.2 - 0.3	2 - 5
Bottom Furnace	4 - 8	0.3 - 0.6	5 - 12
Burnout	5 - 10	0.5 - 1.0	5 - 15
Separation	6 - 12	0.5 - 1.0	7 - 15
Saw	7 - 18	0.5 - 1.0	10 - 20
Mold Recondition [†]	2 - 8	0.1 - 0.4	2.5 - 10
Saw Sharpener	0.5 - 1.5	0.1 - 0.3	0.5 - 2
Graphite Shop	1.0 - 1.5	0.1 - 0.3	1.0 - 1.7
Plant 9 Chemical: ⁺			
Charging	5 - 12	0.6 - 1.5	5 - 15
Mold preparation	2 - 4	0.2 - 0.5	2 - 5
Top Furnace	2 - 4	0.2 - 0.5	2 - 5
Bottom Furnace	4 - 8	0.5 - 1.0	5 - 10
Separation	5 - 10	0.6 - 1.5	5 - 12
Derby Soak	2 - 3.5	0.2 - 0.5	3 - 5
Zirno	1 - 3	0.1 - 0.4	2 - 4

*Based on 1981 film and wrist badge data.

†Much higher levels from flat mold reconditioning.

+No radiation dose rate data available on Plant 9 lathes.

TABLE 4
PERSONAL INFORMATION

Name:
Birthdate:
Birthplace:
Sex:
S.S. No.:
Address:

3. PERSONAL EXPOSURE RECORD:

The radiation dose to the skin of the whole body for the three NLO, Inc. employees is presented in Table 5. YTD CY-83 and CY-82 are presented for further discussion.

TABLE 5
Radiation Exposure Record (mrem)

	<u> -Plt. 5</u>		<u> -Plt. 5</u>		<u> -Plt. 9</u>	
	<u>1983</u>	<u>1982</u>	<u>1983</u>	<u>1983</u>	<u>1982</u>	
Jan.	630	233		1,409	1,052	
Feb.	1,791	641		1,430	457	
Mar.	2,551	1,400	1,456	1,309	571	
Apr.	1,549	2,123	2,347	1,249	681	
May	1,405	847	2,793	1,320	782	
Jun.	1,578	868	640	2,415	598	
Jul.	591 ¹	437 ¹	845 ¹	728 ¹	472 ¹	
Aug.	1,320	1,654	1,125	2,857	1,559	
Sep.	3,460	1,048	1,063	1,964	1,271	
Oct.	1,229 ³	1,771	2,384 ⁴	482 ²	1,576	
Nov.		1,347			1,660	
Dec.		870			1,264	
Total (mrems)	16,104	13,239	12,653	15,163	11,943	

¹ Vacation shutdown - two weeks.

² Re-assigned to Transportation (Garage).

³ Re-assigned out of Production.

⁴ Re-assigned to low exposure job.

4. SOURCE OF RADIATION DURING MELT-CASTING:

The radiation dose generally associated with melt casting of uranium metal stems from the appreciable amounts of radioactive daughters from the decay of uranium, which becomes highly concentrated in the dross materials produced when uranium is vacuum melted. Part of the total dross is held up or migrates to the interior surface of the

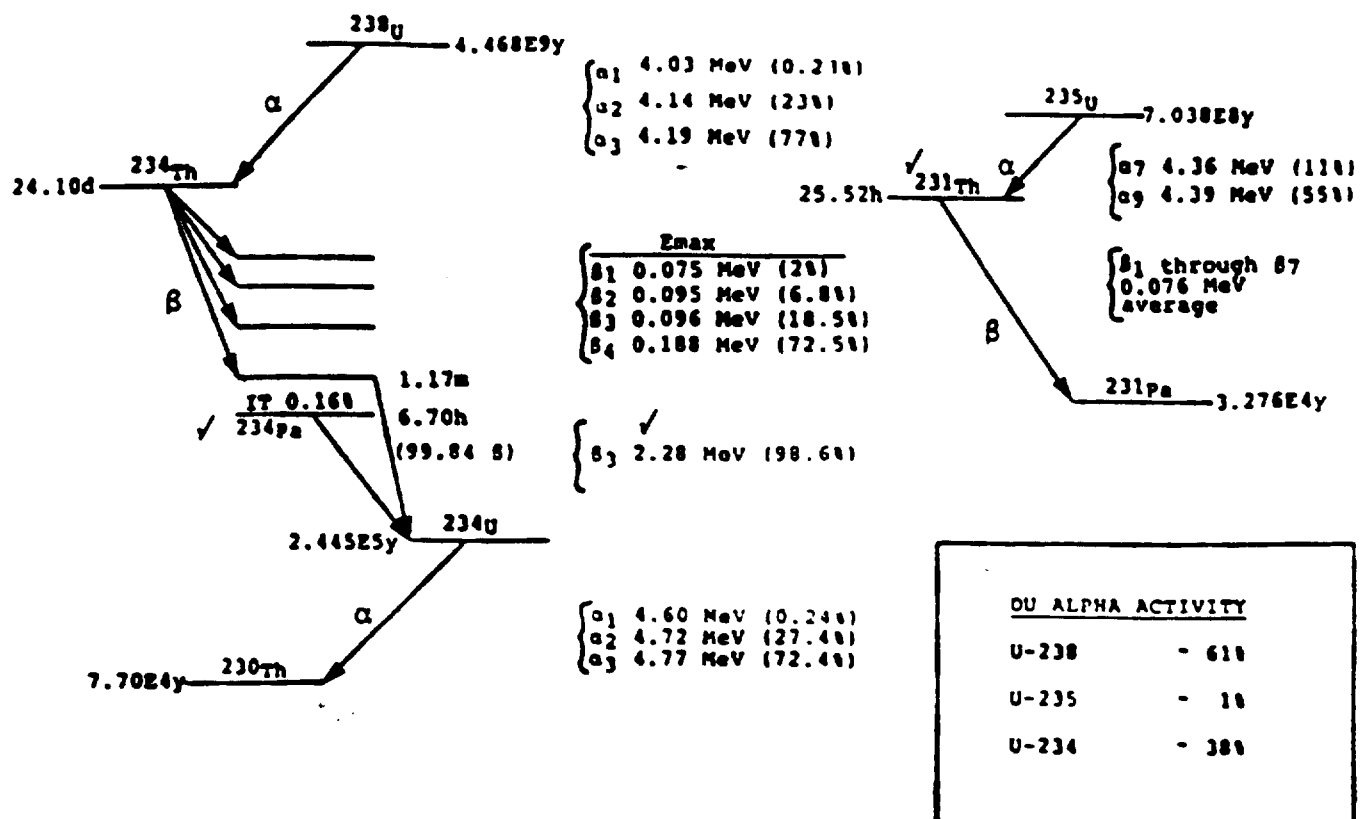
melting crucible and some is splattered on the crucible cover. Yet other amounts of this dross become inclusion material within the liquid uranium when the metal is poured into the molds. During solidification of the metal in the molds the inclusive materials carrying the decay daughter products apparently show a strong tendency to separate or migrate to the cooler ingot surface or liquefy to the top of the ingot. NLO, Inc. knows this is a total surface effect because the range of the most energetic beta (2.28 mev) is only 0.6 mm in uranium metal.

The dross material deposited on the interior of the crucibles represents a direct radiation dose to those engaged in the cleaning operation of the crucibles. Unremoved dross or that which impregnates into the crucible is a direct radiation dose to those personnel charging metal into crucibles. The concentration of decay daughter product activity on the surface of ingots is a direct radiation dose to those NLO, Inc. personnel engaged in stripping the molds from the uranium ingots and also, a direct radiation dose is presented to employees who saw the top crops, samples, and size the ingots and/or slabs.

The particular beta radiation of concern at the FMPC, and also at Y-12, and Rocky Flats, is the Pa-234 beta which has a beta energy of 2.28 mev. Evaluation of the decay schemes of interest are shown in Figure 2.

The decay scheme presented in Figure 2 is based on the assumption of chemical purification of the uranium. The U-234 is apparently favored in the diffusion process and will require many thousands of years to re-equilibrate with U-238. Short lived Th-231 and Th-234 will be in equilibrium again at approximately one week and five months, respectively. The most important point to note in the decay scheme in Figure 2 is that for the purposes of external beta dosimetry, it is only the 2.28 mev beta decay of Pa-234m that contributes dose at depths greater than 7 mg/cm². Decay studies at FMPC and elsewhere confirm the beta activity of concern results from the decay of Th-234 - half-life of 24.1 days.

There remains little doubt that the betas from the Pa-234m is the major contributor to the beta whole body dose received by the three NLO, Inc. employees, [REDACTED], [REDACTED], and [REDACTED], in performance of their assigned duties in the FMPC metal plants. This same

FIGURE 2NUCLEAR DECAY SCHEME - DEPLETED URANIUM

1114500

conclusion of higher than normal whole body beta dose to workers at Carbide Nuclear has been confirmed by Ray (G. R.) Quinn of Y-12.

5. NLO, INC. RADIATION CONTROL PROGRAM:

The only "cures" to date to reduce or eliminate body absorption of ionizing radiation is distance, shielding, and control of time. To determine the need of one or a combination of the three tools available to the FMPC to control worker exposures, is to monitor exposure by film badges, TLD dosimeters and direct reading instrumentation.

NLO, Inc.'s current major control program at the FMPC utilizes personnel monitoring by TLDs. Administrative control of time has and is currently in effect and generally has been effective in prohibiting operating personnel to exceed DOE quarterly and annual limits. To a much lesser extent, shielding and distance are employed at Fernald to reduce dose to employees.

a. Dosimetry:

NLO, Inc. switched to a TLD-type dosimeter for monitoring betas and gamma radiation after a long period of use of the conventional film badge. Calibration of the new TLDs by using Sr^{90} - Y^{90} (2.3 mev β) and Tl-204 (700-800 kev β) and cross calibration with the former film badge monitoring system indicates the current method of exposure recording achieves more sensitivity and accuracy to the various beta energies and of course, are reuseable detectors.

The NLO, Inc.-TLD radiation monitoring system is graphically shown below:

E_4	$CaSO_4$	828 mg/cm ² Shield Cover
E_3	$CaSO_4$	228 mg/cm ² Shield Cover
E_2	$Li_2B_4O_7$	99 mg/cm ² Shield Cover
E_1	$Li_2B_4O_7$	42 mg/cm ² Shield Cover
$E_1 - E_4 = E_1^1$ (Subtracts gamma dose)		
$E_2 - E_4 = E_2^1$ (Subtracts gamma dose)		

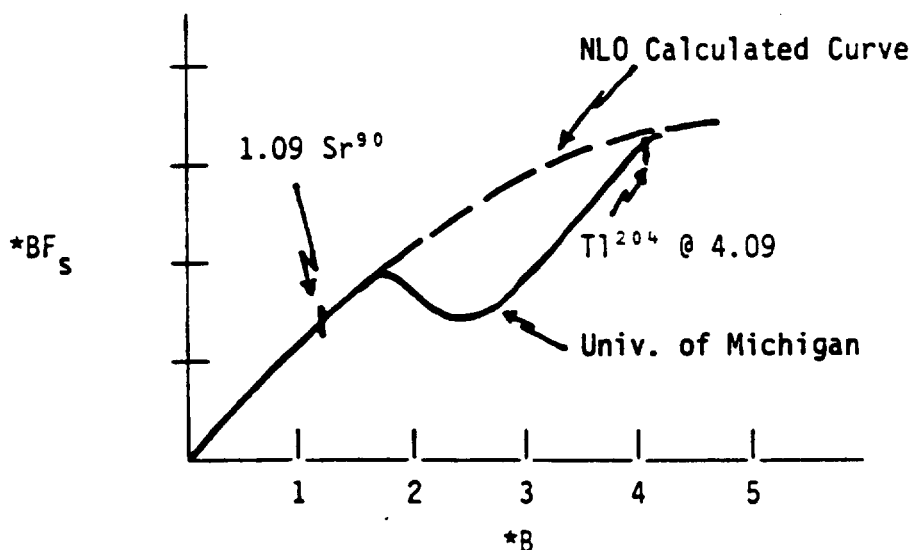
Energy absorption in the skin is possible from betas that penetrate to 0.007 cm skin depth - or shield/absorber density of 7 mg/cm². Thus, to determine the low energy radiation shielded out (absorbed) from the E₁ monitor by the 42 mg/cm² shield cover in the NLO, Inc. badge, a correction BF_S must be made to the beta dose monitor to include betas which do not penetrate the 42 mg/cm² absorber.

This low energy beta correction, which is being re-investigated by NLO, Inc. at this time, is achieved in this following manner:

$$\frac{E_1^1}{E_2^1} = B ; E_1^1 \times BF_S^* = \text{True Beta Dose}$$

*Beta factor for skin.

To determine B, eleven or twelve NLO, Inc. TLDs were exposed to a standard Sr⁹⁰-Y⁹⁰ source and about eleven or twelve of NLO, Inc. TLDs were exposed to a standard Tl-204 source. A series of ratios between doses observed on the exposed TLDs by the two different energy sources produced a curve similar in shape to the curve shown below:



*Curve shape approximate - for illustration only.

To determine the true beta dose, BF_S is determined from the above curve and is multiplied by E₁¹. Therefore, the low energy betas with ranges from ~7 mg/cm² to 42 mg/cm² have been factored

into the dose reading observed from the reading of the TLDs. If the value of B is in the range of 1.1 - 1.8, little difference exists between the Univ. of Michigan curve and the NLO, Inc. curve. For B values greater than 1.8, the NLO, Inc. curve will give doses significantly higher than the Univ. of Michigan curve. Resolution of this difference in curve shape is apparently imminent and certainly required because Health and Safety Division states that B values of up to the maximum curve values of 4.09 are being observed and calculated - thus, large discrepancies would exist from data taken from the curves shown above. Although the B ratio is not changing, in recent months NLO, Inc. has observed occasionally dose ratios near the top of the curves, thus, resolution of the true shape of the curve is essential.

b. Administrative Control of Workers Time:

NLO, Inc. has and continues to use administrative action on work assignments to control radiation exposure to NLO, Inc. personnel. Each employee has two dosimeters, alternating dosimeters every other month. Health and Safety Division (H&S) reads dosimeters monthly. There is about 7 to 10 days lapse time required to process the TLDs. Employee high readings are reported to his/her supervisor the same day as it is determined there is a high dose reading. Work re-assignments or limited time restrictions at a particular work station for the employee may be made on the reporting of the high dose data.

When H&S detects employee doses which appear abnormally high or quarterly/annual summary is approaching the DOE criteria limits, an investigation is made. Exposure dose is corrected for material accumulation on the exterior of the badge and a "theoretical dose" is calculated based on time at each work station times the average dose expected at that work assignment.

c. Shielding, Remote Control, Distance Considerations:

The only areas where a committee member observed shielding being utilized at work stations known to produce above average exposure to workers was (1) the use of rubber floor runner-type mats to cover uranium ingots/slabs, (2) an aluminum bonnet partially

covering the hot ingot after separation, (3) shielding at the bottom of the crucible at the burnout station, and (4) partial shielding at the crucible loading station. No consideration appeared to be given to placing stockpiled work in process a further distance from the operator.

It is this committee's opinion much can be done quickly and economically by use of shielding (betas only) and distance, and work habits to reduce operator exposure.

Certainly it is the committee's opinion that H&S should be actively consulted in the "productivity retention" program scheduled for Plant 5. H&S inputs can contribute to ALARA in general, but specifically in material storage and handling (distance and shielding), remote control at some operations, negative pressure utilization at various work stations and worker wear-gear (leather aprons), and employee work habits to reduce beta dose to NLO, Inc. operators. The committee recognizes that the TLD is worn outside any protective clothing, but NLO, Inc.'s philosophy is to reduce dose to the employee to as low a level as possible. H&S would then need to develop data to determine actual skin dose.

6. EXPOSURE HISTORY - PLANT 5:

The radiation dose to the skin of the whole body reported in reference 1 is attributable to one or more of the following causes:

1. More material being processed in Plant 5.
2. Poor employee work habits.
3. Inaccurate dosimetry.

Figure 3 is a plot of MTU processed in the casting area of Plant 5 for CY-82 and YTD - CY-83. Material throughput increased 24 percent. Also plotted is [REDACTED] beta dose for the same period. [REDACTED] exposure followed the uranium production rate; however, his annual average exposure increased 46 percent versus a production increase of only 24 percent. Eight fellow workers in Plant 5 experienced an average of 49 percent exposure increase - again, based on only the 24 percent production increase. The cause of this general increase in exposure to NLO, Inc. workers in Plant 5 should be investigated.

An "at random" group of workers from Plant 5 were selected to check if a trend in exposure may exist in Plant 5. This limited data on the twelve employees selected is listed in Table 6.

TABLE 6

Average Radiation Dose to the Skin of the Whole Body

Selected Plant 5 Casting Workers

<u>YEAR</u>	<u>MREM/MONTH AVERAGE</u>
1955	358
1960	430
1965	573
1970	485
1975	194
1980	550
1981	500
1982	576
1983 (10 Months)	755

This data, though not conclusive, suggests an upward trend in CY-83 and should be investigated more thoroughly.

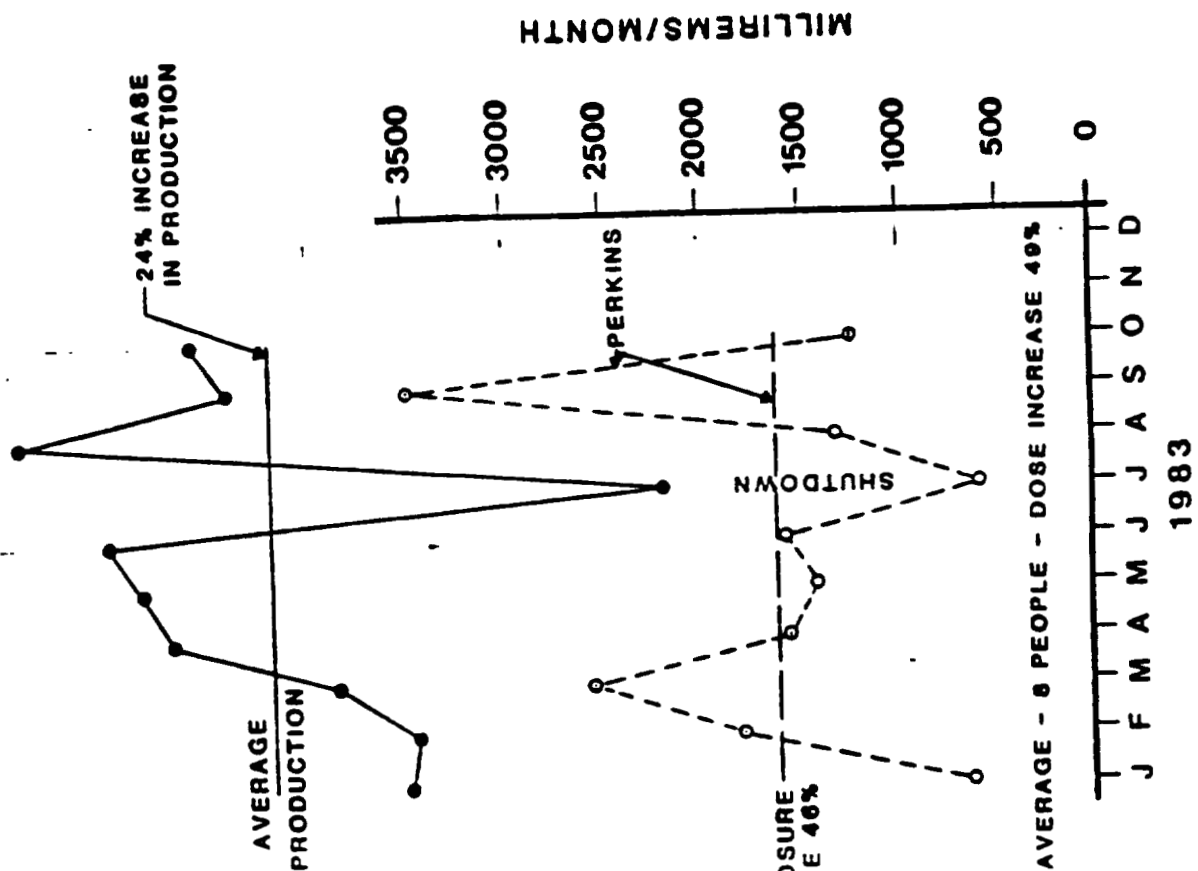
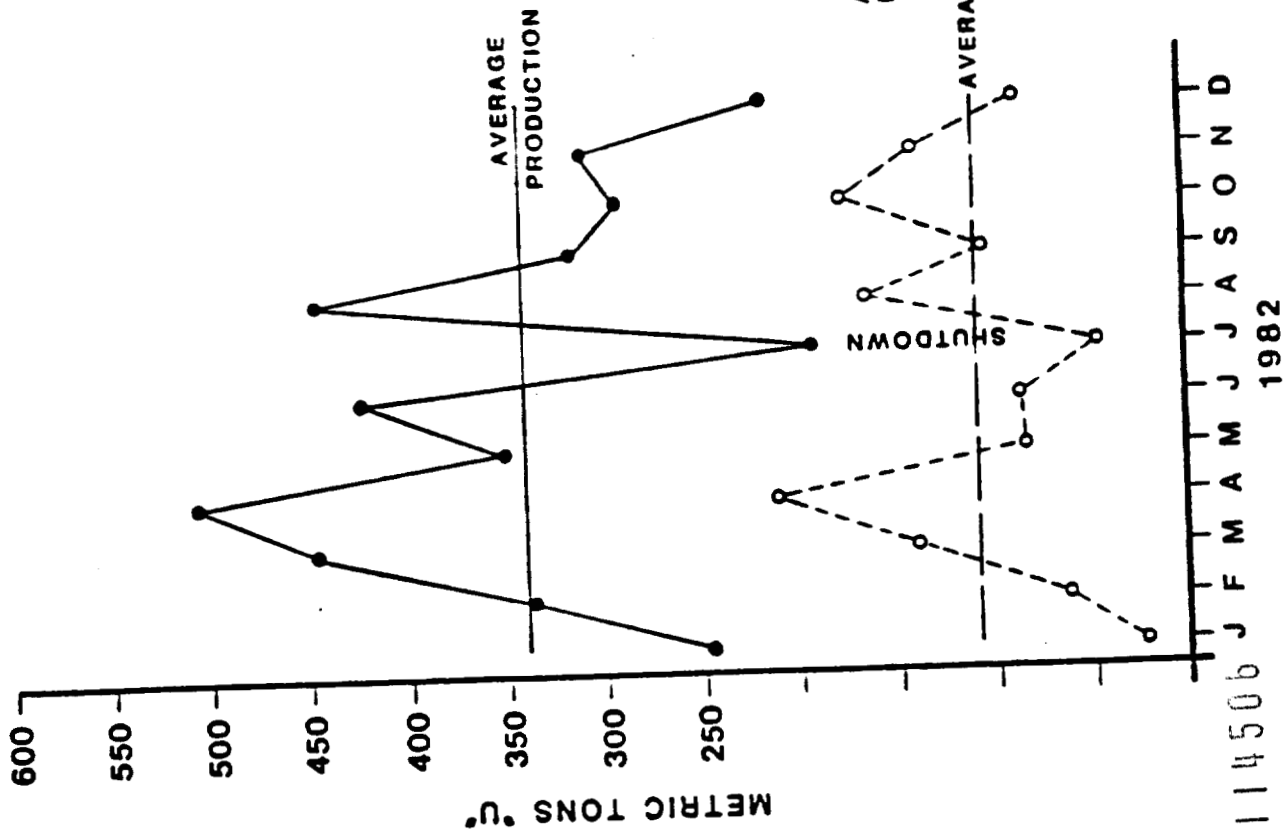
Of interest, in Plant 5 more slabs have been recently processed, i.e., 36 pieces in August, 37 pieces in September, 123 processed in October, and 130 processed in November, 1983. Does this larger surface area increase exposure to NLO, Inc.'s workers processing the material?

7. NLO, INC. DEVELOPMENT EFFORT TO REDUCE BETA DOSE FROM URANIUM METAL:

At the present time, NLO, Inc. is studying the exposure dose problems in order to gain a more complete understanding of the mechanisms responsible for separation and concentration of the decay daughter products (primarily Th-234) from the metal during the casting operation in Plants 5 and 9. It appears the primary mechanism involves forms of partial chemical scavenging of the radioactive Th-234 into dross oxides, carbides, or MgF_2 slag components which develop or are present during the uranium melting operations, and that these scavenging materials are largely expelled from the liquid metal to report at the surfaces of interest on the solid cast metal.

FIGURE 3

●—PLANT 5 CASTING - PRODUCTION CY 82 & 83
○—SELECTED OCCUPATIONAL RADIATION DOSE - CY 82 & 83



Some work is being devoted to possible chemical scavenging of the Th-234 metal atoms by the mold castings. Another experimental approach is based on the possibility of decreasing the amount of Th-234 reaching the ingot surface or being expelled into the skull material by diluting with innocuous Th-232 introduced as metal, either in the melting step or in the preceding bomb reduction step. The incorporation of a few ppm Th-232 should greatly dilute the radioactive Th-234. It has been determined that the Th-234 is present in the metal at the part per billion level.

NLO, Inc.'s development work will continue with the objective being to eliminate the surfacing of the Th-234 isotope and its decay daughters.

8. CONCLUSIONS AND RECOMMENDATIONS:

- a. The analysis of exposure data presented in this investigation and results from recent reproducibility testing of the NLO, Inc. TLD system suggests the TLDs being used at the FMPC may require further refinement and more precise calibration and reproducibility work. Perhaps re-reading the TLD elements a second or third time and a check on established annealing procedures in use at NLO, Inc. now may improve reproducibility/confidence in individual measurements.

In section 5 of this report it was stated the new NLO, Inc. exposure monitors (TLDs) are being corrected for low energy betas. The exact amount of this correction is not known precisely, but may result in a 20-30 percent increase in whole body beta exposure for production workers. The data reported in Figure 3 shows a dose increase to NLO, Inc. workers of about 50 percent. No process change which could affect exposure to workers, has occurred in Plant 5 casting area in the past two years. The committee recommends further investigation of this observed increase in dose to NLO, Inc. workers. Are the employees receiving higher doses because of more production? Are the employee work habits deteriorating? Is the dosimetry correct and with adequate precision/reproducibility to assure proper control of exposure to NLO, Inc. workers?

1114507 To further support this conclusion, in November 1983, [REDACTED] was reassigned at mid-month to a low exposure job, yet her

November TLDs indicated her exposure was tentatively 3589 mrem, which calculates to CY-83 YTD dose of 16,242 mrem. This obvious spurious reading adds credence to the fact that flaws exist in the FMPC's TLD dosimetry.

Also, H&S is currently performing reproducibility (precision) studies on some 20 TLDs in Plant 5. Very preliminary data generated to date from the Plant 5 tests (see Attachment 1) and aberrations observed from personnel TLDs (B ratio ranging to >5) indicate the current TLD system lacks accuracy and precision to be an effective control on whole body dose.

- b. Work habits apparently have contributed to the high beta exposure received by [REDACTED], [REDACTED], and [REDACTED].

1. [REDACTED]: [REDACTED] is a highly productive worker. His major job assignments have been at the bottom "F" machine and the saw, with the saw being classified as a high exposure operation. Since NLO, Inc. would like to maintain high productivity from [REDACTED], protective gear and shielding, plus distance, should be incorporated at these work stations to reduce exposure, which would permit [REDACTED] and his colleagues longer work time at these assignments. His supervisor should assist [REDACTED] to improve his work habits to reduce whole body exposure.
2. [REDACTED]: Like [REDACTED], [REDACTED] is a productive worker and his work habits of "hovering" over his lathe (5L Gisholt) and his close proximity to his stockpile of work-in-process has apparently contributed to his higher than average exposure to betas. Again, an evaluation of the work area, utilizing shielding, distance and work habit is essential to reduce the dose to any employee utilizing this ingot material and machine.
3. [REDACTED]: [REDACTED] work assignments were primarily at the top of furnace station and crucible burnout. The crucible burnout operation was rated "high dose" on 11/11/83 by H&S, as a result of [REDACTED] high October TLD reading. [REDACTED], it is told, on some occasions

Page 20

in the performance of her duties, would climb to a position near the furnace. This activity was to assure that the crucible plug would be removed and a successful pour would result.

Also, H&S indicated that due to [REDACTED] small stature, to successfully perform her duties she would be much closer to contaminated equipment and uranium "hot" from the Th-234 daughters discussed earlier. This analysis and conclusion appears reasonable. Thus, either shielding must be incorporated into some of her work station, remote handling operations installed, or her work time must be administratively controlled.

In summary:

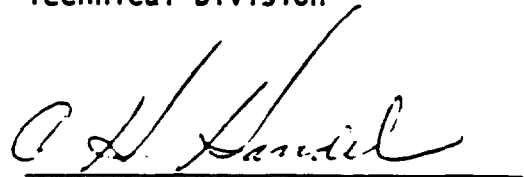
The apparent high beta whole body dose received by [REDACTED], [REDACTED], and [REDACTED] in CY-83 to date is based on one or more of the following causes:

1. Unreliable dosimetry - the current TLD system apparently has flaws in measure of dose and precision of detection. This could be in the theory of interpretation or the reading/processing at Fernald. Data evaluated indicates the doses reported are on the high side.
2. It is absolutely essential for H&S to assess the employees radiation history - that is, checking back over many months looking for trends, dose peaking which may be associated with variations in work assignments, TLD calibration and poor work habits. Personnel exposure data should be made available to each Division promptly.
3. Poor work habits, relative to proximity of the worker at freshly cast uranium. H&S should assist production in retraining of old employees as well as any new personnel assigned to "high dose" operations.
4. Lack of use of equipment and personnel shielding/time/distance in the reduction of dose to personnel at their work stations. Administrative control of time has, in some cases, been executed late.

5. Also, it is recommended H&S be involved in developing lower doses (via shielding, time, distance) at work stations. H&S can assist in S.O.P.s for work procedures, to minimize operator doses.
6. Finally, the very basic objective is to reduce beta dose levels from the freshly cast uranium. The Technical Division should actively find out and correct the phenomena which results in the selective migration of thorium to the ingot/slab cool surfaces. Zone heated mold is an area which should be investigated.


G. L. Stukenbroeker, Director
D&D Division


C. E. Polson, Director
Technical Division


C. H. Handel, Controller

GLS/paw
Attachment (1)

cc: W. J. Grannen
R. M. Spenceley (xc)

1114510

memorandum

DATE February 28, 1984

REPLY TO SE-334 (Lepper)
ATTN OF:

SUBJECT: NOTIFICATION OF DOSES TO SKIN EXCEEDING DOE QUARTERLY AND ANNUAL LIMITS AT THE FEED MATERIALS PRODUCTION PLANT, FERNALD, OHIO

TO: David E. Patterson, Director, Office of Operational Safety, EP-32, DOE/HQ

Attachment I is a copy of the investigation report prepared by NLO, Inc., operating contractor for the Feed Materials Production Plant, Fernald, Ohio, regarding skin doses to three individuals which exceeded DOE limits as follows:

- ██████████ - Exceeded quarterly limit during 3rd quarter CY 1983 and annual limit during CY 1983.
- ██████████ - Exceeded quarterly limit during 3rd quarter CY 1983 and annual limit during CY 1983.
- ██████████ - Exceeded quarterly limit during 2nd and 4th quarters CY 1983 and annual limit during CY 1983.

Specific dose values are identified in Attachment I. Pages 18 and 19 identify six areas determined to be causal factors and include recommendations for corrective actions. Attachment II contains information on progress on the recommendations.

We believe the fundamental factor involved was the failure to treat reported doses as "correct" and control on that basis, even if an error in the personal monitoring system was suspected. We will be following progress on corrective actions closely; however, the fundamental need is for engineering improvements, some of which are underway and some proposed in a productivity retention line item.

If you have questions please contact M. Lepper, FTS No.: 626-0855.

William H. Travis
William H. Travis, Director
Safety and Environmental
Control Division

Attachments:
As stated

For attachments to this memo, see memo previously transmitted to you the same date as this memo.

1114511

The following is a brief status report regarding each of the six causal factors identified on pages 18 & 19 of Attachment 1.

1. The Industrial Hygiene and Radiation (IHR) Department is currently using the University of Michigan calculated curve to determine true beta dose as described on pages 10 & 12 of the report. IHR plans are to validate the curve using values obtained from TLD's exposed to various intermediate beta energies between those of Sr-90-Y-90 (2.3 MeV) and Tl-204 (700-800 keV).

IHR is also conducting an intercomparison study with EG&G and Battelle. TLD's which had been exposed at six stations at NLO were sent to EG&G and Battelle for processing, then compared with NLO readings. Initial results show EG&G and Battelle reporting similar readings for all six stations. IHR reported readings similar to those of Battelle and EG&G for two stations (burnout replugging, and charge station), however, IHR readings reported for stations located at burnout delidding, the saw, a skid of ingots and crucible storage were all much higher than those of Battelle and EG&G. It was noted that the TLD's at the burnout replugging and charge station were located at a greater distance from these stations than were those TLD's at the remaining stations. Evaluation of these results is continuing.

2. The IHR staff is compiling radiation histories for a selected group of employees to perform trend analyses. A plan for computerization of these records has been presented to the computer science steering committee at NLO for approval.
3. Additional job specific training programs have begun for Plants 5 and 9 employees. Emphasis is being placed upon good work habits, particularly the use of shielding at work stations. Plants 5 and 9 supervisors will be receiving supplemental training to further emphasize the importance of ensuring proper work habits are followed by their employees. IHR plans to expand the above training to all areas of the complex.

IHR has observed that TLD readings for second and third shift employees have generally been higher than for day shift employees. They attribute this to lack of attention to proper work habits. In an effort to reduce exposures not only will these workers receive the training mentioned above, but health physics technicians will be assigned to these off-shifts at first on a spot check basis, and, possibly, later on a full-time basis to ensure that proper radiation safety work practices are being followed.

4. The lack of use of existing equipment and personnel shielding/time/distance in the reduction of dose will be addressed in the training sessions. To ensure that administrative control is effective, at the end of the first month of each quarter those employees with elevated readings will have their TLD's read twice per month during the remainder of the quarter.

5. INER is currently determining the best means of providing additional shielding at the charge station and saw locations in Plant 5 to reduce exposures. They are also investigating the use of a protective body cover shielding.
6. Work continues on reducing beta levels from the freshly cast uranium. Nothing conclusive has been reported to date.

Construction has begun on an ingot pickling facility and is expected to be completed towards the later half of this year. Pickling in hot nitric acid has been shown to reduce beta-emitting daughter products on ingot surfaces by as much as 75 to 90%. This should greatly reduce exposures to saw, boring and outside diameter turning operators.

0 sept 1900

Gentlemen:

References: 1. Letter from R. M. Spenceley, to M. R. Thelsen, "Investigation of Overexposure Among Plant 5 Chemical Operators," dated November 11, 1983.

2. Reply Letter from R. M. Spenceley to M. R. Theisen, "NLO Health Physics Appraisal-1983," dated January 31, 1984.
3. Letter from R. M. Spenceley to W. H. Travis, "Funds for Health Protection Research," dated January 25, 1984.
4. Report from G. L. Stukenbroeker to R. M. Spenceley, "Investigation of Beta Dose Exposure - Plant 5 Chemical Operators," dated December 16, 1983.

John Martin and Marcia Lepper, Health Protection Branch, ORO, conducted an NLO health protection visit for follow-up review of the NLO Type C investigation into the skin overexposures reported to DOE-ORO by letter dated November 11, 1983 (Ref. 1). The results of this review were discussed with you and members of your staff on February 24, 1984.

Primary findings may be summarized as follows:

- 0 Elevated beta exposures were recognized at NLO in March 1983 (Ref. 2), and may be associated, in part, with the January 1983 changeover to a thermoluminescent dosimeter (TLD) based system.
- 0 Malfunction of the panasonic TLD reader may be responsible, in part, for bogus results. At the time of the health protection visit, elevated TLD readings indicating apparent beta exposures were noted among workers assigned exclusively to areas with no exposure potential.

[illegible]

March 6, 1984

- Technical assistance for beta dosimetry is currently being provided by Bryce Rich, EG&G, Idaho. A research project (Ref. 3) has been contracted by NLO and the on-site measurements are scheduled for early March 1984, the results of which should resolve fundamental disparities identified in the December 1983 intercomparison test with dosimeters from the Radiological and Environmental Sciences Laboratory (RESL), and Battelle-Pacific Northwest Laboratories (PNL). Preliminary results indicate that NLO dosimetry is overresponding relative to the RESL and PNL dosimeters, however, definitive resolution of NLO TLD response to the uranium beta workplace will rest upon state-of-the-art confirmatory measurements during the March 1984, EG&G, Idaho research project.

- Observations of work processes at Plants 5 and 9 identified in the Type C investigation report (Ref. 4) as probable exposure pathways for the three chemical operators indicate that some additional monitoring of workers is being conducted together with task tradeoffs to "share" exposure, however, very little in the way of radiological controls are in place to reduce or minimize exposure potentials.

Ingots, laden with beta emitting uranium daughter products were observed to bind on open roller assemblies requiring workers to coax them into position. Once into position, the ingots are sawed or machined, open air, with little, if any, shielding or local ventilation to confine uranium smoke and/or beta radiation. Maintenance functions such as the 5-L Gisholt Lathe tool changeouts were observed to take place while the ingot was in position without benefit of shielding or preventive maintenance to mitigate exposures to workers.

The Plant 5 pickling facility scheduled for construction this summer together with engineered upgrades contained in Title 1/2 Special Materials Process line items to be implemented by July 1985 should substantially reduce radiation exposure potentials at NLO. One interim engineering control measure to provide a prototype shielding package for one saw operation at Plant 5 has been requested (Engineering Work Request). Implementation schedules for this valuable interim control plan were not available during the health protection visit.

- In general, radiation work practices observed did not reflect an ALARA quality. Protective aprons worn by workers were found to be contaminated and, therefore, sources of exposure themselves. Mats and floor surfaces on which workers positioned themselves at process stations were found to be sources of unnecessary exposure.
- Exposure trend data examined for 1980-83 reflect an upward trend in beta exposure at NLO independent of the present potential for positive bias in TLD results. Exposure data for 1984 to-date indicate this undesirable beta exposure trend to be continuing.

CONCURRENCES		
RTG. SYMBOL		
INITIALS/SIG.		
DATE		
RTG. SYMBOL		
INITIALS/SIG.		
DATE		
RTG. SYMBOL		
INITIALS/SIG.		
DATE		
RTG. SYMBOL		
INITIALS/SIG.		
DATE		
RTG. SYMBOL		
INITIALS/SIG.		
DATE		
RTG. SYMBOL		
INITIALS/SIG.		
DATE		
RTG. SYMBOL		
INITIALS/SIG.		
DATE		
RTG. SYMBOL		
INITIALS/SIG.		
DATE		

March 6, 1984

Conclusions

- o Accuracy and reliability for the personnel monitoring program at NLO are imperative. Current efforts appear to be well conceived and should resolve apparent disparities in the TLD system soon.
- o In parallel with ongoing problem solving efforts in personnel monitoring and irrespective of the absolute results thereof, aggressive actions should be taken to reduce beta exposure potentials and the observed upward trends in collective and individual skin exposures.

Recommendations

1. The best available health protection technology should be utilized to provide and maintain:
 - (A) Accurate personnel dosimetry and evaluation techniques to include direct reading devices, when possible.
 - (B) Effective workplace monitoring by stationary and/or portable specialized beta instrumentation and/or fixed dosimetry to assess and control exposure potentials.
2. Radiological controls such as the saw enclosure proposal should be expedited and expanded to similar saw operations as soon as possible. Interim fixes at the 5-L Gisholt Lathe in Plant 9 such as shielding and/or preventive maintenance which excludes ingot loading are highly advisable.
3. Work practices should be closely monitored by supervision to assure that personnel exposures are maintained as low as reasonably achievable.

Sincerely,

SE-334:JRM

M. R. Thiesen, Director
Weapons Division

cc: P. W. Kaspar, SE-30
 J. S. Frazier, PE-10
 E. W. Bailey, SE-34
 R. W. Cochran, DP-13, GTN
 Stephen Matovich, DP-13.1, GTN
 Leo Derderian, NE-74, GTN
 W. H. Travis/K. Leifheit, SE-33

SE-334:JRMartin:hv:6-6638:3/5/84

RTG. SYMBOL	SE-334
INITIALS/SIG.	XKM JRM
DATE	3/5/84
RTG. SYMBOL	SE-33
INITIALS/SIG.	WHT T
DATE	3/5/84
RTG. SYMBOL	DP-81
INITIALS/SIG.	MRT
DATE	
RTG. SYMBOL	
INITIALS/SIG.	
DATE	
RTG. SYMBOL	DP-81
INITIALS/SIG.	Thiesen
DATE	3/6/84
RTG. SYMBOL	
INITIALS/SIG.	
DATE	
RTG. SYMBOL	
INITIALS/SIG.	
DATE	
RTG. SYMBOL	
INITIALS/SIG.	
DATE	
RTG. SYMBOL	
INITIALS/SIG.	
DATE	

memorandum

DATE: December 3, 1984

REPLY TO:
ATTN OF: SE-334(Thomas)

SUBJECT: CORRECTIONS TO PREVIOUSLY REPORTED OVEREXPOSURES AT THE FEED MATERIALS PRODUCTION PLANT, FERNALD, OHIO

TO: David E. Patterson, Director, Office of Operational Safety, EP-32, DOE/HQ

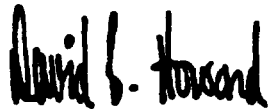
On February 28, 1984, we reported that three employees at the Feed Materials Production Plant had received skin doses which exceeded DOE quarterly and annual limits. After an extensive study of beta measurement problems associated with the thermoluminescent dosimeter (TLD) system, adjustments were made to the algorithm originally used to calculate doses. Recalculation of the reported overexposures has resulted in a reduction in the doses previously assigned to these employees with no employee exceeding DOE Radiation Protection Standards (RPS).

The corrected 1983 beta exposures (mrem) for the involved employees are as follows:

	<u>1st Quarter</u>	<u>2nd Quarter</u>	<u>3rd Quarter</u>	<u>4th Quarter</u>	<u>Annual</u>
██████████ -	3,057	3,505	4,053	373	10,993
██████████ -	815	3,403	1,884	4,277	10,379
██████████ -	3,067	2,870	3,492	1,437	10,866

Attached is correspondence dated October 10, 1984, from NLO, Inc., summarizing activities and findings which resulted in the decision to recalculate the the originally reported doses.

If you have any questions, please contact M. Thomas, FTS No.: 626-0856.



David B. Howard, Director
Safety and Environmental
Control Division

Attachment:
As stated

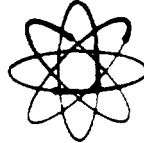
cc w/o Attach.:
M. R. Theisen, DP-81

1114517

NLO, Inc.
A SUBSIDIARY OF NL INDUSTRIES, INC.

D. Leffer

P. O. BOX 39158



CINCINNATI, OHIO 45239

PHONE AREA CODE 513-738-6200

OCT 11 1984

M. R. Theisen, Director
Weapons Division
Oak Ridge Operations
Department of Energy
P. O. Box E
Oak Ridge, Tennessee 37831

Dear Mr. Theisen:

REEVALUATION OF 1983 SKIN DOSES

- Ref: 1. Letter, R. M. Spenceley to M. R. Theisen, "Investigation of Beta Dose Exposure - Plant 5 Chemical Operators," dated December 21, 1983
2. Alvarez, J. L., et al, Radiation Field Characterization and Radiological Equipment Evaluation at the Feed Materials Production Center, NLO, Inc., EG&G Idaho Internal Technical Report No. HS-84-033, May, 1984
3. Letter, R. M. Spenceley to M. R. Theisen, "Status Report - NLO Health Physics Appraisal - 1983," dated July 10, 1984

A decision has been made concerning the status of the three employees reported as having received beta doses above DOE guide limits (reference 1). It is the opinion of NLO, Inc., that those individuals' exposures did not, in fact, exceed the Radiation Protection Standard. The doses reported in reference 1 were found to be in error and have been corrected. The original reported doses and the revised doses for each of those individuals are shown in the table below.

Name	Exposure Period	Original Reported Dose (mrem)	Revised Dose (mrem)
[REDACTED]	2nd calendar qtr., 1983	5,780	3,057
	4th calendar qtr., 1983	6,168	4,277
	calendar yr., 1983	16,437	10,379
[REDACTED]	3rd calendar qtr., 1983	5,371	3,492
	calendar yr., 1983	16,896	10,866
[REDACTED]	3rd calendar qtr., 1983	5,549	4,053
	calendar yr., 1983	15,235	10,933

101
OCT 12 1984

The individuals involved have been notified of these changes. A brief summary of the events leading up to this decision follows.

In January, 1983, the film badge dosimetry system at the FMPC was replaced by a Panasonic TLD system. This system incorporated a relatively new method for determining skin doses. In the past, skin doses were estimated from the response of a single detector under an "open window," i.e., a detector that was covered by only a small amount of absorbing material. The Panasonic system presently being used measures the dose to the region of interest for skin doses (5 to 10 mg/cm² below the skin's surface). To do this, two shallow TLD elements, each covered by a different thickness of absorber, are utilized in each dosimeter, and their relative responses are used to make an indirect estimate of the energy of the beta particles to which they were exposed. Once this estimate is made, the skin dose that would be caused by that energy of beta particle is calculated using a formula called an algorithm. The initial algorithm that was used with the TLD system was developed by a consultant who also performed the initial badge and reader calibrations.

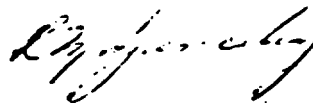
After a few months it became apparent that the TLD system was reporting much higher beta doses than had been received in the past. In addition, there were several instances in which employees who had worked an entire month at jobs that were known to entail little radiation exposure received reported skin doses in excess of those that had historically been received at known high exposure jobs. Confidence in the reported skin doses eroded, and an extensive review of the consultant's final report on the TLD system ensued. This review discovered some errors, but none that would account for the extremely high reported doses.

As a result of the poor confidence in the skin doses reported by the TLD system, the breakdown of an administrative control, and the late receipt of August dosimetry results because of a malfunction in the TLD reader, three employees received reported skin doses in excess of quarterly and annual Radiation Protection Standards. These exposures were reported to the Health Protection Branch.

The development of a prototype beta dose instrument by EG&G Idaho provided NLO with an opportunity for testing the response of the Panasonic TLDs to radiation from materials used at the FMPC. (Tests by the consultant had utilized laboratory standard sources.) A five-person survey team from EG&G Idaho performed such a study during the week of March 5, 1984. Their report (ref. 2) has been forwarded previously. They found that the initial beta dose algorithm introduced a great deal of uncertainty into the skin doses reported by the Panasonic system, and they identified a second algorithm which, with some modifications, could be applied to the NLO dosimeter. This second algorithm, which is used by DOE's Radiation and Environmental Sciences Laboratory (RESL) at Idaho Falls, produced dose estimates that were superior to those received from the initial algorithm, when compared to measurements made with the prototype dose rate instrument.

As a result of this study, it was decided that the initial algorithm would be rejected and the RESL algorithm adopted. All 1984 dosimetry results have now been calculated using the RESL algorithm, and individuals who received reported skin doses in excess of 2000 mrem during 1983 will eventually be recalculated. A more complete discussion of the decision to change algorithms can be found in reference 3.

Sincerely yours,



R. M. Spenceley
Manager

SLH/vvs

cc: M. W. Boback
G. L. Love
M. R. Theisen
R. B. Weidner
B. J. Davis
Central Files

1114520

INVESTIGATION OF SEPTEMBER-DECEMBER 1984
PLANT 9 EXCESSIVE URANIUM EMISSIONS

FEED MATERIALS PRODUCTION CENTER

INCIDENT INVESTIGATION BOARD

FEBRUARY 6, 1985

1114521

ORO - 855

INVESTIGATION OF SEPTEMBER-DECEMBER 1984
PLANT 9 EXCESSIVE URANIUM EMISSIONS

FEED MATERIALS PRODUCTION CENTER

BY

INCIDENT INVESTIGATION BOARD

FEBRUARY 6, 1985

1114522

TABLE OF CONTENTS

	<u>Page</u>
I. SCOPE OF INVESTIGATION	5
II. SUMMARY	6
III. FACTS	
A. Background Information	8
B. Chronology	13
C. Supportive Technical Data	21
IV. ANALYSIS	
A. Physical Condition of Equipment	32
B. Inspection and Testing	33
C. Management Controls	34
D. Regulatory Issues	37
E. Amelioration	38
V. CONCLUSIONS	
A. Findings	39
B. Probable Causes	40
C. Judgment of Needs	41
VI. SIGNATURES OF INVESTIGATION BOARD	42
APPENDICES	
APPENDIX A	
Exhibit 1 Letter of Appointment (1 page)	A-1
Exhibit 2 Statement of R. M. Spenceley, Manager, and W. J. Adams, Assistant Manager (3 pages)	A-2
Exhibit 3 Baghouse Experts Inspection Report (3 pages)	A-5
Exhibit 4 Measurement and Location of Bags Removed After December 14 Shutdown (1 page)	A-8
Exhibit 5 Industrial Hygiene and Radiation Department Procedure 1.4 (3 pages)	A-9
Exhibit 6 Rate Meter and Detector Description (3 pages)	A-12
Exhibit 7 Informal Stack Monitor Alarm Log (2 pages)	A-15

1114523

Exhibit 8	Quality Assurance Analysis and Quality Assurance Plan #5 (10 pages)	A-17
Exhibit 9	Quality Assurance Analysis and Quality Assurance Plan #8 (5 pages)	A-27
Exhibit 10	Example of a "Minor Event" Report (2 pages)	A-32
Exhibit 11	Post Incident Special Survey Results (12 pages)	A-34
Exhibit 12	Post Incident Urinalysis, In Vivo Counting and Air Sampling Data (10 pages)	A-46
Exhibit 13	Standard Operating Procedure for Dust Collectors (8 pages)	A-56
Exhibit 14	CERCLA Guidance Letter of April 13, 1981 (20 pages)	A-64
Exhibit 15	NLO Communication Flow Diagram (1 page)	A-84

APPENDIX B

FIGURES

1	Area Map	B-1
2	NLO Management "Executive Group"	B-2
3	NLO Health and Safety Division	B-3
4	NLO Plant 9 Production Group (first tier)	B-4
5	NLO Plant 9 Production Group (second tier)	B-5
6	NLO QC Department	B-6
7	Plant 9 Remelt Furnaces and Support Operations Process Flow Diagram	B-7
8	Plant 9 Baghouse Cutaway	B-8
9	Plant 9 Baghouse Mechanical Details	B-9
10	Staplex Filter Specifications	B-10

APPENDIX C

PHOTO

1	Plant 9 Remelt Furnaces Area Air Cleaning Facilities	C-1
2	Baghouse Stack with Stack Sampler	C-2
3	Baghouse Stack Sampler Filter and Geiger Counter Probe	C-3
4	Baghouse Monitor	C-4
5	Baghouse Control and Monitoring Center	C-5
6	Blow Ring	C-6
7	Bags and Blow Ring	C-7
8	Blow Ring Nozzle Assembly Penetrating Secondary Air (Rubber) Seals	C-8
9	"Mock Up" of Blow Ring Nozzle Action	C-9

10	"Mock Up" of Secondary Air Seal and Seal Retainer Makeup	C-10
11	"Bent" Seal Retainer Found on Floor on November 9	C-11
12	Detail of November 9 Bent Seal Retainer	C-12
13	Differential Pressure Gage Recorder	C-13
14	Bags at Lower Flange	C-14
15	Upper Flanges	C-15
16	Lower Flanges	C-16
17	Removed Bags	C-17
18	Pinholes	C-18
19	Pinhole Detail	C-19
20	Access Door Gasket Seal	C-20
21	Residue Drum Enclosure Access Door	C-21
22	Inlet Duct Hole	C-22

I. SCOPE OF INVESTIGATION

As a result of an excessive release of slightly enriched uranium from the Feed Material Production Center, Plant 9 dust collection system during September-December 1984, a type B investigation was initiated in accordance with DOE Order 5484.1. The investigation board was charged with assessing the situation and determining causal factors which contributed significantly to the release (Exhibit 1).

The board assembled facts and findings by conducting interviews, inspecting plant facilities, consulting with a team of baghouse experts, and conducting physical tests on site. The data was analyzed in part by utilizing the Management Oversight and Risk Tree (MORT) Chart, identifying causal factors, and using change analysis. Based upon these investigative techniques, judgment of needs were prepared.

II. SUMMARY

On December 7, 1984, NLO, Inc., contract manager of the Feed Materials Production Center (FMPC), reported to the Department of Energy's Oak Ridge Operation Office (DOE/ORO) that there had been an excessive and unanticipated amount of uranium emissions to the air. The loss was reported to have occurred from the Plant 9 operations from approximately mid-September to December 6, 1984.

DOE/ORO made reports to the National Response Center and several State of Ohio health and environmental protection agencies, pursuant to the provisions of the Comprehensive Environmental Response, Compensation and Liability Act on December 7, 1984. The loss has been determined to have been 123.9 kilograms of slightly enriched uranium, emitted from some time after September 11, 1984 through the early morning of December 7, 1984.

The excess emissions caused no discernable impacts offsite. An intensive in-vivo whole body count of Plant 9 workers indicates that none have incorporated an amount of uranium in their lungs in excess of allowable standards. Apparently much of the uranium and other released particulate matter was deposited on the roof of Plant 9 or in the one to two thousand foot wide buffer area which surrounds the FMPC process buildings.

During the incident, stack sampler results and radiation detector readings told NLO operating personnel and environmental protection professionals that the dust collector system was not operating properly. NLO personnel repeatedly opened the baghouse and from a very limited outside vantage point, looked for excessive dust. They did not see excessive dust, discounted the stack sampler results and radiation detectors, and continued to operate. Evidence suggests that a bag was loose in a difficult to see area in the baghouse during this time allowing excessive emissions to escape.

NLO does not have an effective program from which to closely monitor and control uranium emissions to as low as reasonably achievable (ALARA). The results of stack sampling and radiation detector excursions were not supported with professional assessments of the consequences of continued operations in a manner to facilitate sound management decisions.

Analysis of investigative data pertaining to the NLO uranium release reveals the following conditions as probable causal factors in the incident:

1. The lack of adequate bag procurement specifications and receipt inspections to assure proper bag length requirements and shrinkage tolerances. This oversight proved critical since wool baghouse fabric, subject to shrinkage, was used to filter effluents from uranium casting support operations with high moisture content.

2. The deteriorated condition of the baghouse with holes in inlet ductwork, worn gaskets on flanges and maintenance ports, and flanges not completely bolted up resulted in significant air and moisture inleakage, thereby contributing to wool bag shrinkage, fabric clogging (blinding) and general loss of efficiency.
3. The blow ring assembly contacts the bags when operating. This abrasive contact contributes to bag failures. The contact of the blow ring nozzle assembly with improperly installed air seals may tear seals and rip off retainers. The seal retainer as acted upon by the moving blow ring may then dislodge or rip bags.
4. The bag connectors depend exclusively upon the tension provided by steel springs sewn into the bags and stretched over supportive flanges without an external steel hose clamp band.
5. Over reliance upon a limited, visual inspection from a single port to ascertain uranium breakthrough and bag failures for a large, close pack 45 bag array.
6. Failure to restrict baghouse operations based upon available stack sample and radiation detector results.
7. The lack of an effective program from which to closely monitor and control uranium emissions to as low as reasonably achievable (ALARA).
8. The absence of minor event reports or effective communications to middle and upper NLO management regarding the uranium emissions as they occurred.
9. The lack of proper bags and air seals, together with the short allowable time (stay times) to work in the radiation zone created by the bags, with very little working space may have resulted in bags coming loose during and after maintenance.
10. The safety analysis program has not yet evaluated baghouse failure in sufficient detail to ferret out problems which contributed to this uranium release.
11. The failure of the DOE Oak Ridge functional appraisal program to ferret out and assure that such causal factors were eliminated.

III. FACTS

A. BACKGROUND INFORMATION

The Feed Materials Production Center (FMPC) is an industrial facility owned by the United States Department of Energy (DOE). The facility is located on a 1,050-acre site about 20 miles northwest of downtown Cincinnati, Ohio. Several rural communities are 1-3 miles away. Figure 1 is a map of the area.

The Feed Materials Production Center was constructed in the early 1950s to convert uranium ore concentrates and recycle materials to either uranium oxides or uranium ingots and billets for machining or extrusion into tubular form for production reactor fuel cores and target fuel element fabrication. Following the initial \$117 million construction project, an approximate \$60 million expansion occurred in the mid-1950s. Metal deliveries peaked in 1960 at approximately 10,000 metric tons uranium (MTU) and then in 1964 began to decline to a low in 1975 of about 1,230 MTU.* It was during the 1970s that consideration was given to closing the FMPC, so capital improvements and staffing were minimized. From 1972 through 1979, the average annual operating and capital funds authorized, in FY 1983 dollars, were \$27.5 million and \$0.7 million, respectively. The staffing level, which peaked at 2,191 in 1956, slowly declined over the same period from 662 in 1972 to 538 in 1979. Then in FY 1981, direction was given to plan the Center's restoration to accommodate projected product requirements that were to grow to near the Center's originally installed capacity. What followed was significantly increased production levels, rapid staff buildup in many areas and implementation of a major facilities restoration program. As of this date, accomplishments include production output of 3 times the 1979 level, a staff increase from 538 to about 1000, and the initiation of over \$70 million of capital facility improvements.

NLO, Inc. (NLO) is a subsidiary of NL Industries, New York, New York, and has been the contract manager of the FMPC, for the DOE and its predecessor agencies, since construction and production began in 1951.

In recognition of the revitalized mission of the FMPC, the Manager, Oak Ridge Operations, chartered a Task Force for Review of Operations at the FMPC. The Task Force reviewed the current operations and planning of NLO to meet its future responsibilities. Among the areas examined were:

* A metric ton is 1000 kilograms (Kgs) or 2200 pounds.

- o Environmental Protection
- o Radiation Protection and Employee Exposure
- o Management's Commitment to Aggressively Implement Required Changes

The Task Force report of June 1984 resulted in several environmental assessments and judgments of need relating to NLO initiative, regulatory compliance, internal and external communication, and training.

In addition, DOE Oak Ridge Operations conducts periodic appraisals in such functional areas as Environmental Protection and Quality Assurance. Reviews of the most recent appraisals in these functional areas, however, reveal essentially no findings pertaining to the programmatic deficiencies leading to this incident.

Today, the principal product from FMPC operations is uranium metal in various physical forms having several standard isotopic assays and purity controlled at a high level. Although some metal is shipped directly to DOE facilities at Oak Ridge, Tennessee, and Rocky Flats, Colorado, most of the production stream metal is cast into ingots, which are center-drilled and surface-machined for extrusion into tubes on the DOE extrusion press facilities located at the RMI Company, Ashtabula, Ohio. Some extrusions are returned to the FMPC, where tube blanks undergo heat treating and fabrication into target element cores for DOE reactors at the Savannah River Plant (SRP), Aiken, South Carolina. Other extruded material is further processed into fuel billets, via an upset forge operation at RMI, for shipment to the Richland, Washington, site. Both fuel cores and target elements are used in government reactors for the generation of electricity and the production of plutonium.

This investigation centers around an incident of continued higher than normal air pollutant emissions which occurred in Plant 9 of the FMPC from approximately mid-September 1984 to December 7, 1984. Plant 9, also known as the Special Products Plant, is a one and a half story building with a ground floor area of 48,500 square feet. Its principal capabilities are:

- o the machining of as-cast ingots and billets prior to extrusion
- o the remelting and casting of uranium metal into large diameter ingots
- o the chemical decladding of unirradiated fuel elements

- o miscellaneous specialized operations to satisfy non-routine requests.

Currently, operations in Plant 9 primarily involve machining uranium metal pieces and casting large ingots up to 13 inches in diameter, 25 inches in length and weighing up to 900 kilograms of uranium. All ingots cast in Plant 9 are for supplying the enriched N-reactor core requirement for the Richland, Washington, plutonium production reactor. The average enrichment of the ingots is about 0.98 percent in uranium-235 content. Natural uranium is 0.72 percent in the 235 isotope.

The organization of NLO directly pertinent to the Plant 9 excess emissions is shown in Figures 2, 3, 4, 5, and 6. Figure 2 is the "Executive Group", including the Plant Manager. Figure 3 is the "Health and Safety" organization. Figures 4 and 5 trace the management control through to the Plant 9 area and shift supervisors. Figure 6 is the "Quality Control" organization.

The operation in Plant 9 which is of interest in this investigation involves the two uranium remelt furnaces and their associated support operations including crucible loading, crucible burnout, and ingot separation. A schematic drawing is provided as Figure 7. The two remelt furnaces are also known as the N-reactor furnaces. They are vacuum induction furnaces which melt uranium metal through the action of an electrically generated magnetic field. The burnout facility consists of a number of work stations at which empty graphite crucibles from the N-reactor furnaces are subjected to a natural gas flame which burns out impurities such as stray uranium dust and loose graphite. An ingot separation process is nearby to the furnaces to separate the furnace castings from their molds. For most of calendar year 1984, the production rate of the above operations was 1,400 to 1,500 metric tons of uranium per year, consisting of three shifts per day, five days per week, fifty weeks per year (6000 hours). The two furnaces produce from eight to nine castings per twenty-four hours. About 907 Kg (2000 pounds) of material are charged to the furnaces per heat.

Air pollutants are generated, with varying degrees, from all of the processes associated with the N-reactor furnaces. In order to minimize or eliminate the potential for exposure of these pollutants to the work force which operates the furnaces and their support facilities, the processes are either enclosed, hooded or occur in ventilated, closed-in booths. These measures draw the air pollutants into a central duct towards the outside of the building for cleaning by a dust

collector. The nature of the emissions is that of: (a) a fine uranium metal fume which quickly oxidizes to a fine black powder, U_3O_8 , ("black oxide"); (b) small uranium metal chips struck loose from crucible cleaning or ingot separation; (c) graphite, (a black solid), from the "burnout" operation; and (d) nitrogen oxides, water and carbon dioxide from the combustion of natural gas used in burnout. It should be noted that small pieces or fine particles of uranium metal tend to be pyrophoric. That is, they will spontaneously spark and burn in a chemical reaction in air to form the black oxide. The various particulate pollutants described above and conveyed to the dust collector are generated at an approximate rate of 59 Kgs (130 lbs) per twenty-four hour day. The material that eventually reaches the ambient air has been measured in recent months, to consist of about 55 percent uranium. A substantial amount of the particulates generated, therefore, are not uranium oxide.

Associated with the Plant 9 remelt furnace operations is a Hoffman brand High Vacuum Generator which produces a vacuum in and around most of the industrial processes serving the remelt furnaces and their related unit operations. This vacuum collects secondary emissions and stray dust that might be generated and serves much the same purpose as a vacuum cleaner in the home. About 44 Kgs (97 lbs) of uranium, as U_3O_8 , is collected in an average 24 hours by the Hoffman unit.

As described above, the primary process operations generate air contaminants which are drawn into a duct. This duct leads outside the building to an American Air Filter brand Model B "Amerjet" dust collector (See Photo 1). This collector and its emission stack is known as source G9N1-1039, at the FMPC, as well.

The dust collector serving the FMPC Plant 9 remelt furnaces is a baghouse-type dust collector which captures particulate matter generated as the result of the operation of the remelt furnaces and their associated support operations. The Plant 9 dust collector consists of 45 wool felt bags of approximately 10 inches in diameter and 22 feet in length, each, in a very tight array, which severely limits the ease of inspection of each bag's surface. The bags are cleaned periodically, when a jet of air is applied on their clean side, which dislodges the collected dust on the bags and allows it to fall into a collection hopper. The jet of air is applied by a device called a blow ring which, when actuated, travels the length of the bags and dislodges the collected dust. The Plant 9 dust collector was installed at the FMPC in the early 1960s, and as such, represents a technological design which is about thirty years old. See Figures 8 and 9.

United States Environmental Protection Agency (USEPA) handbooks indicate that a baghouse, when properly maintained and in good operational order, should be able to capture as much as 99.3 to 99.9 percent, by weight, of the particulate matter to which it is subjected. Since a baghouse is not one hundred percent efficient, there is a small emission of particulates, over time from an operation like the Plant 9 remelt furnaces. For example, given 99.9 percent efficiency, for a three shift per day operation, the Plant 9 baghouse might be expected to emit about 0.032 Kg uranium per day (approximately 0.07 pounds uranium per day, about 0.13 pounds of total particulates per day). For a 24-hour, 5 days per week, 50 weeks per year operation, that would be 8.0 Kg uranium per year (approximately 17.5 pounds uranium per year, about 32.5 pounds of total particulates per year).

For information, the Ohio air pollution emissions control code would allow, for a nominal throughput of 1,500 metric tons in a 6000 hour year, an average total particulate rate of 1.73 pounds per hour or 42 pounds per day. There are no specific numerical emission limits established by Federal or State regulations for radioactivity for this facility. The DOE limits emissions from its facilities so as to limit doses to the general public below 500 millirems to the whole body. Based upon annual NLO Environmental Monitoring Reports, doses to the general public from FMPC operations, in recent years, have been less than 100 millirems.

The baghouse exhausts to a stack which is approximately sixty feet in height. The stack is equipped with a continuous stack sampler which indicates the quantitative amount of emissions released over time by the baghouse. The stack sampler consists of one probe (a small diameter tube) which faces into the baghouse discharge air stream and draws a small sample of air to a filter housed outside of the stack. See photos 1, 2, and 3. Suction for this sampler is supplied by the operation of the Hoffman High Vacuum Unit.

Ideally, the proper suction is applied to the sampler such that the face velocity of the sample tube's opening, matches the velocity of the gases in the stack at the location of the sample tube and "isokinetically" draws in a representative concentration of particle sizes in the gas. It has been the practice of NLO to have its Industrial Hygiene and Radiation (IH&R) Department inspect the sampler once a month. The inspection consists of looking at the filter to see if it has been "soiled" by the operation, indicating that a measurable amount of uranium has been deposited. If sampling filters do not have visual dust, they are left in the sampler, usually until the next monthly inspection, unless some process incident warrants reinspection of the filter for evidence of a significant release.

During the monthly inspection, NLO personnel take a flow measurement gauging of the sampler to insure it is operating properly (See Photo 2). If necessary, an adjustment is made to the flow rate.

Mounted behind the filter is a thin window, beta particle sensing Geiger-Meuller detector. The detector provides a qualitative real time indication of the amount of emission deposited on the sample filter. The radiation detector was an innovation of the IH&R Department and has been installed for two years. The purpose of the system is to detect the rapid deposition of radioactive particles on the filter, which would be indicative of a sudden, significant baghouse failure, usually caused by a sudden bag rip or bag becoming loose or disconnected from its mounting. The detector is connected to a visual and audible alarm located in an out-of-the-way position in Plant 9 near the baghouse central controller. See photos 3, 4, and 5. It was intended that the system would give a rapid indication that a baghouse was malfunctioning, well in advance of the monthly check of stack samplers for "soil", and, therefore, result in rapid shutdown of the pollution generating devices and repair of the dust collection system.

B. CHRONOLOGY

The chronology begins in September 1984, the last time the baghouse underwent major servicing. It had been determined that the blow ring drive cable required significant repair. Also, some bags looked old and worn. Note that it is the practice at the FMPC to remove and replace with all new bags, the bags in the Plant 9 baghouse, during major servicing, to allow more easy access to the blow ring and because such servicing, itself, tends to dislodge bags. The major repair job to the Plant 9 baghouse occurred during the Labor Day weekend of 1984.

September 4, 1984 (Tuesday)

The Plant 9 dust collector resumed operations with 45 new bags and ring blower repaired. Interviews indicate that rubber seals on the northwest, west, and southwest blowing air supply columns were installed in multiple sections instead of single units. The seal retainers for the southwest air column as installed failed to provide complete support for rubber seals. (Figure 9, item 14) In addition, several bags which were installed appeared to be short. See photographs 6, 7, 8

September 11, 1984 (Tuesday)

Sample filter number 1120 was put into service in the continuous stack sampler.

October 10, 1984 (Wednesday)

The monthly visual check of the stack sampler indicated a very slight accumulation of material, indicating small stack losses. The filter was kept in service.

November 5, 1984 (Monday)

Remelt furnace operation switched from a fifteen to twenty-one shift per week schedule.

November 7, 1984 (Wednesday)

The differential pressure gauge recorder had readings higher than normal, indicating that the collector bags were heavily laden with particulates. (See photographs 5 and 13 for recorder.) The blow ring drive was running continuously, yet with the differential pressure remaining high, there was clear reason to believe that the bags were not being cleaned by the blow ring action. The baghouse was shut down and inspected from the outside by an operator and a supervisor. The blow ring was put on manual operation to check for proper alignment and suspension and the bags were inspected. No problems were noted.

The Plant 9 Area Supervisor requested the Maintenance Department to inspect the baghouse because of the high differential pressure problem. The rubber seals (item 13, Figure 9) were found to be torn loose, thereby reducing the effectiveness of the reverse air flow through the bags.

November 8, 1984 (Thursday)

The IH&R Department, inspected the stack sampler filter. Although it was soiled with what looked like more than one gram of material, it was not taken out of the sampler for analysis, as required per IH&R procedure 1.4.

November 9, 1984 (Friday)

The Maintenance Department obtained an entry permit to enter the confined dusty interior of the baghouse in order to repair the blow ring rubber seals. The entry permit required that the millwright craftpersons work for no more than 24 minutes per person per week in the baghouse because of the radiation levels from residual dust on the bags, which were left hanging in the baghouse. The millwrights were to wear individual "airline" type respirators which require trailing an air hose out of the baghouse to a source of clean air. Most of the millwrights were used in relay crews to fix the baghouse between November 9 and November 12. The bags in the baghouse had not been removed, as in normal practice, which would have allowed for more repair (stay) time per crew, because Stores did not at that time have a full complement of 45 replacement bags.

The maintenance crew discovered five air column seal retainers laying on the west floor of the baghouse. Two of the retainers were bent. In addition, rubber seals were torn in the same areas. (See photos 11 and 12.)

The maintenance repair crews also found that a bag was loose in a hard to see section of the baghouse at its top connection. During the inspection, two bags were knocked off in the northeast corner of the baghouse. There was an accumulation of dust in the bottom of the baghouse, and this was vacuumed up. The loose bag and several additional bags were removed to facilitate repairs to the blow ring assembly.

November 12, 1984 (Monday)

Rubber seal and retainer replacements were completed and new bags were withdrawn from Stores to replace the bags which had been removed. It was found that the new bags were too short, so the bags which were removed during servicing were re-installed. The baghouse was returned to operation in the afternoon. At that time, instruments indicated normal operation. Interviews reveal that at least five bags were inadvertently knocked off during November 9-12 maintenance activities. Reportedly, these bags were all reconnected prior to resuming operation.

November 16, 1984 (Friday)

The IH&R Department inspected stack filter number 1120. It was laden with material and was removed for analysis and replaced with stack filter number 1134. At that time, the IH&R Department informed Plant 9 supervision that there had been a stack loss. The operator inspection of the baghouse on November 17 at 8:00 a.m. showed no excessive dusting in the baghouse; operations, therefore, continued. Sample 1120 was analyzed. NLO's laboratory data sheet shows that a gravimetric and chemical analysis of the filter was completed on November 16, 1984. The analysis, when put into a conversion equation, would indicate a loss to the environment of 38 Kg of uranium from September 11 through November 16, 1984.

November 19, 1984 (Monday)

The Geiger counter stack monitor alarm indicated a possible loss. An IH&R Department technician inspected and removed sampling filter 1134 and inserted new filter number 1138. Sample 1134 was gravimetrically and chemically analyzed on November 21, 1984 (Wednesday). It had measured a loss to the environment of 24.7 Kg of uranium from the period November 16 through November 19. Operator routine morning inspection of the baghouse indicated no stray dust in the baghouse which would be indicative of a bag failure. The Geiger counter's alarm sensitivity was decreased by a factor of 10 so that it would not alarm.

The Plant 9 Area Supervisor was informed of the November 16 and 19 filter changes by the IH&R Department. However, he was given no guidance on the significance of the actions.

The Plant 6 and 9 General Supervisor was aware of the stack alarm and the need for sample filter changing as well, although he did not see numerical results until December 3. The Plant 6 and 9 General Supervisor has indicated that shortly after November 19, he discussed the facts as he knew them with the Department Superintendent of Plants 5, 6, and 9. It was understood that the Plants 5, 6 and 9 Department Superintendent was going to speak to the chief IH&R field representative.

November 21 through November 26, 1984 (Wednesday through Monday)

The chief IH&R field representative took several days off from work.

1114537

November 26, 1984 (Monday)

Inspection by IH&R of the stack sampler filter number 1138 indicated continued loss and was removed for analyses. However, no abnormal condition was indicated through inspection of the dust collector by an operator and a supervisor. Later, the loss indicated above was determined to be 22.4 Kg of uranium. NLO records do not indicate when this analysis was completed. Although instruments showed continued, above average losses, visual inspection of the baghouse from an outside access door did not reveal excessive dusting within the baghouse, which would be indicative of a loose bag or other significant malfunction. NLO, Inc. operational personnel, therefore, continued operation. The new sample filter which was installed was number 1140.

November 27, 1984 (Tuesday)

At approximately 6:30 a.m., a fire occurred in the cyclone of the Hoffman High Vacuum Generator. An additional inspection of the stack sampler filter by IH&R indicated continued loss. The Plant 9 Area Supervisor and the IH&R representative inspected the dust collector together and nothing unusual was found. Later, the loss indicated for the period from November 26 through 27 was determined to be 12.6 Kg of uranium. Operations of the remelt furnace continued despite the fact that the emissions monitoring capability for the system was lost, while the Hoffman High Vacuum Generator was inoperable. To permit repair of damage caused by the fire and by water, the dust collector was used without the High Vacuum Generator from November 27 until December 2. NLO made no report to ORO regarding the fire nor the loss of sampling capability.

November 29, 1984 (Thursday)

At approximately 6:00 p.m., while repairing the High Vacuum system, five hourly workers were exposed to a puff of approximately four pounds of U_3O_8 . The vacuum system was thought to be free of uranium oxide before the dismantlement and the puff was unanticipated. Consequently, the workers were not wearing respirators during the repair activities. Urinalysis tests were not performed following the exposure. No report was made to NLO management concerning the exposure at this time. These workers were subsequently analyzed about 2 weeks later in a radioactivity whole-body counter. It was determined that their lung burden had not increased over previous levels.

On November 29, 1984, the IH&R Department completed its November stack sampling report. This report was reviewed by the chief IH&R field representative and the Head of the IH&R Department.

1114538

November 30, 1984 (Friday)

A stack sampler analysis report was reviewed by the FMPC Plant Manager. It indicated the 9-11-84 to 11-16-84 loss of 38.0 Kg uranium and the 11-16-84 to 11-19-84 loss of 24.7 Kg uranium. Apparently prior to the Plant Manager's review of the report, neither the IH&R Department nor other reviewers had recognized the significance of the data or issued a special report to upper management. The Plant Manager indicated that, on November 30, he was not aware that the problem was continuing (See Exhibit 2).

The Plant Manager was interested in knowing how to prevent a recurrence and he asked the Production Division General Superintendent to provide an explanation of the 63 Kg loss of uranium.

December 3, 1984 (Monday)

When the stack sampler results, through the sample of November 19, were brought to the attention of Plants 5, 6, and 9 Department Superintendent, who reports to the Production Division General Superintendent, he contacted the IH&R Department about shutting down the dust collector and casting operation. Reportedly, the IH&R representative suggested that operations wait for laboratory results on the samples of November 26, November 27, and December 3.

December 6, 1984 (Thursday)

The additional stack sampler results were received, indicating a total loss of 117.4 Kg emitted since mid-September 1984 through December 3. These results were given to the Plant 5 and 9 General Supervisor in terms of pounds of emission and he discussed the results with the Plants 5, 6, and 9 Department Superintendent who made a decision to shutdown at 8:00 a.m. on December 7. Operations were allowed until December 7 since the furnaces were in operation. Shutdown with the charge in the operating furnaces would require a loss of approximately \$5,000, according to the Plants 5, 6, and 9 Department Superintendent.

December 7, 1984 (Friday)

NLO management was given a report on the losses, which at that point totaled to 117.4 kilograms of uranium. The DOE/ORO Weapons Division manager, then in Washington, D. C., was informed during a telephone call placed to the plant. DOE/ORO staff was also informed by NLO management. DOE/ORO staff was

told that potentially 180 kilograms of uranium had been lost as excess emissions during the period from approximately mid-September to December 6, 1984. This information and other facts were reported to the National Response Center pursuant to the requirements of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) by the DOE/ORO Environmental Protection staff. CERCLA requires that excess or unanticipated emissions of radioactivity greater than 1 pound per day be reported. Reports were also made to the Ohio Environmental Protection Agency, the Ohio Department of Health, and the Ohio Disaster Services Agency. NLO was told to prepare a press release for December 10, in accordance with standing ORO policy to keep the public informed about unusual occurrences at its facilities.

DOE/ORO staff had been given the estimate of 180 kilograms of uranium which is more representative of the total year's loss of uranium from the Plant 9 baghouse rather than the loss during the upset condition period. The losses from mid-September 1984 through December 7, 1984, inclusive of the December 3 through December 7, 1984 sample, totaled to 123.9 kilograms of uranium, according to information given to the Board. (123.9 kg = 273 pounds)

It was later found that one of the 45 bags (located in the obscure southeastern area) was loose from its bottom flange. The bag was too short to be reattached at the bottom flange. Entry into the baghouse, itself, did reveal the presence of dust accumulations.

Subsequent to the remelt furnace operation shutdown, the following measures were pursued:

1. The baghouse was vacuum cleaned.
2. A bag was replaced.
3. New gaskets were installed on the units' access doors on Monday, December 10.
4. A visolite dye test was administered on Tuesday, December 11. Visolite is a brand name for fluorscein and has a face powder texture. It is a black-light sensitive phosphor. An inspection of the clean side of the baghouse was conducted with a black light. No leaks were detected. A bag was loosened at the bottom, purposely, to check the inside of one bag with the black light for the presence of the test dye. There was a significant amount of the test dye on the inside of the bag (dirty side) indicating that the dye had been dispersed to and had been captured by the bags.

The stack sample filter was removed and checked with the black light for presence of the test dye. None was found.

5. A dry run was conducted of the remelt furnace baghouse and related systems. The dust collector was turned on and allowed to operate for the second and third shift periods, approximately 16 hours on Tuesday, December 11.

December 12, 1984 (Wednesday)

The remelt furnace operations were restarted. Subsequent inspection of the stack sampler on December 13, 1984, at 8:00 a.m., revealed no evidence of any leaks. The Geiger counter monitor also indicated no evidence of a baghouse malfunction.

December 14, 1984 (Friday)

On December 14, the Geiger counter started to show an unexpectedly rapid rise in its readings. As a precaution, the remelt furnaces' operation was shut down. An analysis of the stack sampler filter indicated a loss to the atmosphere of 0.05 Kg uranium for a two-day period. This is an extremely small amount. However, the DOE decided to keep the furnaces shut down until the baghouse could be inspected by a team of experts.

December 18, 1984 (Tuesday)

As a result of an ongoing, intensified inspection of all major process ventilation systems at the FMPC, Plant Management made a decision to temporarily shut down a portion of a second processing facility (Building 5) because of marginal performance of the facility's bag filtration system. The malfunctioning of the system, involving two bag filtration units and associated stacks, had resulted in slightly more uranium dust being discharged to the atmosphere than would be expected for the operating period involved. Approximately 5.5 Kg of uranium are estimated to have been discharged from one stack at Building 5 from December 11 through December 17, and approximately 7 Kg of uranium dust are estimated to have been released from the second stack between November 10 and December 11.

A team of baghouse experts examined the Plant 9 dust collection system. The team examined Plant 5 on December 19. The technical report is attached as an Exhibit. (No. 3)

The DOE investigating board was told that on this day, NLO upper management first learned of the previous exposure of 5 hourly workers to U_3O_8 dust which occurred on November 29.

C. SUPPORTIVE TECHNICAL DATA

1. Collector Housing System

- o The housing of the baghouse provides inspection/access doors only on the north side of the collector. Two doors are provided at the lower level and one door is provided at the upper level of the collector. For the daily inspection, only the lower level doors are utilized.
- o The physical arrangement of the housing does not allow physical accessibility within the collector for a thorough inspection. (The photographs 7 and 14 illustrate the limited field of view available to an inspector. Several bag rows cannot be observed from the doors.)
- o No permanent lighting is within the collector nor is utilization of temporary lighting required by procedure.
- o The filtering system operates on a vacuum and in-leakage would definitely decrease the efficiency of operation. Several in-leakage areas were noted by the investigation team and also by the special bag house expert task team. In-leakage of moist wet air can cause wetting of the bags and the collected particles on them which can lead to blinding of oxide on the dust bags as well as providing potential dust bag problems discussed below.

2. Dust Bags

- o The wool bags connect to upper and lower flanges by a spring tension device designed into each end of the bags. The device is strictly tension, such as a rubber band, and not adjustable. (See photographs 15 and 16 for flanges.)
- o The bags pass through a blow ring assembly. Tolerances between the bag and blow ring are very close and rubbing does occur from time to time during operation which can cause pinholes. This is noted since all bags removed from the collector over December 14 weekend were found to have pinholes in them. (See photographs 7, 17, 18, and 19.)

- o The blow ring makes contact with the six air supply columns by six elliptical nozzle assemblies which must extend through the rubber seals and extract air within the pressurized column. The rubber seals, which are about 23 feet in height, should be installed in a single top to bottom piece so that the metal nozzle lip will get an adequate seal. (See photos 8, 9, and 10.)
- o The last procurement and receipt of bags for the Plant 9 collector prior to this investigation occurred in 1979. No records were provided to indicate any receipt inspection took place.
- o There is no receipt inspection procedure used for Plant 9 dust bags.
- o Presently there is a Quality Control (QC) group, which for approximately two years, has performed dimensional checks on dust bags on a sample basis. Checklists are utilized and were available from the QC group.
- o No vendor certification or utilization of an independent lab on requirements of the procurement specification (shrinkage, bag strength, material, etc.) has been required.
- o No preoperational test(s) is required by procedures for the Plant 9 collector.
- o All bags removed after the Plant 9 shutdown on December 14, 1984 were measured. The 45 removed bags ranged in size from 21 feet, 9 inches to 21 feet 11 1/2 inches. Measurement of all bags is provided as Exhibit No. 4.
- o The bag found loose on December 7, 1984 was also measured and found to be 21 feet, 8 1/4 inches.
- o The bags that had been pulled from storage for replacement in November 10-12, 1984 time frame were not used because they were too short. These bags were later measured to be 21 feet, 5 inches to 21 feet, 9 1/2 inches.
- o The procurement specification requires the Plant 9 bags to be 21 feet, 10 inches, but provided no tolerances. Measurement by the bag house expert task force team indicated 21 feet, 10 1/4 inch from upper flange to lower flange. For proper connection, the task team estimated a bag should probably range in size from 21 feet, 11 3/4 inches to 22 feet, 1 to 2 inches.

1114543

- o The bag procurement specification also required preshrunk material be used.
- o The investigation team requested that a bag be removed from stores, wetted and then dried. A bag was wetted and dried in the NLO laundry and shrunk from 22 feet, 2 inches to 20 feet, 4 inches, a total shrinkage of 22 inches. Operation with moist/wet in-leakage together with the moisture inherent from natural gas usage in upstream processes and the heat produced by the industrial process could result in some bag shrinkage. (See photographs 20-22 for in-leakage source examples.)
- o The team of baghouse experts indicated that some bag stretching during installation may occur.
- o The wording of the bag procurement specification requires a spring at one end of the bag. However, the drawing of the bag, which is part of the procurement package, and actual physical installation requires springs at both ends.
- o The QC group presently is using a check mark (✓) to indicate an acceptable dimension on a checklist in lieu of putting the actual measurement. QC supervisory acceptance and bag acceptance (by another organization) is based on these check marks.
- o Any deviation approval of the procurement bag specification is requested from maintenance personnel in lieu of the procurement specification preparer and operations.
- o Stores attempts to keep one set of bags for a complete changeout. Bags in storage on December 14, 1984 were measured and found to range in size from 22 feet, 1 inch to 22 feet, 2 3/8 inches.

3. Visual Inspection and Differential Pressure Recorder Chart

- o The differential pressure recorder (photo 13) records the difference in air pressure between the process side of the baghouse and the clean side. The differential pressure recorder is to be read once per shift. (High differential pressure would be indicative of restriction to air flow, such as dust buildup on the bags. Low differential would be indicative of less restrictions, such as loose bags or new bags.)

- o Discussions revealed that accepted practice was to operate if visual inspection revealed no bag problems.
- o Discussions indicated that management did not believe one loose bag would be detected on the differential recorder but did not have an idea as to how many bags would have to be disconnected before a noticeable change on the recorder was seen.
- o The NLO Standard Operating Procedure (SOP) indicates the desired range for the AMERJET baghouse is 3 to 4 inches. However, the procedure provides for flexibility by allowing plant supervision to adjust the range when new bags are installed or older bags become blinded. Plant 9 supervision did adjust setpoints between 1 and 3 on December 5, 1984 to have the ring blower operate more.
- o Review of recorder charts prior to bags being found loose do not indicate any sudden unexplained drop of differential pressure.

4. Stack Filter Sampler

- o The stack filter sampler inspection requirement and filter change procedure is described in Industrial Hygiene and Radiation Department (IH&R) Procedure Number 1.4 (Exhibit 4).
- o The filter sampler was to be inspected within the first two weeks of each month. If the filter shows evidence of significant accumulation of material (i.e., estimated at greater than one gram) the filter is to be changed and analyzed. Per the chief IH&R field representative, one gram on the filter is representative of 20.75 Kg of particulate up the stack.
- o Per IH&R procedure 1.4, if deficiencies are noted, the IH&R must notify the Plant Supervisor before leaving the plant and make suggestions for correcting any deficiencies.
- o The filter in use is a Staplex Type TFAS pleated cellulose filter, 4 inches in diameter, which is mounted in a fixed housing drawing an effluent sample stream from an isokinetic stack probe. (Photo 3 and Figure 10)

- o The evaluation of uranium emissions relies upon a gravimetric and chemical analysis of the filter and its contents, together with a proportionality factor to assess effluent emissions by comparing the volume of effluent sampled with the total stack throughput. The evaluation, however, is without a filter collection efficiency factor which will account for that small fraction of the particulate sample stream which passes through the filter.
- o DWYER Rotameters with a 0-60 liter per minute range are used to test the stack sampler flow rate monthly. The Rotameter used during the uranium emission episode was calibrated on October 4, 1984 using a wet test meter, however, calibration of rotameters at NLO is ad hoc with no required frequency.
- o The standard operating procedure for collector systems does not address the sampler or require the sampler for dust collector bag operation. The sampler in Plant 9 relies on the Hoffman High Vacuum Generator to be operating to obtain adequate flow rate across the sampler. Commencing November 27 and for approximately six days thereafter, operation of the dust collector continued with the Hoffman down for repairs.
- o The IH&R Department issues a monthly Stack Discharge Report reflecting filter analyses results.

5. Geiger Mueller Stack Monitor

- o The Ludlum Rate meter and Geiger Mueller detectors (See Exhibit 6) were installed upon seven stacks about two years ago to provide more sensitive indications of uranium losses as they occurred. Presently, 53 stacks exist without such detection systems. The plan was to judge the effectiveness of the radiation detection systems upon the seven stacks known to have higher emission rates and then extend usage to the remaining stacks if warranted.
- o The Ludlum Model 177 Alarm Rate Meter has an audible and visual alarm which may be set on any of four scales, 0-500, 0-5000, 0-50,000, or 0-500,000 counts per minute. The physical location of the rate meter is in an area with industrial noise and removed from office spaces which make it difficult to recognize alarms when they occur.

- o The alarm settings and scale positions are easily changed and could be adjusted by unauthorized personnel.
- o The Ludlum Model 44-9 Pancake Geiger Mueller detector is positioned in the stack sample assembly to detect uranium beta/gama radiation from the sample filters (Photo 3).
- o The rate meter and detector represent a sensitive indicator which, in addition to detecting major bag failures and pinhole leaks, also monitors the gradual buildup of uranium upon the filter as a consequence of nominal uranium penetration under design filtration conditions. As the filter loads normally, the rate meter will gradually increase, but usually remain below 50,000 counts per minute between filter changes, at Plant 9.
- o The stack monitor was not addressed by any operating procedure or by an IH&R procedure.
- o No permanent recordings nor slave alarms in manned areas are provided.
- o No procedural setpoints were or have been established, nor any training provided for operator action if alarms were seen or heard.
- o The IH&R Department has custody of the monitor operation and apparently on plant 9 had set the alarm at full range on the X100 scale when its alarm sounded on November 19, 1984. Changes between the X1000 and X100 scale took place several times during the September-December time frame (See Exhibit 7).

6. Administrative Controls

- o The NLO Quality Assurance (QA) Program requires Quality Assurance Analyses (QAA) and Plans (QAP) to determine and prevent significant potential problems. The QAA and Plans are attached as Exhibits 8 and 9.
- o The NLO QA program requires that a minor event report be written and submitted to the NLO Assistant Plant Manager within 24 hours after the event. Minor event is defined as: "Any unusual happening which did occur or might have taken place and caused a problem." Some

examples are serious violations of operating procedures, a failure of emergency equipment, injuries if potentially serious, damage to equipment, etc. The supervisor must judge if the event is serious enough to require a report". No minor events were prepared on the plant 9 collector prior to commencement of the investigation. An example of a minor event is attached for information, Exhibit 10.

- o NLO upper management holds daily meetings to discuss plant highlights. A listing of the highlights is typed and readied for the meeting which is held at 11:00 each day. During the September through December 7, 1984 time frame, the following entries concerned the Plant 9 collector:

November 12: The N-Reactor Furnaces have lost seven shifts while Maintenance is repairing the dust collectors. They are still down this morning.

November 13: The American Dust Collector was repaired at the end of the first shift yesterday, and we resumed operation on the second shift.

November 27: We had a fire in the cyclone of the American Dust Collector (Hoffman High Vacuum Unit) in Plant 9 this morning. We plan to use the portable dust collector and continue to operate. Maintenance plans to replace the bottom cone of the cyclone.

December 7: The N-Reactor Furnaces have been shut down to allow thorough inspection of the American Air Filter Dust Collector. Stack samples have indicated enriched uranium losses from this dust collector. N-Reactor casting will not be resumed until this problem is resolved.

- o NLO has not established any plant action level, emissions tracking or control measures to be utilized to trigger a plant response, to reduce or eliminate excess emissions. An effective ALARA program from which to closely monitor and control uranium emissions has not been implemented.
- o No internal QA audits specific to the plant 9 baghouse have been performed to evaluate the efficiency and effectiveness of the operation. Interviews would indicate that an internal appraisal system, to

evaluate effectiveness and efficiency of management systems, is not in place but that all QAAs and QAPs are audited (i.e., reviewed) on an established frequency. An internal audit of the QAP-PROD-OG-5, Dust Collectors Systems in Production Plants was performed in May 1984. The audit included an item by item review of the plan and basically suggested several word changes which was reported in June 1984.

- o The Assistant Manager indicated that it was standard practice of the various plants to maintain a shift log of the events that occur during operation, however, plant 9 was not maintaining such a log. This fact required reliance on the memories of several persons during the investigation.
- o Plant 9 does maintain production logs and various operational checklists such as the operator's Dust Collector and Residue Report and Recorder Charts which were utilized during the investigation.
- o Oak Ridge Order OR 5484.2 requires prompt notification of unusual occurrences to be made to DOE Contracting Officers/Contracting Officer's Representatives. The policy of the ORO order indicates that even events which do not qualify as unusual occurrences, yet are of interest to ORO, particularly as related to environment, safety, health, public information, security, quality, and programmatic matters should be informally communicated directly from the contractor to their ORO counterpart.
- o DOE Order 5484.1 provides guidance for notification to DOE of occurrences which would give rise of inquiry by members of the press or public or where a press release is made.
- o The Safety Analysis Report for Plant 9 has not been commenced and is scheduled for completion in the fourth quarter of fiscal year 1988. (Only a draft report for Plant 1 has been completed to date.)

7. Personnel

- o There is no experienced, qualified staff health physicist working in the environmental area at the FMPC. The chief IH&R field representative and the chief of IH&R Department are experienced industrial hygienists.

- o Operational and the IH&R staff appear to be conditioned to tolerating large size releases because of the operational experiences of earlier years (1955-1972) when routine and upset losses were much higher than recent years.
- o Upper management has maintained the responsibility for reporting Unusual Occurrences to DOE and have relied on NLO administrative systems to kick up necessary reportable information. For this reason, management has not passed on specific DOE occurrence reporting requirements to lower levels.
- o A representative from the Safety Division is not a routine attendee at the daily plant meeting to discuss highlights.

8. Health Physics Activities

- o Routine health physics surveys performed at Plant 9 include quarterly ground floor and high platform alpha and beta/gamma surveys for both fixed and transferable uranium contamination. Comparisons of third and fourth quarter 1984 survey results (Exhibit 11) provide for a rough before and after incident contamination profile at Plant 9. No significant increase is noted in the general workplace.
- o About seventy personnel were reported by NLO to have been potentially exposed. This determination was completed about two weeks after the incident.
- o Routine breathing zone air samples for Plant 9 workers were compiled for the uranium release period September 4 - December 7, 1984 and compared with a comparable 1983 period which represents a minimal uranium emission period. The post incident samples appear to be slightly less than the 1983 results (Exhibit 12) . The time weighted average exposures are well within DOE standards.
- o On December 14, 1984, special surveys were conducted in the vicinity of the baghouse on the south side of Plant 9, on and below the baghouse platforms near the stack, on the lower maintenance platform at the Hoffman Hi-vac unit, ground level underneath the baghouse and related plenums and on adjacent Plant 9 roof areas and drainage easements. Visual examination

revealed accumulations of wet, black residue in the roof drainage easement, the dyked area under the baghouse and on platforms near the stack. Uranium analyses of residue samples indicate uranium deposits upon the roof and high platform areas consistent with the uranium content identified in baghouse effluent (about 55% uranium) calculated to be about 9% of the total release. The ground level deposits appear to be associated with the elevated uranium content (62.6%) released during a minor fire that occurred in the Hoffman Hi-vac unit on November 27, 1984. Other uranium residue identified by this special survey are consistent with residual contamination levels generated from routine plant site operations.

o The most definitive health physics exposure data is the urinalysis and whole body analyses for the potentially exposed personnel. This data (Exhibit 12) yields no evidence of elevated exposure to the workers in the proximity of the Plant 9 baghouse.

9. Environmental Activities

- o Seven permanent monitoring instruments located around the FMPC perimeter fence line did not detect any elevated levels of uranium during the timeframe of the recent accidental release, indicating that the uranium was primarily deposited on the plant site. This indicates that any off-site contamination from the recent accidental release was not readily discernable from that resulting from expected routine releases.
- o As a result of the DOE CERCLA notification, the FMPC was visited on December 13, 1984, by representatives of the Ohio Environmental Protection Agency, the Ohio Disaster Services Agency, the Ohio Department of Health, the Southwestern Ohio Air Pollution Control Agency, and the Hamilton County Civil Defense Agency. Various environmental sampling collection methods and sampling data were reviewed with these representatives and feedback from the representatives did not indicate any concern regarding off-site contamination. Soil and milk samples have also been taken and results of their analysis were not available at the time of the report. Since the inhalation pathway is the most significant effective exposure pathway from U_3O_8 particles, the lack of effect to the ambient air is indicative that the levels of U_3O_8 in soil and milk, as a result of the Plant 9 excess emissions, will probably be within acceptable limits.

1114551

- o During the past approximately thirty years of FMPC operation, uranium has been discharged to the environment via both the air and water pathways under both normal and upset operating conditions. The major discharges occurred during the 1950's and 1960's. During the past ten years, significant progress has been made in reducing both routine and accidental discharges of uranium to the environment. A comparison of discharges of uranium from baghouses during 1955 and 1984 is as follows:

	<u>1955</u>	<u>1984</u>
Total Loss, Kilograms Uranium	12,477	322
Uranium Metal Production, Metric Tons	6,500	5,400
Loss Per Metric Ton of Production, Kilograms Uranium	1.92	0.06
Number of Major Loss Incidents, Over 45 Kilograms Uranium	37	1

- o Discharges of uranium from FMPC operations over the past 30 years have resulted in some accumulation of uranium in the soil, sediments, and groundwater in the area surrounding the plant. Current levels of uranium in these media are documented and evaluated in Environmental Monitoring Reports which are issued on an annual basis. The annual Environmental Monitoring Reports are furnished to such agencies as the U. S. Environmental Protection Agency, Region V, the Ohio Environmental Protection Agency, and Ohio Department of Health, and the Cincinnati Commission of Health.
- o The annual Environmental Monitoring Report for 1983 indicates, on pages 34 through 39, that the radiological doses to residents living near the FMPC, both from ongoing operations and the effects of accumulated uranium in the environment, are far below the DOE dose limit standards of 1500 millirem to critical organs (the lung) or 500 millirem to the whole body.

IV. ANALYSIS

A. PHYSICAL CONDITION OF EQUIPMENT

The age, exterior location of the plant baghouse collection facility, and past years' budgetary constraints have contributed, in part, to the deteriorated physical condition of the equipment involved. It also appears that successful meeting of schedules during former austere budgetary periods has brought about a pride of accomplishment which centers upon production. A combination of these conditions may have fostered the continuance of a minimal maintenance program when production goals have been increased in recent years and the equipment had been designated for replacement in the near future.

There is no record of the lengths of the bags prior to their installation in early September 1984. The bag manufacturing specification indicates the end to end length is to be 21 feet, 10 inches, however, the baghouse expert team measured the true distance between flanges to be 21 feet, 10 1/4 inches. In mid-December, measurement of the bags after several months in service showed that 32 of the 45 bags are now 21 feet, 10 inches or less. The bag found loose and removed on December 7, 1984, measured 21 feet, 8 1/4 inches and the unused bags that were measured from Stores ranged from 21 feet, 5 inches to 21 feet, 2 3/8 inches. Operation of the Plant 9 baghouse also provides all necessary conditions (moisture, heat, and wool material) for shrinkage. In the case of Plant 9, additional in-leakage sources for moisture and heat from exposure to direct sunlight exist.

Because of the above facts, the potential for several bags to barely make connection on the upper and lower flanges during installation existed, particularly if the bags just met the procurement specification of 21 feet, 10 inches prior to installation.

The presence of joints were reported in the three western column rubber seals during the September 4 maintenance due to the lack of appropriately sized rubber seals in NLO stores. On November 9, five retainer brackets, two being bent, were discovered on the baghouse floor (See Photos 11 and 12). The moving blow ring with extended nozzle edges could catch upon protruding rubber seal edges at a joint. This action may result in a ripping action which could tear seals and force off seal retainers. The bends in the seal retainers appear to be the result of force exerted by the blow ring which is the only moving part. The bag discovered to be loose was disconnected at the top. Forces such as those exerted by one

or more retainers being directed upon a bag by the moving blow ring may have dislodged the bag. The simple wedging action of the blow ring against seal retainers may be sufficient to force the horizontal blow ring off center. The off center blow ring movement may apply disruptive force to bags as well as remove additional seal retainers.

B. INSPECTION AND TESTING

The baghouse continued to be operated despite elevated stack samples and radiation detector alarms because it was an accepted practice to do so until such time as a visual inspection confirmed the presence of uranium oxide in the baghouse. The visual baghouse inspections were not adequate to identify uranium oxide at all locations within the baghouse.

The monthly stack sample check is also a visual inspection upon a pleated, convoluted filter matrix relying upon a trained eye to estimate significant oxide deposits in difficult to view filter folds (See Photo 3). The monthly filter inspections appear to be subject to considerable variability of detection limits among various IH&R personnel and, moreover, do not constitute a sensitive method from which to control emissions but rather represent, largely, an after the fact indicator to be firmed up by subsequent gravimetric and chemical analyses. The lack of a uniform, continuous flow across the filter and collection efficiency correction factor combine to diminish measurement precision in a manner which would likely underestimate the true uranium emission rates.

The differential pressure readout is primarily used to trigger bag cleaning and can only be considered a very crude indicator which would only detect a severe, multi-bag failure in a manner which would not permit timely actions to avert significant releases.

The Ludlum Rate Meter and Geiger-Mueller Detection System does appear to represent a sensitive indicator of stack losses in a timely manner which may permit effective emissions control. During routine operation conditions at design filtration, there is residual sample filter loading and, consequently, a gradual increase in count rates. Therefore, it is necessary to identify excess counts from those expected from normal build-up. This distinction is simplified when sudden bag failures, such as bag detachments occur, since the rate meter would rapidly increase and may alarm; however, for pinhole leaks and gradual failures, the increases may not be readily discernible and, hence, go unnoticed. Moreover, the lack of formal monitoring requirements, absence of readout recordings, and the difficult to view location selected for the rate meter combine to create circumstances whereby alarms might go unnoticed and certainly any gradual excess build-up of rate meter counts corresponding to a gradual failure such as worn bags with increasing numbers of pinholes would likely be unrecognized.

There appears to be a lack of coordinated, aggressive efforts to minimize uranium releases as evident from the casual visual inspection practices used for both the baghouse and stack samplers; the ad hoc manner in which the radiation detectors had been used for two years; lack of clear cut guidance for interpretation of results; or preset action plans to mitigate releases based upon knowledge of consequences.

C. MANAGEMENT CONTROL

1. Communications and Execution of Procedures

- o NLO pursued a management system based on the expectation that each subsequent lower level, somehow, knew what was the correct way to respond to unusual occurrences. Key people within the IH&R Department who were responsible for collecting the stack sampler data and providing interpretations of its significance to operating management personnel had limited formal Health Physics training and did not aggressively apply ALARA philosophy. These people performed their duties in an independent fashion and failed to take advantage of other Health Physics expertise.
- o DOE orders, which provide some cogent examples of events which require reporting, were not disseminated to lower echelons for fear of inducing "over reporting". NLO management expected its definition of "Minor Event" to elicit the proper response from NLO employees, in the event of an unusual occurrence, that would fulfill DOE Order requirements.
- o IH&R professionals continued to casually develop data which indicated that the environment was being insulted. The IH&R Department did not realize the significance of the data it generated and, therefore, could not properly advise the production management staff about the stack sampler readings nor recommend a shutdown of operations. Despite evidence from two monitoring devices showing a baghouse problem, NLO operating and IH&R Department personnel allowed the operation which was causing the problem to continue. There was no perception of the need to consult with higher health and safety or production management at NLO or with DOE.
- o First line IH&R Department and production personnel made statements to the Board to the effect that the losses indicated by the Plant 9 stack sampler were not significant when related to FMPC experience of twenty to thirty years ago. Although the executive management of NLO displayed a sensitivity to the incident's releases, this sensitivity was

1114555

not widespread in the plant. Finally, late into the incident, it took an inquiry by the Plant Manager on November 30 to precipitate an investigation into the excess emissions reported as of that date. On December 3, the Plants 5, 6, and 9 Department Superintendent decided to continue to operate while the IH&R Department developed more data. Therefore, the incident continued for another seven days beyond November 30.

- o The Director of the Health and Safety Division is not a regular member of the daily meeting to review highlights of the plant. His presence could have contributed to upper management awareness of releases, fires, etc.
- o NLO failed to have procedures in place that would allow for compliance with DOE Order 5484.1, "Environmental Protection, Safety, and Health Protection Reporting Requirements" (See Chapter I, m. and n.). On November 30, the Plant management knew that NLO had measured two large, unanticipated releases yet NLO failed to notify the DOE.
- o NLO management became aware of the exposure of the Hoffman unit cyclone repair crew to U_{308} dust of November 29 over two weeks after the exposure. This late perception made the use of the quick urinalysis test procedure for assessing internal uptake moot.
- o NLO senior management believed that the Geiger counter monitors were routinely and effectively being utilized as an aid to controlling emissions.

2. Procedures

There were only two procedures (Exhibits 5 and 13) which describe the dust collector system equipment and the stack sampler. No procedure mentioned the two year old stack monitor. The two procedures were plantwide documents which provide great flexibility, while depending on subjective interpretations and judgments to accomplish goals. For example, the procedure covering the collector system lacks specificity to operators for the need for stack monitoring equipment to be functional prior to placing the dust collector system in operation. Actions to be taken if stack monitor equipment fail while in operation is not addressed. The sampler procedure requiring the IH&R technician to estimate weight of soiled material is also subjective.

3. Quality Assurance

Although both the dust collector and dust bags had an associated QA Analysis and Plan, these documents failed to accomplish their objective, which was to prevent this type of unacceptable situation by implementing preventive measures. During the review, several other QA programmatic failures were noted which occurred apparently previously, and definitely during, the September to December time frame and contributed to this situation. Significant failures found were:

- a. The bag procurement specification has not dictated the proper bag size since issuance of the original specification in the 1960s.
- b. No timely "minor event" reports were prepared, nor DOE notified although items were encountered as followed:
 - i. Bags too short for installation were obtained from Stores.
 - ii. Loose bags were found on two separate occasions.
 - iii. A fire occurred. This fire also resulted in the loss of the capability to measure emissions for approximately the next six days.
 - iv. Blow ring maintenance was required in November after major repairs had recently been performed in September.
 - v. Personnel were exposed to oxide.
 - vi. Sampler results of large emissions could not be correlated to a physical operational problem by visual inspection.
- c. Acceptance of equipment (bags) continually being obtained without specific measurable criteria or certification.
- d. Lack of procedures which addressed monitor alarm action although a specific action of the QA analysis was to be familiar with SOP on alarms.
- e. A lack of a check and balance system which would provide management with objective feedback in the effectiveness and efficiency of the QA program.

- f. Lack of procedures which require that a baghouse and associated facilities be shut down if the stack sampling capability is lost. The loss of the operation of the Hoffman High Vacuum Unit should have resulted in a shutdown of the Plant 9 baghouse.
- g. Lack of procedures to designate personnel authorized to adjust radiation alarm set points.

It appears the existence of the above problems can continue unless a better communication and understanding occurs throughout all levels of the NLO organization on how all parts of its QA program is to be implemented and maintained.

D. REGULATORY ISSUES

Controversy surrounds the issue of CERCLA requirements as they pertain to FMPC operations. NLO upper management indicated that formal DOE guidance had not required full compliance with all CERCLA requirements. This guidance was later determined to be a 1981 letter (Exhibit 14) which only required ORO contractors to report accidental or episodic hazardous substance releases for which remedial action might be necessary. DOE staff members indicate that they verbally advised the NLO Director of Health and Safety as recently as the spring of 1984 to meet CERCLA requirements, but no written guidance which revises the 1981 memorandum have been issued. The DOE letter remained, forgotten, in the DOE files. NLO brought this letter to the attention of DOE after December 7, 1984. Nevertheless, the confusion as to CERCLA requirements did apparently prevent timely reporting by lower management of inadvertent discharges at the one pound per twenty-four hour level, pursuant to CERCLA.

Irrespective of parallel requirements to report under the Environmental Protection Agency CERCLA provisions, the releases were significant enough to be reported, as they occurred, to DOE per the DOE Unusual Occurrence Order. They were not reported to DOE until the incident was over.

- o DOE Order 5480.1, "Environmental Protection, Safety and Health Protection Program for DOE Operations," requires that all DOE operating sites maintain a program to manage and reduce radioactive releases to as low as reasonably achievable (ALARA). NLO IH&R Department staff were not acquainted with the requirement to have an active ALARA program to manage emissions during the course of the year.

- o The Ohio Air Pollution Control Code requires that malfunctions of air pollution control equipment which result in the violation of emission standards are to be reported to the Ohio Environmental Protection Agency. NLO environmental oversight procedures did not provide for recognition and compliance with this regulatory requirement.

E. AMELIORATION

The Plant 9 baghouse was shut down on December 7 and tests conducted prior to restart. All baghouses and associated stacks were placed on a more frequent monitoring schedule. As a result, the Plant 9 and Plant 5 baghouse operations were ceased on December 14 and 18th, respectively, by order of DOE and NLO following timely identification of slightly higher than normal release rates. DOE and NLO actions were timely and decisive in preventing unnecessary uranium emissions. DOE has ordered that all the units in question shall remain shut down until it is determined they can operate in a normal manner.

The on-site radiation safety response to the incident was to conduct a special contamination survey a week after the episode of excessive uranium releases. The survey (Exhibit 11) was confined in scope to surface contamination in the immediate vicinity. No air contamination surveys were conducted except for the routine breathing zone samples which were fortunately ongoing during and after the episode of excessive uranium emission. Although there does not appear to be significant exposures to personnel at Plant 9, there were a total of some 70 personnel potentially exposed, including other contractor personnel involved in a ventilation survey at Plant 9. NLO staff were slow to identify potentially exposed personnel and evaluate exposures. This may have been due, in part, to earlier experiences of IH&R personnel with evaluation of similar or even greater releases without apparent exposure problems.

The environmental assessment consisted of gathering air, soil, well water, cistern, and milk samples at the end of the emission episode. The response appeared to be timely and effective in evaluating the environmental consequences. The results to date indicate no measurable environmental impact.

V. CONCLUSIONS

A. FINDINGS

1. The attitude of IH&R personnel, Plant 9 operators, and line management regarding inspection and monitoring of baghouse leakage was somewhat casual and reflected earlier operational regulatory requirements and philosophies which had tolerated larger uranium losses.
2. The daily visual inspection practices at the Plant 9 baghouse were not adequate to identify uranium oxide leakage.
3. The Geiger Mueller radiation detection systems were not researched and developed to provide credible, clearcut information to management.
4. The monthly visual inspection of stack filters is inadequate in frequency, scope, and quality to provide timely information in order to assure that stack releases are maintained as low as reasonably achievable.
5. Uranium control, monitoring equipment and practices have, in general, failed to keep pace with best available technology.
6. Bags can become loose at their flanges because of one or more of the following factors: improper sizing, weak bag attachments, shrinkage, blow ring forces exerted upon seal retainers and bags, vibration, restoring forces of a stretched bag, high differential pressure and/or being inadvertently knocked off during maintenance.
7. The bag procurement specifications and certification assurances required from vendors were less than adequate.
8. Many aspects of the NLO QA program were not adequately implemented (See Section IV.3.).
9. Significant omissions were present in the operation procedures (See Section IV.2.).
10. Subjective judgment instead of measurable criteria is utilized to accept and operate equipment.
11. The level of authority which approves deviations and variances has not been established. In the bag or air seal installation, deviation approval authority appears to be improperly accepted by the maintenance personnel installing such equipment.

12. Implementation of internal and external reporting on occurrences is less than adequate.
13. The management of NLO had failed to insure that its environmental protection professionals had established and maintained an effective excess emissions reduction and control program incorporating ALARA practices.
14. The DOE Oak Ridge functional appraisal program failed to identify and assure correction for significant causal factors.

B. PROBABLE CAUSES

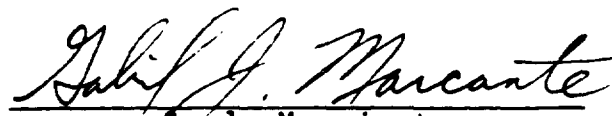
1. A casual and sometimes frustrated attitude towards control of uranium emissions in accordance with increasingly restrictive contemporary standards and practices. This appears to be due, in part, to the difficulties encountered in operating a tightly budgeted uranium production plant with emissions control equipment which borders upon obsolescence.
2. Visual inspections were inadequate and knowledge of radiation monitoring systems was insufficient to provide timely, useful information to management regarding the extent of uranium emissions and, more importantly, the significance of those levels as compared with appropriate standards and reporting requirements.
3. The Plant 9 baghouse operated with undetected loose bags which were only visible during physical entry. The bags became loose due to reason(s) stated previously in Finding number 6. The bag discovered loose on November 9 most likely became dislodged during the blow ring malfunctions which may have caused retainers to act as levers. The December 7 bag which apparently shrank below tolerable limits probably worked its way loose by vibration and blow ring actions.
4. Failure of the QA Program to identify and implement necessary preventative actions and also to provide timely proper corrective actions for known problems at lower levels.
5. The lack of an effective ALARA program from which to closely monitor and control uranium emissions.

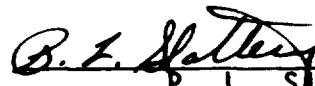
C. JUDGMENT OF NEEDS

1. A critical need exists to assure that cognizant line management, operators and IH&R staff are knowledgeable in appropriate reporting requirements for inadvertent uranium emissions and are committed to effective control strategies which maintain uranium emissions as low as reasonably achievable.
2. A need exists for management control that provides clearcut implementation of procedures for abatement actions and operational curtailment whenever uranium releases may potentially exceed acceptable levels.
3. Inspection and monitoring programs for baghouse emissions should be upgraded to provide aggressive evaluative surveys of sufficient scope, frequency, and quality to assure that inadvertent releases and routine emissions are minimized.
4. NLO needs to promptly evaluate exposure potential during significant uranium releases and assure that exposures are minimized.
5. A need exists to improve and streamline communications regarding minor event reports and other significant occurrences, between NLO lower and upper management levels (See Exhibit 15).
6. Evaluation and implementation of the team of baghouse experts recommendations as they apply to all baghouses should be performed.
7. NLO should establish means to evaluate efficiency and the effectiveness of in-place management control systems. These reviews should include, but not be limited to, the QA program, procurement, inspection, maintenance, and the environmental protection program.
8. A need exist to assure measurable acceptance criteria and vendor certification requirements are included in procurement packages. NLO management should also designate the proper authority which must approve procured and installed equipment deviations.
9. NLO needs to conform fully with CERCLA and all other regulatory requirements cited in this report.
10. The DOE Oak Ridge appraisal programs need to be evaluated to assure that the overall scope and depth is adequate to identify significant needs in the NLO environmental protection and quality assurance programs.

VI. SIGNATURES OF BOARD MEMBERS


J. R. Martin, *Chairman
Health Physicist, Health Protection Branch
DOE - Oak Ridge Operations Office


G. J. Marcante
Industrial Engineer, Weapons Division
DOE - Oak Ridge Operations Office


P. L. Shattery
Quality Assurance Engineer, Quality and Reliability Division
DOE - Oak Ridge Operations Office

*This member of the Board is a DOE-Certified Accident/Incident Investigator.

memorandum

DATE: December 10, 1984

REPLY TO
ATTN OF: SE-333:Howard

SUBJECT: INVESTIGATION OF ABNORMAL ENRICHED URANIUM EMISSIONS AT THE FEED MATERIALS PRODUCTION PLANT

TO: John R. Martin, Health Protection Branch, Safety and Environmental Control Division

You are hereby appointed Chairman of a DOE Investigation Board to investigate the excessive enriched uranium emissions which occurred at the Feed Materials Production Plant during the period September - December, 1984. The following individuals are also appointed as members of the Board:

Pat Slattery, Quality and Reliability Division
Gabe Marciante, Weapons Division

You are to perform a Type B Investigation of this situation and prepare an investigation report in accordance with DOE 5484.1 requirements. The scope of the investigation is to include all of the factors which contributed significantly to the cause and extent of the situation.

The investigation is to be the first priority assignment of the Board members and they are to be relieved of their other duties to the extent necessary to carry out this assignment. Please submit a draft of the investigation report to me by January 15, 1985.


Joe La Grone
Manager

CC:
R. L. Egli
D. B. Howard
W. Range
M. R. Theisen
R. M. Spenceley
Members of the Board

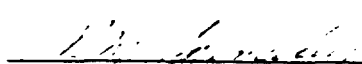
1114564

Statement of R. M. Spenceley re reaction to the report of 63 Kgs loss from G9N1-1039 as noted in the November report of stack losses received on November 30, 1984:

The report received on November 30, 1984 indicated two losses; one of 38.0 Kg for the period 9/11/84 to 11/16/84 and a second of 24.7 Kg for the period 11/16/84 to 11/19/84. I was unaware that the problem was continuing and thus was interested in what steps were necessary to prevent recurrence rather than in limiting losses in this occurrence. Therefore, I asked E. M. Nutter, General Superintendent, to provide an explanation for the 63 Kgs of loss. This question was transmitted to Mr. Nutter on 11/30/84 by means of a note on the top of the Stack Discharge Report. On Friday morning, 12/7/84, E. M. Nutter called in response to my note of 11/30/84 to report the continuing problems on collector G9N1-1039 and the fact that the operation would be shut down as soon as the two heats in progress could be completed safely. I concurred.

I called M. R. Theisen's office on Friday, 12/7/84, after lunch, asking for R. Cross since I knew that M. R. Theisen was in Washington. Mr. Cross was out and was asked to return my call. In the meantime, Mr. Theisen called me from Washington on another matter and I reported the "Unusual Occurrence" to him at that time. I left the project at 3:00 PM to oversee arrangements for the Manager's Christmas Party. R. Cross returned my call sometime later and W. J. Adams, Assistant Manager, informed him of the "Unusual Occurrence."

In summary, collector losses of the order of magnitude of the 63 Kgs known to me on 11/30/84 have not in the past occasioned reports to DOE-ORC. It was reported by me on 12/7/84 as an "Unusual Occurrence" because of the repetitive losses and the lack of upward communication evident at that time. Secondly, I did not order the shutdown of the collector on 11/30/84 because I was not aware of the continuing problem.



R. M. Spenceley, Manager
NLO, Inc.

Exhibit 2
(Continued)

The following is a statement by me in response to questions asked by the DOE committee appointed to investigate the loss in the FMPC G9N1-1039 collector which occurred in November and December of 1984.

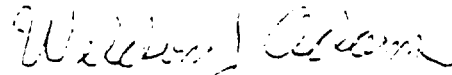
The November 27, 1984 fire in the Plant 9 Hoffman High Vacuum Unit Primary Cyclone was not reported to Mr. Theisen either by phone or in writing nor were the chip fires of September 11, 12, and 21, 1984 reported to Mr. Theisen. These events were not reported because they were not considered to be of sufficient importance to report. In the past we had reported only those incidents involving an offsite loss of 11 pounds or more of uranium or those incidents which had immediate potential for serious consequences involving significant material loss or significant hazard to health, safety, or environment. We did not regard any of the above incidents to fall in those categories. There had been some discussions between our Health and Safety personnel and ORO personnel to the effect that NLO might be required to conform to CERCLA reporting standards. These standards would, of course, have required reporting for each of those incidents; however, I had personally received no instructions or other indications which led me to believe that CERCLA reporting standards were required. Certainly there was no written instruction indicating that the more stringent reporting standards were necessary. I have thoroughly searched my files and can find no document requiring the more stringent reporting standards as required by CERCLA.

My understanding of DOE Order 5484.2 is as follows. The order defines the Unusual Occurrence reporting system but there are or were specific exemptions defined in the Order. In particular, occurrences reported in accordance with OR 5484.1 were exempted (paragraph 5b). OR 5484.1 sets forth provisions for reporting information having environmental protection, safety, or health protection significance (paragraph 1 under Purpose). Strictly interpreted, environmental, safety, and health protection occurrences would be exempted from the Unusual Occurrence reporting procedure. We did not apply such strict interpretation and did report as unusual occurrences some health, safety, and environmental occurrences. These occurrences were relatively minor but still not as minor or as common an occurrence as a depleted or slightly enriched uranium chip fire unless, of course, that fire had demonstrated the potential for burning out of control or resulting in significant loss or release of material.

On December 11, 1984, we received DOE Order 5000.3 which redefines the requirements for unusual occurrences reporting. In that Order which cancels DOE 5484.2, some of the specific exemptions listed under OR 5484.2 are no longer listed. In particular there are no specific exemptions for items covered under OR 5484.1. In fact, an unusual occurrence affecting safety is specifically included (paragraph 6b under definitions).

I understand that DOE-ORO now requires NLO Management to report all events having environmental protection, safety, or health protection significance as unusual occurrences, at least initially. I understand furthermore that these events are required to be considered as significant in accordance with the provisions of the CERCLA. I will comply and all members of NLO Management have also been instructed to comply with these requirements. I do believe

that some further clarification of DOE 5000.3 and OR 5484.1 would help to clear up some confusion in the matter. I believe furthermore, that a written directive should be issued by DOE-ORO indicating that NLO Management should generally use the CERCLA standards for determining which events are significant enough to report.



Weldon J. Adams
January 15, 1985

INSPECTION AND REVIEW OF AIR POLLUTION CONTROL SYSTEMS AT NLO FERNALD PLANT

OBJECTIVE

Review equipment, systems, repair, sampling, maintenance, and other procedures relating to fabric filter on uranium dust service. Make recommendations on improvements to systems and procedures to DOE/ORO (U.S. Department of Energy/Oak Ridge Operations).

SHORT HISTORY:

The main system of concern was the American Air Filter "Blow-Ring" type baghouse fabric filter at NLO building 9. This unit was placed into service during the later part of 1961. Two similar Mikropul units inspected in building 5 are of comparable age. Physical inspection of systems and discussions with plant personnel were held on December 18 and 19, 1984 by:

Paul S. Farber	-	Argonne National Laboratory
T.C. Wilson		{ Martin Marietta Energy Systems, Inc.
Joe R. Barkman		{ Oak Ridge Y-12 Facility

FACILITIES DESCRIPTION

The building 9 fabric filter is an American Air Filter Model B Amer-Jet designation 21-45-2390. This unit is 10'-6" in diameter and 33'-7" high containing 45-10" diameter bags with 21'-10" between bag flanges. Based on a fan capacity of 19,160 ACFM, at 10.4" water pressure drop, this results in an air-to-cloth ratio of 7.45. The unit is cleaned with a blow ring assembly fed by a Buffalo Forge blower (3000 CFM @ 31" water pressure drop).

The building 5 fabric filters inspected were also blow ring types with 16 inch diameter bags about 10 feet high. One unit consisted of 16 bags (4x4 assembly), while the second had 32 bags in 2-4x4 assembly's. Units in both buildings filter uranium oxide dust from fuel remelt facilities.

CONCLUSIONS

Many of the filters at the NLO facility are old enough, and the technology has become sufficiently advanced, to justify replacement with newer equipment (see long term recommendations for further details). Of the units inspected, the building 9 unit is located in an outdoor exposed position, whereas the collectors in building 5 are in a heated process area. As might be expected the building 9 unit, exposed to the elements, is in poorer condition than that of units in building 5. Many of the emissions problems seemed to have occurred due to improper pretreatment of the bags which, due to water condensation, have resulted in unwarranted shrinkage along with possible blinding of the fabric. This shrinkage, when considered along with the fact that the fastening of bags to the thimbles depended upon an internal steel spring, rather than an external steel "hose clamp" band; and the inability of plant staff to view all the bags during an inspection (a reflection of the age of the baghouse design), are the probable causes of bag failures and subsequent high-release rates. Compounding this problem was a sampling and detection system that, all be it of a developmental nature, was not properly acknowledged by production personnel, and the sampling frequency was insufficient to promptly detect unusual losses.

RECOMMENDATIONS:

Near Term

1. Proper lengths of all filter bags should be determined through field measurement.
2. Specifications for all filter bags should be revised to include acceptable manufacturing tolerances. Of special importance is the need to clarify the term "preshrunk" used on wool bag specifications, since tests on a new bag in NLO stores showed a 9% decrease in length (from 22'-2" to 20'-4") after steaming and drying.
3. Specifications for all bags should include provisions for proper QA review and testing of a portion of received material, if necessary by some third party testing laboratory.
4. All bags must be properly tensioned, so as to avoid contact with the blow rings, and thereby reduce abrasion. In addition, all bags must be fastened at both ends with hose clamp type fasteners.
5. The plant should investigate other bag materials to determine the best bag design for the collector service.
6. All inlet ductwork to collectors, and collectors themselves, (especially plant 9) must be inspected for leaks and properly sealed. This includes gaskets on all flanges and doors. Where wear is evident, gaskets must be replaced to minimize system inleakage. The ductwork on the collector for plant 9 had holes in several locations and flanges not completely bolted up. Leak checks with smoke, soap solution, or equal, should be an integral facet of the annual maintenance shutdown, at a minimum.
7. There was no visible closure at the base of the filter hopper on system 9 to ensure proper discharge of the collected dust while minimizing air inleakage. Unless there is a valve inside the dust collection drum housing, a positive closure should be installed. The drum collection container may have been designed with a positive seal to the filter house hopper, however this was not verified at the time of the inspection.
8. The production systems serving collectors should be examined with the objective to identify and correct potential problem areas that will affect bag collector operation and reliability. For example, in building 9, consideration should be given to installation of flame/spark arrestors near to the crucible burnout and remelt furnaces to prevent burn holes in the bags.
9. Improved stack sampling methods should be investigated along with increased frequency of measurements. The stack sampling system should be inspected at a minimum of once per week, including sampler filter replacement. Dirty filters should be weighed and/or analyzed to determine the amount of uranium emitted.

10. All stack samplers should have their own independent vacuum pumps preferably with gas meters. The practice of using "house" vacuum systems should stop since this has lead to variations in sampling rate and, in some instances of heavy usage no sampling at all.
11. Consideration should be given for equipping sampling systems on collectors handling radioactive dust with alarms which would not only sound locally (preferably loud) but should be tied into a Central Surveillance System (CSS) in Security. Security should always have an up-to-date calling list in case of alarms. In addition, procedures must establish proper alarm levels, and corrective procedures up to and including immediate production shutdown for each installation.
12. Manual sampling (EPA, ASME, or equal) methods should be performed at regular intervals to check auto sampler operation as part of the plant Quality Assurance procedures. Source samples should be used during sampler inspections to check calibration of radiation detectors on stack samplers.

Long Term

13. An improved, accurate, and reliable continuous source sampling and analysis system should be developed. At a minimum this should include a recording system (strip chart or equal); auto calibration with zero and span checks; and a means to calculate instantaneous and cumulative emissions based on gas flow and activity level.
14. NLO should prepare a long-range plan for upgrading of all collector systems including a back-up with absolute (HEPA) filters. Priority should be assigned based on a weighting system which includes, but is not limited to;
 - (1) Age of existing unit
 - (2) Condition of unit
 - (3) Significance of process that unit serves

Consideration should be given to establishing a full-time environmental coordinator with authority and responsibility for all air, water, and solid wastes at NLO.

Submitted: *P.S. Farber*
P.S. Farber

1/3/85
Date

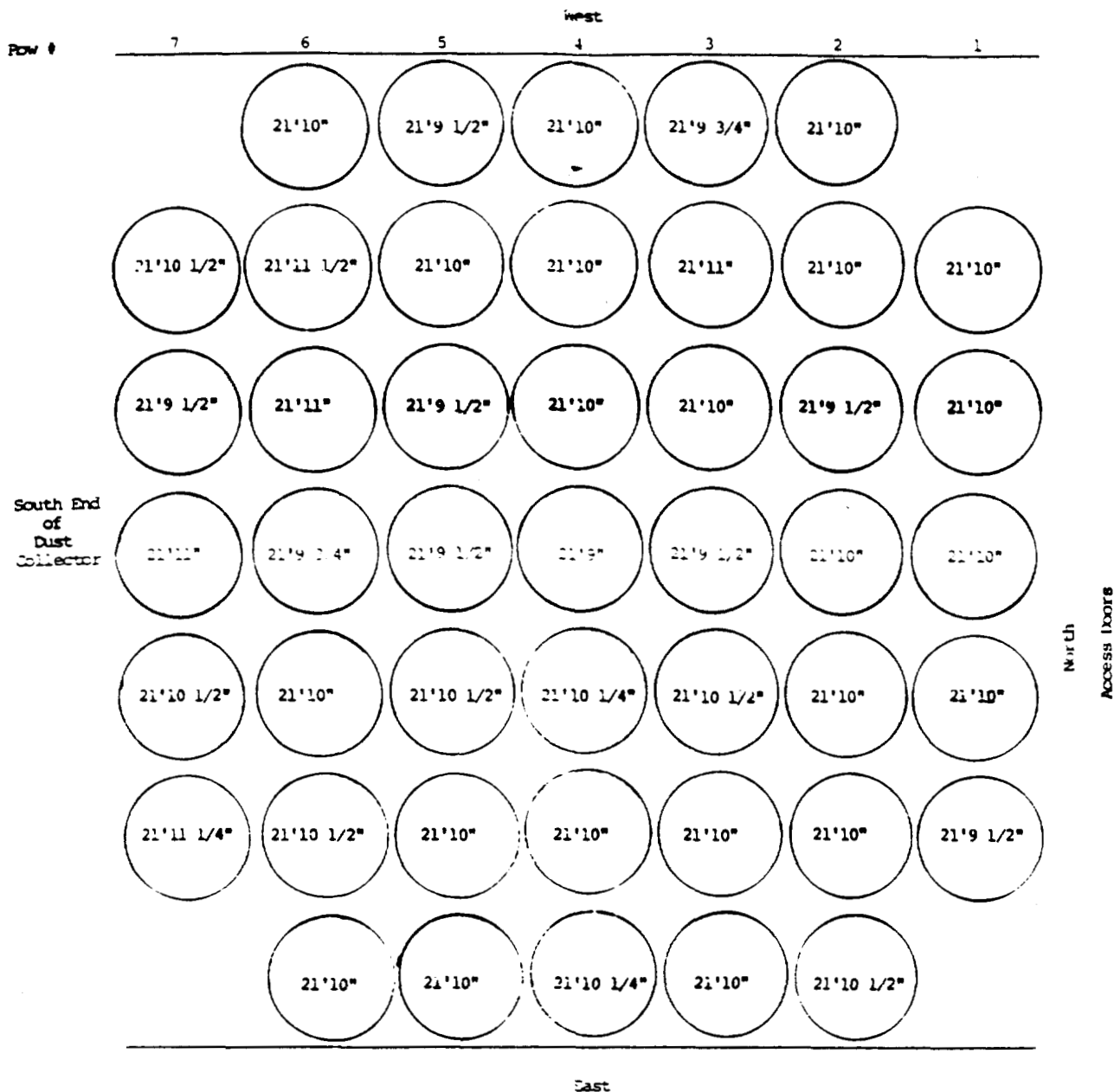
T.C. Wilson
T.C. Wilson

1-3-85
Date

J.R. Barkman
J.R. Barkman

1-5-85
Date

AMERICAN DUST COLLECTOR'S
Bag Location and Measurement



Bags were removed from west to east starting from the northwest corner of the dust collector in mid-December. Each circle represents the bag location. The number in the circle is the length for the bag that was in the circle's location.

1114571

NLO, Inc.

INDUSTRIAL HYGIENE & RADIATION DEPARTMENT

TITLE: STACK SAMPLER INSPECTION AND FILTER CHANGE PROCEDURE

NUMBER: IH&R Procedure No. 1.4

DATE: July 2, 1981

AUTHOR: K. N. Ross

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

1.0 REQUIRED EQUIPMENT

- 1.1 Rotameter, 0 to 60 Lpm, with Schrader fittings.
- 1.2 Weighted and numbered type S pleated filters.
- 1.3 Polyethylene bags.
- 1.4 Screwdriver and pliers
- 1.5 Stack Sampler Inspection Report for plants to be inspected.

2.0 SPECIAL PRECAUTIONS

- 2.1 Many stack samplers are located near ceiling levels. Use care to avoid falls when working on ladders, walkways, and other elevated structures.
- 2.2 Do not attempt to inspect outside stack samplers when there is ice on the ladders and walkways.

3.0 PROCEDURES

- 3.1 Inspect all stack samplers during the first two weeks of each month.
- 3.2 Obtain required equipment at IH&R Decontamination room. Obtain numbers of installed filters and prescribed flow from the Stack Log book and fill in on Inspection Report. The Stack Sampler Inspection Report will be filled out in duplicate with the original to be filed in the Stack Log Book and copy to the Plant Supervisor of the plant inspected.

- 3.3 At the control panel of the dust collector being inspected, observe the differential pressure chart. Log the high and low pressure on the Inspection Report. Also see that there is no unusual pattern on the chart and that the collector cleaning mechanism is operating in the correct D.P. range. Any unusual or incorrect operation should be noted in the Remarks section of the Inspection Report.
- 3.4 At the stack sampler, check to see that the stack sampler, vacuum tubing, and other sampling equipment is operating properly. If any defects are found note them in the Remarks section.
- 3.5 Determine the existing sampling rate by inserting the rotameter between the vacuum line and the filter holder. Record this reading under "Rate" actual on the "Stack Sampler Inspection Report" and adjust to prescribed rate if necessary. If the prescribed rate is not obtainable, this should be noted on the "Stack Sampler Inspection Report."
- 3.6 Strike the cone section of the filter holder several times with the handle of the screwdriver to dislodge any material that might be clinging to the inside of the cone.
- 3.7 Using the screwdriver, loosen the three $\frac{1}{4}$ " bolts and carefully lower the bottom section of the filter holder.
- 3.8 If the filter shows evidence of significant accumulation of material (i.e., estimated at greater than one gram), remove the pleated filter and place it in a plastic sample bag. Care must be taken to assure that a minimum amount of material falls from or is blown off of the filter while being removed and placed in the bag.
- 3.9 If a filter change is necessary, insert a new numbered and weighed pleated filter in the filter holder. With the three $\frac{1}{4}$ " bolts, secure the filter holder tightly to the cone using pliers and screwdriver. If no change is made, check that the filter number is correct before closing the filter holder.
- 3.10 Recheck the sampling rate of the stack sampling assembly. Adjust to the prescribed rate if necessary. Remove the rotameter and reconnect the vacuum line to the sampler. If the prescribed rate could not be obtained, note this on the "Stack Sampler Inspection Report" sheet.
- 3.11 Go to the next dust collector and continue inspection by repeating steps 3.3 through 3.11 until all dust collectors in the plant are inspected.
- 3.12 If any filters were changed or if there is any deficiency in sampler or dust collector operation advise the Plant Supervisor of the facts before leaving the plant and make suggestions for correcting any deficiencies.
- 3.13 After returning to the IH&R Decontamination Room, fill out an Analytical Data Sheet (NLO-H&S-736) with all required information for the analysis of the filters removed from the stack samplers. Under "Sample Description" write the date the filter was put into the sampler and the date it was taken for analysis. Request analysis for percent uranium and total particulate weight. Take the Analytical Data Sheet and all filters to the Bioassay Lab.

4.0 RECORDKEEPING

- 4.1 During the actual inspection of the stacks a rough copy of the Stack Sampler Inspection Report is carried in a pocket because it is difficult to climb ladders with a clipboard in your hands. This copy is prepared before the inspection by copying the old filter identification number and the prescribed sampling rate from the previous Inspection Report. (Note that any new filter identification numbers on the previous Inspection Report are copied as old filter identification numbers on the rough copy.)
- 4.2 During the inspection the actual rate in the L/m column is filled for each sampler. The flow measurement is the rate of sampling in L/m as determined in step 3.5. The D.P. reading minimum and maximum are the high and low readings on the D.P. chart.
- 4.3 After the inspection is complete, two copies of the rough copy are made. The original copy is mailed to the Plant Supervisor of the Plant inspected. (For Plant 9 inspections, three copies must be made, with one sent to the Plant 5 Supervisor and one to the Plant 6 Supervisor.) The carbon copy is filed in the Stack Log book.
- 4.4 Each filter change must be recorded also in the Dust Collector Log book. The filter number of the new filter and the date it was put into service is logged on the line below the old filter number. The date the old filter was taken out of service is logged in the line starting with the old filter number. The analytical data and calculations of the loss are logged when the Analytical Data Sheet is returned from the Bioassay Lab. If the filter is not analyzed the reason for changing it will be logged in the spaces usually used for analytical data.
- 4.5 On the last working day of each month the Stack Discharge Report will be submitted to the Head of the IH&R Department.

5.0 QUALITY CONTROL

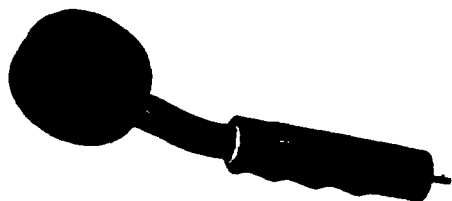
- 5.1 During the last week of each month a Senior Industrial Hygienist will compare the Stack Discharge Report, the Dust Collector Log book and the Stack Log book to determine that all entries have been properly made each month. Any differences between log books and report will be discussed with the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

Approved by:

M. W. Boback

M. W. Boback, Chief
IH&R Department

Ludlum BETA-GAMMA DETECTORS

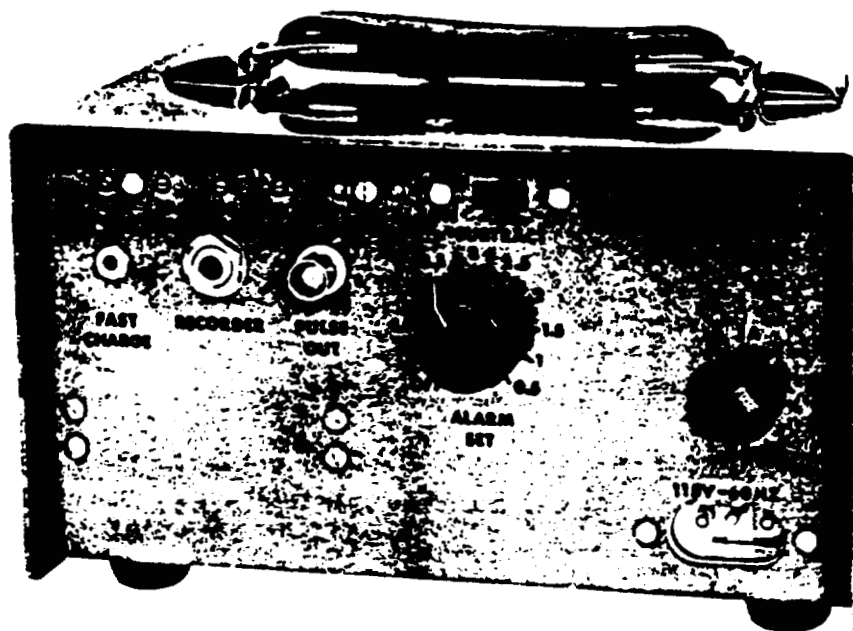
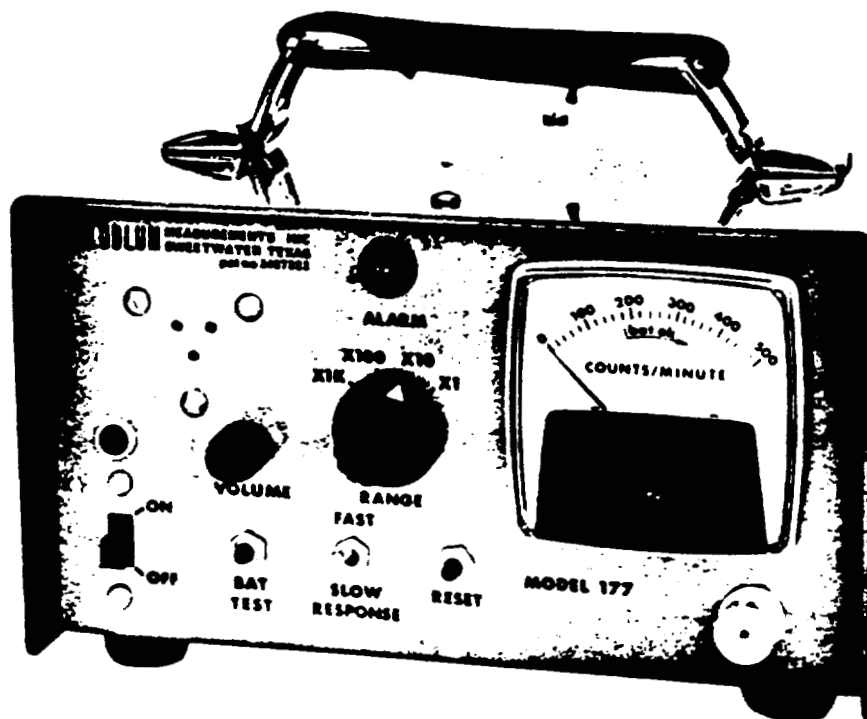


**MODEL 44-B
PANCAKE GEIGER-MUELLER PROBE**

WINDOW: 1.5 to 2 mg/cm² mica
WINDOW DIAMETER: 1.75"
MOUNTING: Aluminum holder, handle and window protector.
DIMENSIONS: 2 3/4" wide, 11" long 1.050" dia. Handle
WEIGHT: 12 oz.

1114575

Ludlum MODEL 177 ALARM RATE METER



LUDLUM MEASUREMENTS, INC.

501 Oak Street • Sweetwater, Texas 79556 • Telephone (915) 235-5494

1114576

Ludlum MODEL 177 ALARM RATE METER

GENERAL DESCRIPTION

A new transistorized regulated high voltage makes this a truly outstanding rate meter. Any G. M. probe offered by Ludlum will work on this unit as well as many of the scintillators since an adjustable high voltage is provided. Standby battery feature makes this unit a "round the clock" monitor that is ready to be used as a portable survey meter.

SPECIFICATIONS:

RANGE: Switch controlled multipliers of X-1, X-10, X-100, X-1K yielding 500, 5000, 50,000, 500,000 CPM Full Scale. Scale marking 0 to 500 CPM with 25 increments.

RESPONSE TIME: Fast 2.2 seconds; slow 22 seconds—measured to 90% of full reading.

LINEARITY: Within plus or minus 5% full scale, typically plus or minus 2% full scale.

BATTERY DEPENDENCE: Less than 2% calibration.

EXTERNAL CONNECTIONS: Scaler Output: Up to 5 volts, negative pulse.

RECORDER OUTPUT: Set at 100 mv. (Internal adjustment for any voltage up to 1.5 volts. Will drive 2 ma load.)

DETECTOR INPUT: Series "C".

INPUT SENSITIVITY: 40 mv.

AURAL: Internal mounted speaker, volume controlled manually from zero output to maximum loudness. One audible click per incident of detection radiation.

ALARM: Alarm point—adjustable over the meter scale from 1/10 scale to full scale; visual alarm—red light on front panel; audible alarm 2800 HZ tone on speaker independent of volume control setting.

POWER: Line—3 wire; 105V-125V, 60 HZ; battery—Gel-Cel, continuously trickle charged with instrument plugged into line.

PORTABILITY: Instrument to be operated away from AC power source with a full battery charge for 50 hours.

ENVIRONMENTAL: Instrument to operate over a temperature range of minus 20 degrees F to plus 140 degrees F with less than plus or minus 10% FS change in meter reading and less than plus or minus 20% FS change in alarm point.

CALIBRATING: Individual calibration control for each range; each calibration control shall be accessible for adjustment without removal of instrument cover.

BACKGROUND ADJUST: Control allows fixed depression of meter scale.

SIZE: 4½ inches tall; 8 inches wide; 6½ inches deep, excluding handle.

WEIGHT: 4 pounds with battery.

NOTE: DIFFERENT VARIATIONS OF THE MODEL 177 ARE AVAILABLE UPON REQUEST.

LUDLUM MEASUREMENTS, INC.

501 Oak Street • Sweetwater, Texas 79556 • Telephone (915) 235-5494

A-14

STACK ALARM

(HALL INFO
ON ITEM 20)

STACK # G9N1-1039

PLANT # 9

	1K	100	10	1	COMMENTS	INT.
6.4.84	90					DA
7-2-84	180					RUG
7-10-84		100				RBG
7-11-84		200			Keep & working often	KRT
7-30-84	40					RUG
8-13-84	120					RUG
8-21-84	180					KRT
8-25-84	200					RUG
8-31-84	240					KRT
9-6-84	240					RUG
9-10-84	230					
9-11-84		130			FILTER CHANGED	RBG
9-18-84		130				KRT
9-19-84		130				RUG
9-26-84		140				KRT
10-5-84		180				KRT
10-11-84		270				KRT
10-11-84		340			Changed to 1K	KRT
10-22-84	50					RUG
11-2-84	70					KRT
11-12-84	230					KRT
11-16-84						KRT
11-16-84		200			Filter changed	RUG
11-26-84	130					KRT
11-26-84		320			Filter changed 1000	RUG
11-26-84	120				12:54	KRT
11-26-84	130				1:00	KRT
11-27-84	260				FILTER changed	KRT
12-1-84	380				11:15 old filter not, heavily soiled w/ material, but very dust from black oxide	KRT
12-7-84	180					RUG
12-7-84		230			Filter changed 18:50.	KRT
12-8-84		230			Ventilation system down 12/7/84 12/8.	KRT

1114578

TB 4-15-83

A-15

01-10-85

13:00

NLO INC CONTI CH

NO. 005

003

9-27		180				TB
10-5		200				TB
10-12		200				TB
10-19		240				TB
10-26		240				TB
11-2		260				TB
11-9		260				TB
11-16		280				TB
11-23		280				TB
11-30		300				TB
12-7		310			Checked Collector/Hole No. 100	TB
12-14		330				TB
12-20		390				KR
12-27		410			Changed to 1K	TB
12-30	45					TB
1-3	45					TB
1-11	40	390				TB
1-18	50	500			Changed to 1K	TB
1-25	50				Checked nest is in filter with 200x10	KR
2-10	55					RBG
2-21	60					TB
2-29	60					RLG
3-7	70					TB
3-21	90					TB
3-28	90					TB
4-9	90					TB
4/10/84		100			changed filter 100x100	RLG

G9N1-1039

TB 4-15-83

Plant 9

G9N1-1039

4-30-84	50	XIK	TB
5-10	50	XK	TB
5-21	50		TB
6-4	90	1-K	RA

A-16

1114579

QAA -	PROD	100	312
Quality Assurance Plan Number to be assigned			
QAP -	PROD	00	5
Quality Assurance Plan Number to be assigned			

PLANTWIDE

NO.	DISTRIBUTION OF COPIES
1	CA Controller, Ch. (RACB COT)
1	CA Audit Controller, Ch.
1	Division Director

Conclusion: Item is considered CA Level 023 (circle one) because The possibility of serious inept to the environment exists

Analysed By: *[Signature]*

Checked By: *[Signature]*

Approved By: *[Signature]*

A-17

0854-

W.L.O., INC.
QUALITY ASSURANCE ANALYSIS

Quality Assurance Plan Number to be assigned QAP --

	PW	CPI	SG
--	----	-----	----

 2-24-84
Date: 8-2-78 Revision No.

PLANTWIDE

QUALITY ASSURANCE ANALYST COLLECTORS

QUALITY ASSURANCE ANALYSIS															
DUST COLLECTORS															
THINK	POSSIBLE FAILURE/CONCERN	SEVERITIES RATIONALE (circle one for each cause)					POSSIBLE CAUSE OF FAILURE/CONCERN (include all relevant other dust responsible)	EFFECT OF FAILURE/CONCERN	NORMATIVE STANDARDS OR PROCEDURES TO ELIMINATE OR MINIMIZE A FAILURE/CONCERN	PROBABILITY (circle one for each cause)					
		High	Low	High	Low	High				High	Low	High	Low	High	Low
	Loss of toxic, radioactive or otherwise noxious dusts to the atmosphere.	1	2	3	4	5	a) The dollar loss would depend on the type of material lost out the stack.	a) Insult to environment.	a) Scheduled PMP by the Maintenance Department.	1	2	3	4	5	
		1	2	3	4	5	b) Any loss of dust to the atmosphere is considered serious.	b) Bag coming loose.	b) Ingestion of materials by personnel.	b) Routine check of the dust collector by the operators.	1	2	3	4	5
		1	2	3	4	5	c) Failure of instrument monitors to anticipate failures.	c) Loss of valuable SS materials.	c) Adhere to SOP's in all areas.	c) Supervisors will continually instruct the operators on checking the dust collectors and their proper operation.	1	2	3	4	5
		1	2	3	4	5	d) Failure of blower and blow rings.	d) Downline because of mechanical failures.	d) Proper respirator used when cleaning inside dust collector's specific ally, air line respirator.	d) Training program such as we now have.	1	2	3	4	5
		1	2	3	4	5	e) Wrong bags installed in collector.	e) Loss of production, thus not meeting production schedules.	e) Routine check of stack sampler.	e) Install alarm and visual instrument, as we now have on G5-260 and G5-261 dust collectors.	1	2	3	4	5
		1	2	3	4	5	f) Fire in dust collector sampler.	f) Estimated Loss.	f) Let us know when we have a broken bag or excessive material out the stack.						
		1	2	3	4	5	g) Fire in dust collector	g) Estimated Loss.							
		1	2	3	4	5		Variable							

Approved By:

Checked By:

Controlled By:

Conclusions

Conclusion: Item is considered QA Level 1A (1B) (Circle one) because: The possibility of serious insult to the environment exists.

100	DISTRIBUTION OF COPIES
1	QA Committee, Dr. (SECOND COPY)
1	QA Audit Committee, Ctr
1	Deletion Director
1	GRB
5	PUB

MLO, INC.

QUALITY ASSURANCE ANALYSIS
DUST COLLECTOR SYSTEMS

Quality Assurance Plan Number to be assigned QAP -
Date: 5-9-83

QAA - PROO 06 5
QAP - PROO 06 5

TIME	POSSIBLE FAILURE/CONCERN	SEVERITIES				SERIOUSNESS RATIONALE (Include all other than negligible)	CAUSE OF FAILURE/CONCERN (Include all contributing causes)	EFFECT OF FAILURE/CONCERN	NORMAL STANDARDS OR PROCEDURES TO ELIMINATE OR MINIMIZE A FAILURE/CONCERN	PROBABILITY (Circle one for each case)				
		High	Med	Low	Very Low					High	Med	Low	Very Low	
	Loss of radioactive, toxic, or noxious dusts to the atmosphere.	1	2	3	4	5	a. Bag rupture. b. Bag comes loose. c. Leak in duct work. d. Blower failure. e. Monitoring instrument failure.	a. Insult to environment. b. Ingestion of materials by personnel. c. Loss of uranium.	a. Scheduled inspection of collectors and bags. b. PH procedures to find and anticipate possible mechanical failures.	1	2	3	4	5
		1	2	3	4	5			c. Familiarization with appropriate SOP's to respond properly to alarms and instrument readings.	1	2	3	4	5
		1	2	3	4	5				Estimated \$ Loss				
		1	2	3	4	5				Estimated \$ Loss				
		1	2	3	4	5				Estimated \$ Loss				
		1	2	3	4	5				Estimated \$ Loss				

Conclusion:
Item is considered QA Level 1A (Circle one) because:
There is the possibility of damage to the environment.

Analysed By: *W. J. Dunning*
Checked By: *Compton*
Approved By: *Compton*
DIVISION DIRECTOR

MLO, INC.

QUALITY ASSURANCE ANALYSIS

DUST COLLECTOR SYSTEMS

Location: PLANTWIDE

Date: 5/7/84

Revision No.

QAA - PROO OG 5a
QAP - PROO OG 5a

POSSIBLE FAILURE/CONCERN	SEVERITIES (circle one for each case)				SEVERITIES RATIONALE (function or other past experience)	POSSIBLE CAUSE OF FAILURE/CONCERN (function or other past experience)	EFFECT OF FAILURE/CONCERN	PROBABILITY (circle one for each case)			
	Very High	High	Medium	Low				Very High	High	Medium	Low
Dust collector failure involving discharge of contaminants to the atmosphere.	1	2	3	(4)	5	Local notoriety. 1) Bag rupture. 2) Bag comes loose. 3) Leak in duct work. 4) Blower failure. 5) Monitoring instrument failure.	Local notoriety due to environmental insult and ingestion of materials by personnel.	1	2	3	4
	1	2	3	4	5		Estimated \$ Loss < \$50,000	1	2	3	4
	1	2	3	4	5		Estimated \$ Loss	1	2	3	4
	1	2	3	4	5		Estimated \$ Loss	1	2	3	4
	1	2	3	4	5		Estimated \$ Loss	1	2	3	4

Conclusion:

1. Distribution of Copies
2. QA Committee (by letter and copy)
3. QA Audit Committee, Ctr
4. Inspection (by letter)
5. DAN

Item is considered QA Level III (circle one) because
A failure or malfunction could result in environmental
insult and/or result in significant adverse publicity.

Analysed By:

Checked By:

Approved By:

D. A. Nixon
D. L. Dunaway
E. M. Muller

By

10/14/81

QUALITY ASSURANCE PLAN NUMBER PROD-OG-5

1B
QA Level

TITLE DUST COLLECTOR SYSTEMS IN PRODUCTION PLANTS

ISSUED BY PRODUCTION

ISSUED ON 2/18/78

REVISED ON 10/7/81

ITEM
27

I. Scope

'This plan covers the operation and maintenance of dust collectors in the Production Division.

II. Reference Documents

A. Manufacturing Standards

1. SOP 2-C-701 - Refinery Dust Collector Systems
2. SOP 4-C-701 - Dust Collection Systems - Plant 4
3. SOP 5-C-701 - Dust Collectors - Plant 5
4. SOP 9-C-701 - Dust Collectors - Plant 9

B. Preventive Maintenance Program and Maintenance Standards.

C. Health and Safety Manual - Section 16

D. Job Order Procedure by Mechanical Department

E. DOE Manual Chapter 0524 "Standards for Radiation Protection"

F. Industrial Hygiene and Radiation 3.5 - "Stack Sample Inspection Procedure"

G. QAA PROD-OG-5 - Dust Collector Systems

H. Specifications for Procurement of Dust Collector Bags

1114584

III. What Are The Problems?

A dust collector failure can result in an insult to the environment. Radioactive and/or toxic material is collected and if a significant failure in a collector occurs, this material may escape from the collector to the external environment. This insult may be confined to the immediate area in the event of a small leak or a large area may be affected if a large leak or major malfunction was involved. Prevention of failure is important as radioactive material can enter the immediate area occupied by personnel and ingestion might cause health problems.

IV. Special QA Activities Required

The responsible supervisor in each plant will ascertain that the operating procedures are followed every day on every dust collector in operation. The responsible supervisor will ascertain that all collector alarm systems are in operating condition. He will also check all reports of the preventive maintenance program on dust collectors to make certain that each unit has been cleared for operation (NLO-ENG-2234).

The responsible supervisor will also inform the plant superintendent of unresolved problems and recommend procedure changes such as frequency of maintenance, etc. to assure satisfactory operations.

Overchecks on operations are performed and reported monthly by Health and Safety Division (Document F) to ascertain stack losses. Copies of the sampling reports (NLO-H&S-2239, 2240, 2241, 2242) are reviewed by Production Supervision. Monitoring stations around site also determine if

air or water has exceeded specified limits of radioactivity. Readings are reported.

The possible failures which may result in an insult to the environment and the actions necessary to minimize their occurrence are listed as follows:

Possible Failure

Action to Minimize Possibility of Failure

Rupture of Bag

Frequent scheduled inspections by operating personnel. Selection and purchase of the bags according to established specifications. Maintenance procedures designed to assure proper installation and operations of bags, blow ring carriages, and other critical components. PM procedures to assure replacement before life of bag has been exceeded.

Bag Coming Loose

Good design of clamps, bands, holders, or other fasteners. Development of maintenance procedures designed to assure their proper installation. PM procedures to assure replacement before deterioration.

Leak in Connecting Duct
Work, Fans, Blowers, etc.

PM procedures to anticipate and prevent such failures.

Failure of Instrument
Monitors and Controllers

Instrument PM procedures to anticipate and prevent failures.

V. Assignment of Responsibility

Chemical operators are responsible for performing checks and operations according to Standard Operating Procedures.

The Production Supervisor assigned to each area which contains dust collectors is responsible for ascertaining that each one is operating satisfactorily.

The Plant Superintendent, General Supervisor and Area Supervisor are responsible for satisfactory operation of dust collectors in their areas.

The Area Maintenance Supervisor is responsible for responding to the needs of Production personnel in providing equipment maintenance and is responsible for implementing the Preventive Maintenance Program.

VI. Records

1. The Preventive Maintenance Program provides check lists and monthly printouts (Report 308-03) of the inspection record on each collector. These data are obtained from the form (NLO-ENG-2234) by Maintenance personnel.
2. Several forms are used by Production to request Maintenance to repair collectors and associated controls. Instruction for these forms are in D or Paragraph II above.
 - a) Minor Work Request (NLO-ENG-2532)
 - b) Job Order Request (NLO-ENG-183-1)
 - c) Letter of Justification (NLO-1226)

3. The Health and Safety Division maintains a log on dust collector sampling (NLO-H&S-1536).
4. The Health and Safety Division - Bio-Assay Laboratory prepares a data sheet (NLO-H&S-736) which is used to summarize and prepare the annual report on Environmental Monitoring. (Issued as an NLCO-Special Report).
5. Records are kept of the Health and Safety Division Stack Sampler Reports (NLO-H&S-2239, 2240, 2241, 2242).

PREPARED BY: *G. R. Blank*
G. R. Blank

APPROVED BY: *E. M. Nutter*
E. M. Nutter

Distribution:

R. L. Sliger, DOE-ORO
W. J. Adams
D. L. Dunaway
R. C. Heatherton
W. C. Hill
E. M. Nutter
R. M. Spenceley
D. A. Tippenhauer (Record Copy)

Copy to Arge Jones (Mechanical) 4/23/84

1114589

APPROVED BY Q.A.C.

ASST. MANAGER
DIR. OF ENG'G.
DIR. OF H.S.
DIR. OF PRCC.
GEN. SUPT.
TECH. DIR.
DIR. OF D&D

INITIALS	DATE
<i>[Signature]</i>	11/20/81
<i>[Signature]</i>	11/5/81
<i>[Signature]</i>	11/11/81
<i>[Signature]</i>	11/12/81
<i>[Signature]</i>	11/15/81
<i>[Signature]</i>	11/11/81
<i>[Signature]</i>	11/18/81

12/12/84

QUALITY ASSURANCE PLAN NUMBER PROD-OG-8

18
Q.A. Level

TITLE Dust Collector Bags

ISSUED BY Production Division

ISSUED ON December 12, 1983

I. Scope

This plan describes the procedure for specifying, procuring, and inspecting dust collector bags to assure they meet NLO requirements.

II. Reference Documents

1. Dust Collector Bag Specifications
2. QAA-PROD-OG-8, "Dust Collector Bags"
3. QAA-PROD-OG-5, "Dust Collector Systems"
4. QAP-PROD-OG-5, "Dust Collector Systems in Production Plants"

III. What Are The Problems?

The primary concern is to insure that dust collector bags minimize the hazards to the health of our employees and to the environment by preventing the loss of radioactive and/or toxic particulates to the atmosphere. Of course, of great concern is the loss of valuable material to the atmosphere.

IV. Special QA Activities Required

The dust collectors ventilating the various operations must be equipped with bags which prevent escape of radioactive or toxic particulates to the atmosphere. The bag must be of the correct design, length, and diameter. They must also be constructed of a material which will withstand those rigorous conditions which may occur in a particular collector such as high temperature or acid exposure.

V. Assignment of Responsibility

The Production Division will specify in accordance with the manufacturer's specifications. Project Engineering will formalize the specifications

and prepare the necessary drawings. The Health and Safety Division will review and approve all specifications. The Procurement Division will purchase dust collector bags according to specifications. The Technical Division Final Inspection Department will inspect the bags according to specifications. The Stores Department will maintain the specified dust collector bags. The Mechanical Department will install the bags in accordance with the manufacturer's specifications.

VI. Records

1. Stores cards with specific bag information.
2. Incoming Materials Disposition Report.
3. Master lists of dust collector bags. These are maintained in the Maintenance offices in the Production plants.

PREPARED BY D. L. Dunaway

APPROVED BY E. M. Nutter

Distribution:

W. J. Adams
E. W. Bailey - DOE-ORO
G. R. Blank
M. W. Boback
A. J. Burns
D. L. Dunaway
W. C. Hill
R. W. Lippincott
E. M. Nutter
✓ D. A. Tippenhauer (Record Copy)

APPROVED BY QAC.

	DATE
WEL. OF ENGIN.	1-9-84
DIR. OF HON.	1-9-84
DIR. OF PROG.	12/15/83
GEN. SUPT.	1/9/84
TECH. DIR.	12/15/83
DIR. OF DOD	12/14/83
	12/14

WLO, INC.
SUPERVISOR'S REPORT OF MINOR EVENT

Date 6/8/84

INSTRUCTIONS:

1. This report is to be completed and submitted for every unusual happening which did occur or which might have occurred and caused a problem.
2. To be completed and submitted during the shift on which the event took place.
3. An immediate telephone call shall be made to the affected Division and the Health & Safety Division if any clean-up, or removal of evidence or other changes prevent a complete investigation of the minor event.

WHAT — Event: Flash fire at the Rapid Bore

(DESCRIBE NATURE OF EVENT)

WHEN — Date of Event: 6/5/84 Time: 5:30 p.m. Shift: 2nd

WHERE — Building or Area: Plant 9 Section: Machining Floor: 1st

Specific Location in Building or Area: North end - Machining

Specific Equipment, Machinery, Tools, Etc., involved: Rapid Bore

WHO — Division: Production Department: Plant 9 Group: Machining

Personnel Involved: (List additional personnel on reverse side)

NAME	BADGE	TITLE	DIVISION	DEPARTMENT
<u>[REDACTED]</u>	<u>[REDACTED]</u>	<u>Machine Tool Oper.</u>	<u>Production</u>	<u>Plant 9</u>

Witnesses: (List additional personnel on reverse side) [REDACTED]

HOW — Describe Fully the Events Leading up to the Event: The operator was drilling P.O. H-094 ingots.

He had just chucked an ingot up and started to drill it. The ingot being out of square, slipped and hit the loader causing sparks which set the oil mist on fire.

WHY — Describe, If Possible, What Caused the Minor Event: The end of the ingot was not square.

RECOMMENDATIONS TO PREVENT A RECURRENCE The inspector should check all ingots for squareness
after cropping and sampling.

ADDITIONAL INFORMATION:

Has Similar Event been Observed Previously: Yes - The chuck spun on an ingot

If Yes — When: Unknown — What was Done to Correct: The operators were told
to double check and be sure the chuck was tight.

Could Personnel Have Been Injured: Yes

If Yes — Describe How: Burns

Was Building or Area Evacuated: No Was Evacuation Alarm Sounded: No

At What Time: _____ By Whom: _____

At What Time was Building Re-entered: _____ Who Authorized: _____

REMARKS: _____

ADDITIONAL INFORMATION, DIAGRAMS, ETC. _____

NO.	DISTRIBUTION OF COPIES
1	Division Director (RECORD COPY)
2	Health & Safety
3	Area - Department or Plant
4	Manager

Signed

Don L. Stutz
Don L. Stutz

Title Production Supervisor

Division Production Dept. Plant 9

A-33

NLO, Inc.

A SUBSIDIARY OF NL INDUSTRIES, INC.

CINCINNATI, OHIO 45239

December 19, 1984

SUBJECT SURVEY AROUND PLANT 9

TO R. B. Weidner

FROM S. L. Hinnefeld

REFERENCE

On December 14, 1984, a visual and contamination survey was performed in the vicinity of the dust collector on the south side of Plant 9. Alice Schneider, Roger Grant, Kevin Tschaenn, and I participated in the survey. An alpha scintillation survey meter and a side-window G-M meter were used for in situ measurements, and smears were taken to measure removable contamination. The results are shown on the accompanying sketches and data sheets. The sketches, labeled "high platform," show the locations of measurements made on the top level of the dust collector. Measurements from all other platforms are shown on the sketch labeled "dust collector area." The roof and ground level surveys have their own sketches.

Visual examination revealed accumulations of wet, black residue in the roof drainage trench, similar residue in the dyked area under the dust collector, black dust deposits on the top of the dust collector (see "high platform" sketches), and standing water in the roof drainage trench. These materials were sampled as shown below.

1. Roof residue - samples 488 & 489
2. Roof water - sample 486
3. Dyked area residue - sample 485
4. Dust from top of dust collector - samples 3170, 3133, 3166, and 3169.

These samples were analyzed for uranium content. The results were:

<u>Sample Type</u>	<u>Sample No.</u>	<u>Result</u>
Roof residue	488	27.2% U
Roof residue	489	30.1% U
Roof water	486	21.20 mg U/L
Dyked area residue	485	62.6% U
Dust from top of collector	3170	55.8% U
	3133	49.8% U
	3166	16.7% U
	3169	53.6% U

Survey around Plant 9
R. B. Weidner
December 19, 1984

Page 2

NOTE: During the survey, Rich Blank told Roger Grant and me that the residue in the dyked area was the result of a fire that had occurred in the Hi-Vac system.

S L Hinnefeld
S. L. Hinnefeld

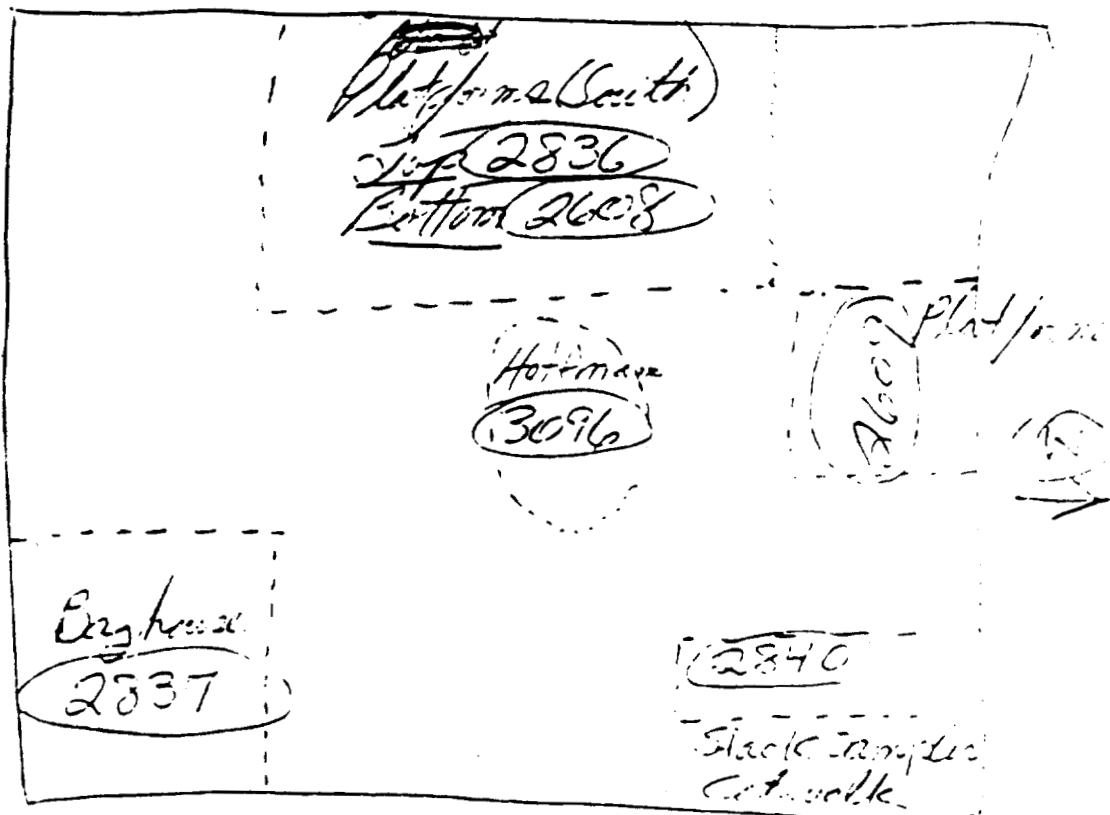
SLH/vvs

cc: D. A. Fleming
R. B. Grant
☒ A. A. Schneider

1114598

A-35

Quartz Collection Area
69011-1039 Plant 9 South



- 1) 2609; Platform, west side of quartz collection area
- 2) 2608, South Platform, Bottom
- 3) 3096, Hoffman (Top)
- 4) 2837 Bryhous platform, bottom ~~side~~ north side.
- 5) 2840 Stack Samples Cotwalk, below Stack Samples.
- 6) 2836 Platform, ~~west side~~ South, Top.

A hand-drawn map of a property, likely a farm or estate, with various numbered points and labels. The map is oriented with a north arrow pointing towards the top right. The property is bounded by a dashed line. Inside the boundary, there are several numbered points (e.g., 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100). There are also labels for 'ground' and 'road'. The map is drawn on a piece of paper with a grid of small squares.

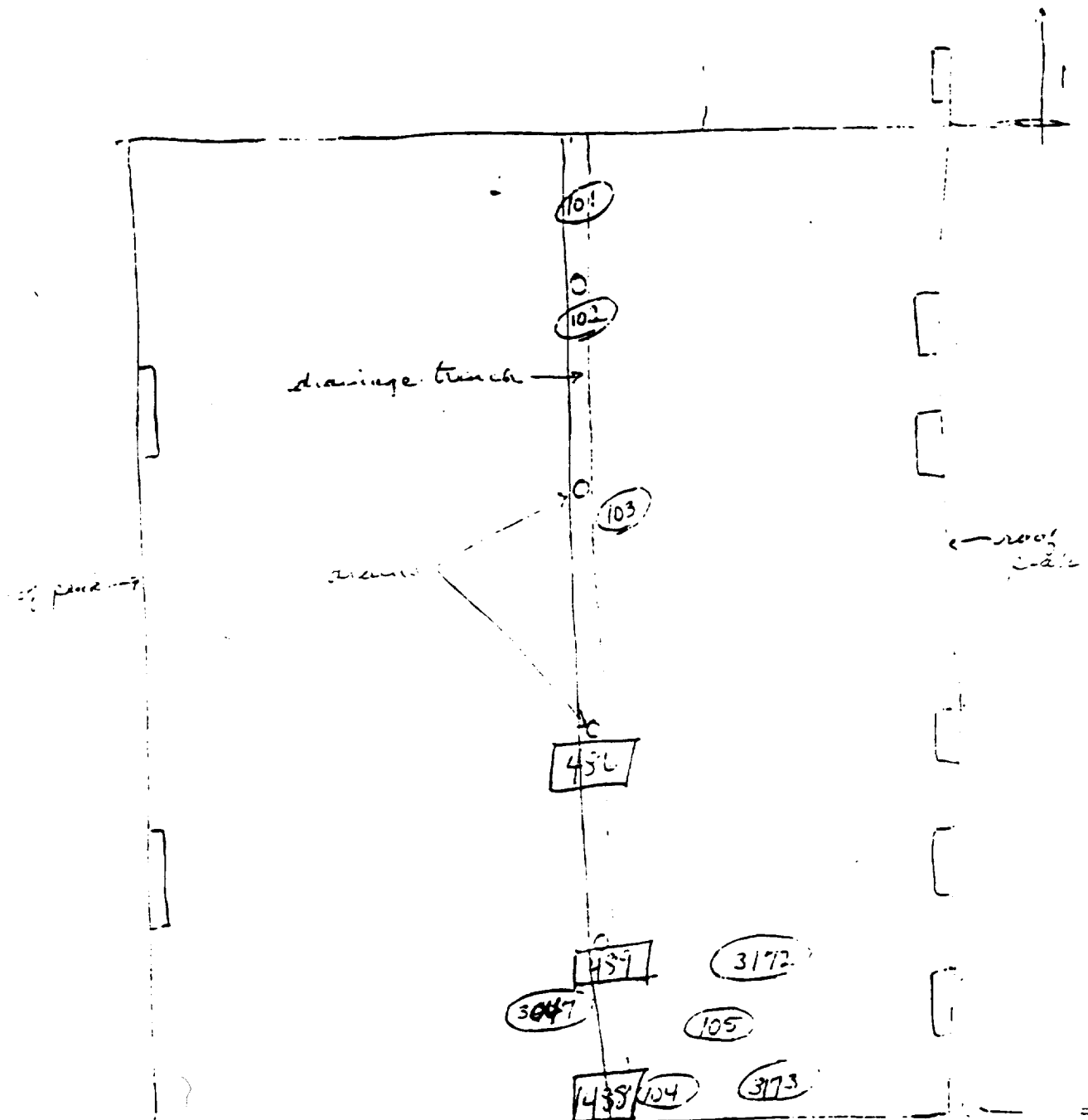
0
9
7
—
—
—

Results of survey, December 1944
12/14/44

	Linear Number	Linear Reading (ft)	2 Meter Reading (ft)	3-Meter Reading (m)	
1					1
2		GROUND LEVEL			2
3	3197	122	122	12	3
4	3200	121	120	11	4
5	3195	121	120	11	5
6	3176	122	120	11	6
7	3185	122	120	11	7
8	3174	124	120	11	8
9	3173	124	120	11	9
10	3192	124	120	11	10
11	3171	123	120	11	11
12	3190	123	120	11	12
13	3195	122	120	11	13
14	3184	120	122	11.2	14
15	3186	122	120	11	15
16	3175	121.2	120	11	16
17	3177	120	120	11	17
18	3174	120	120	11	18
19	3172	121.2	120	11	19
20	3170	121	120	11	20
21	3165	120	120	11	21
22	3182	120	120	11	22
23	3178	121	120	11	23
24	3176	121	120	11	24
25	3163	120	120	11	25
26	3164	120	120	11	26
27	3175	120	120	11	27
28	3173	122	120	11	28
29	3172	121.2	120	11	29
30	3172	120	120	11	30
31	3172	120	120	11	31
32	3177	1170	120	11	32
33	3171	1170	120	11	33
34	3170	1170	120	11	34
35	3170	1170	120	11	35
36	3170	1170	120	11	36
37	3170	1170	120	11	37
38	3162	1170	120	11	38
39	3174	1170	120	11	39
40	3170	1170	120	11	40
41	3175	1170	120	11	41
42	3174	1170	120	11	42
43	3155	1170	120	11	43
44	3126	1170	120	11	44
45	3126	1170	120	11	45
46	3147	1170	120	11	46
47	3126	1170	120	11	47
48		PLANT 1 ROOF			48
49					49
50					50
51					51
52					52
	ALUMINUM		11/0	6.5	A-38

	Sample Number	x Sample Result (µg/g)	x Sample Result (µg/g)	3-111 Result (µg/g)	
1	PLANT & ROOT (CONTINUED)				1
2					2
3	104	5.37			3
4	105	21.54			4
5	3192	206			5
6	3173	230			6
7	3047	14.72			7
8	DUST COLLECTOR AREA				8
9					9
10	2601	191			10
11	2609	275	1200		11
12	2936	101	1000		12
13	3026	1171	2000		13
14	2937	750	11500		14
15	2540	750	2000		15
16	HIGH PLATEFORM				16
17					17
18	2167	200	400		18
19	3167	6000	6000	200	19
20					20
21	To be used from 11-12				21
22					22
23					23
24					24
25					25
26					26
27					27
28					28
29					29
30					30
31					31
32					32
33					33
34					34
35					35
36					36
37					37
38					38
39					39
40					40
41					41
42					42
43					43
44					44
45					45
46					46
47					47
48					48
49					49
50					50
51					51
52					52

Plant 9 Roof



○ = Simon

□ = Sample collected in specimen bottle

⊗ appropriate location of last collection date

A-40

436 was water

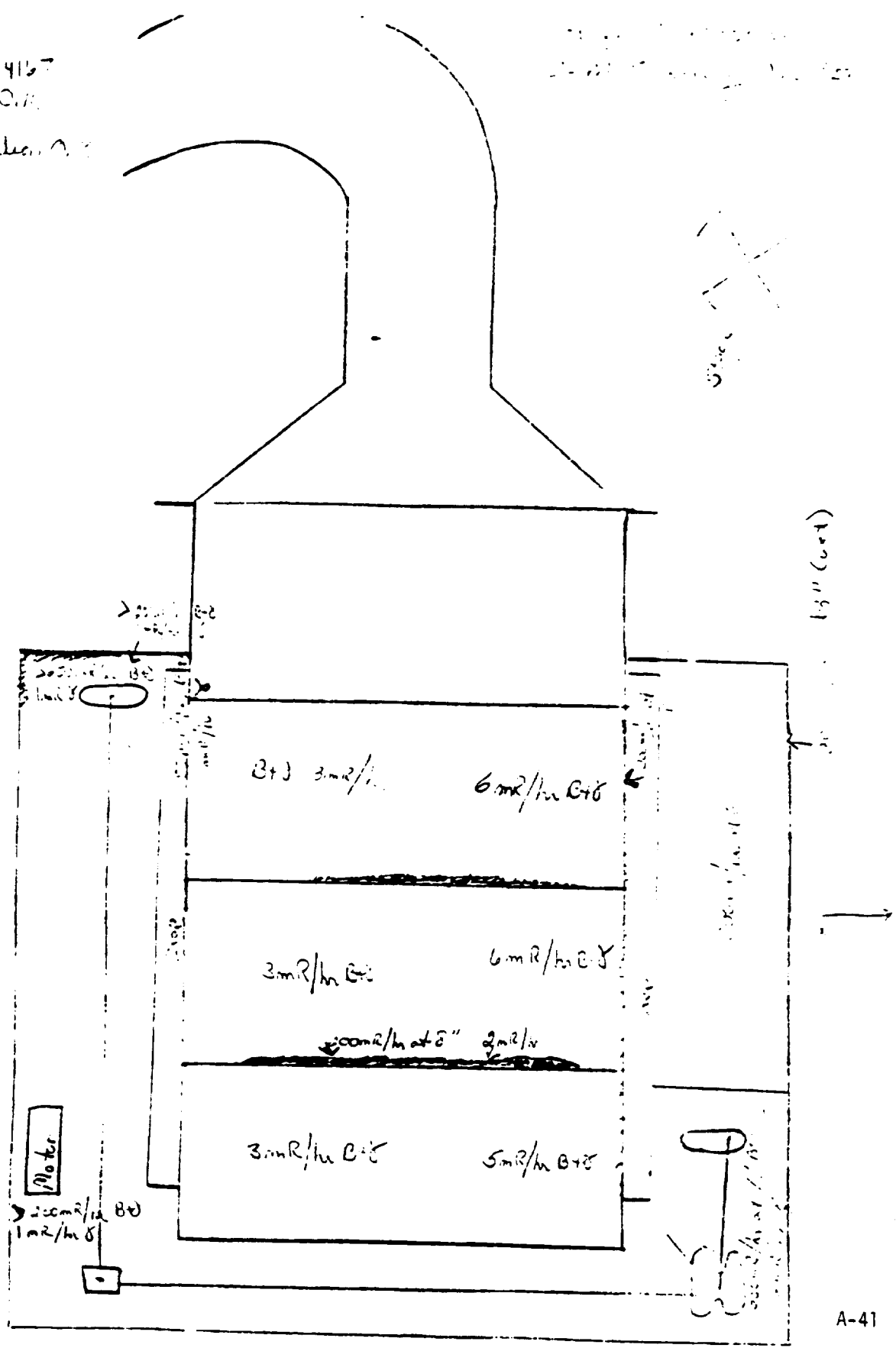
438 & 439 were black residue

1114603

Ludlum 14157
 Cathey C.R.
 Calibration 2.8

1.5" (604)

5.00



A-41

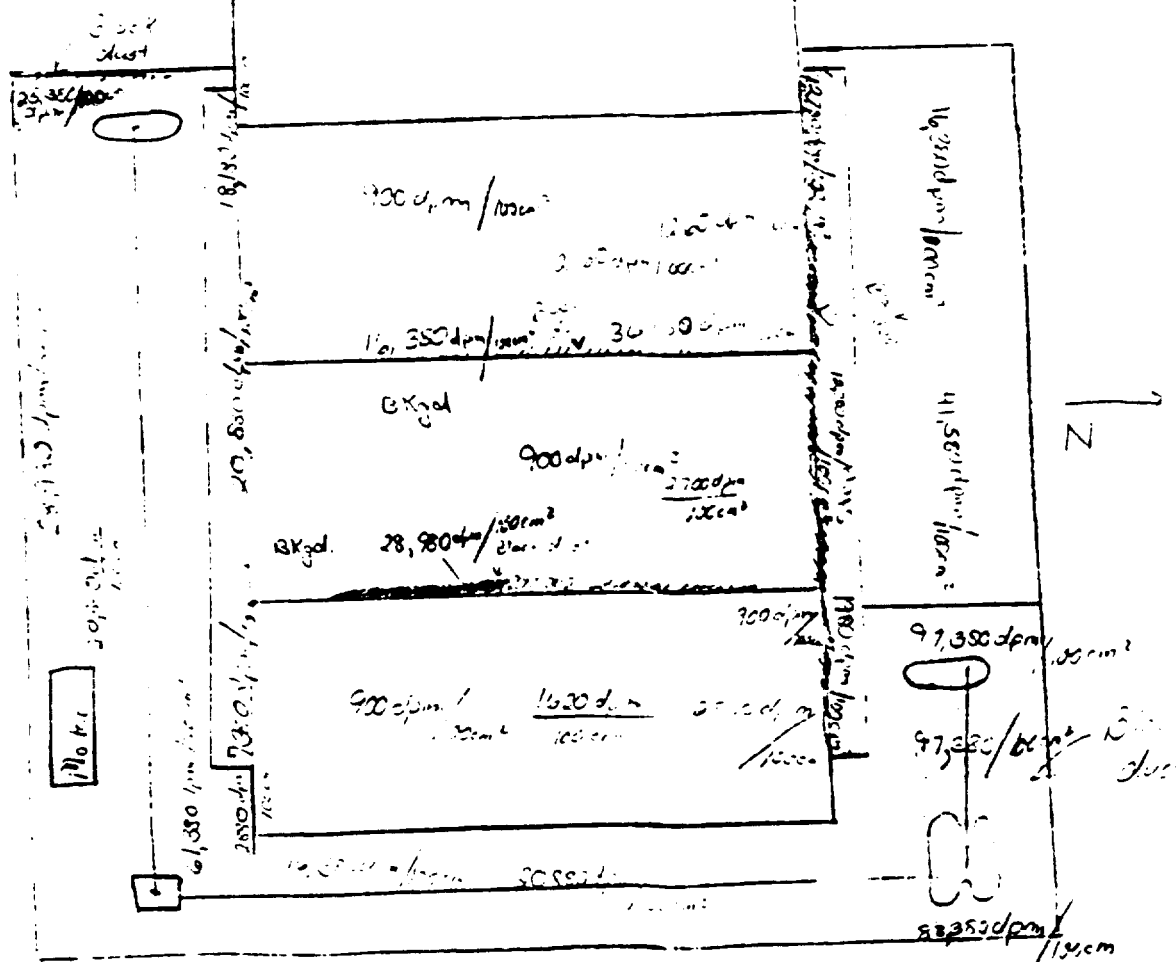
All readings are at contact center

1114604

1947
Secretary, 1947

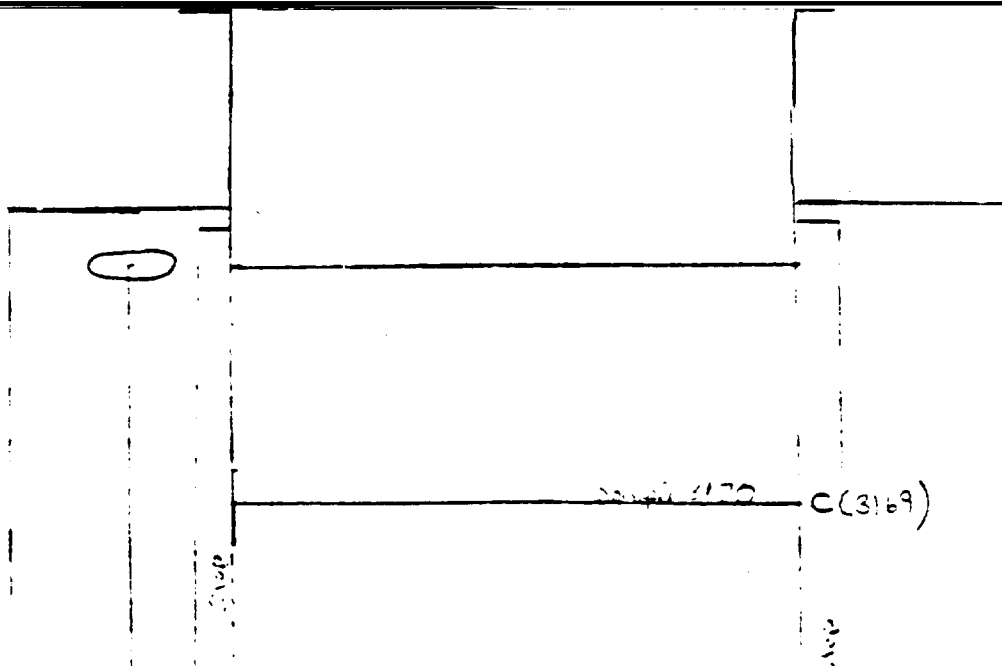


Readings: $\frac{1}{100} \text{ cm}^2$

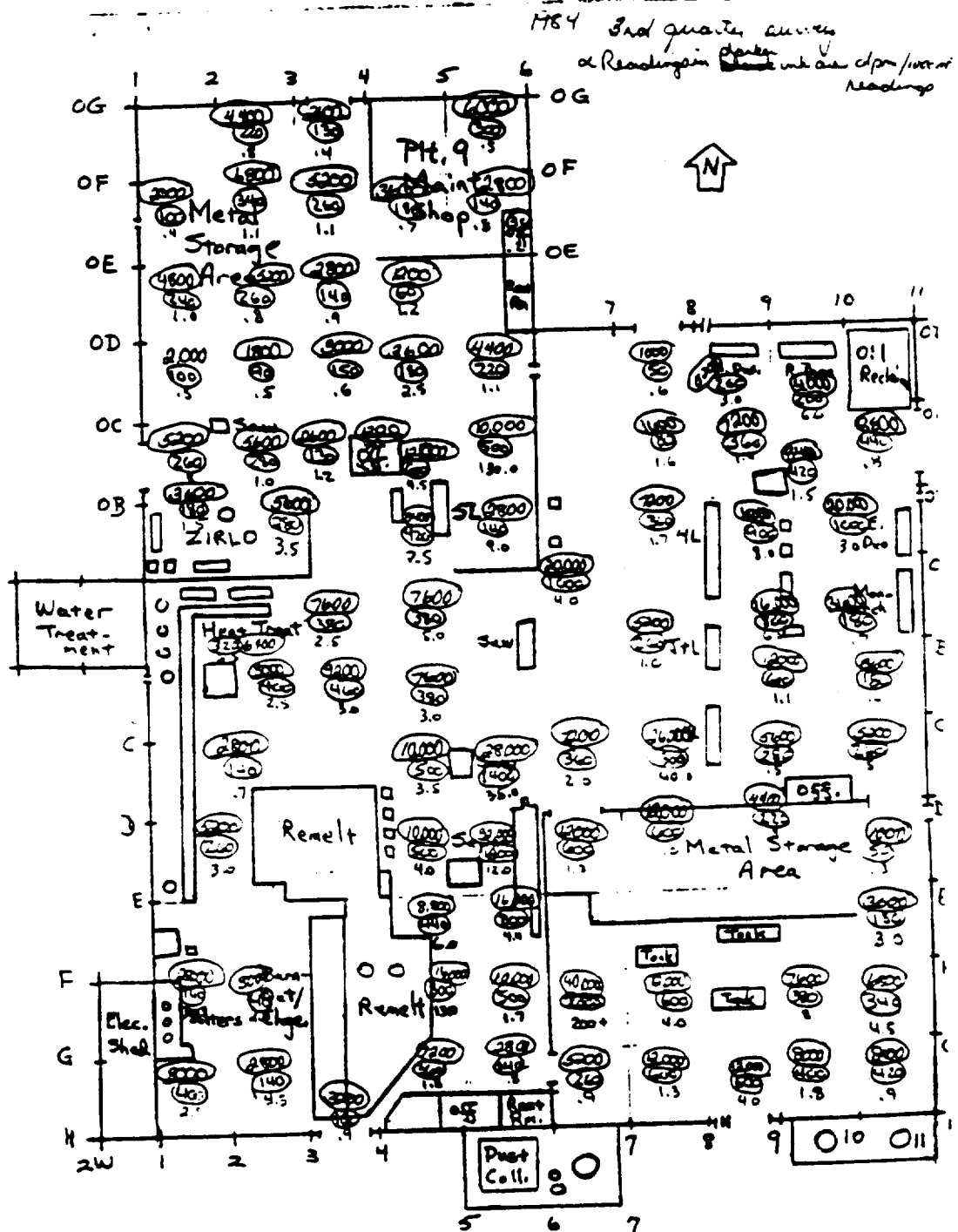


1114605

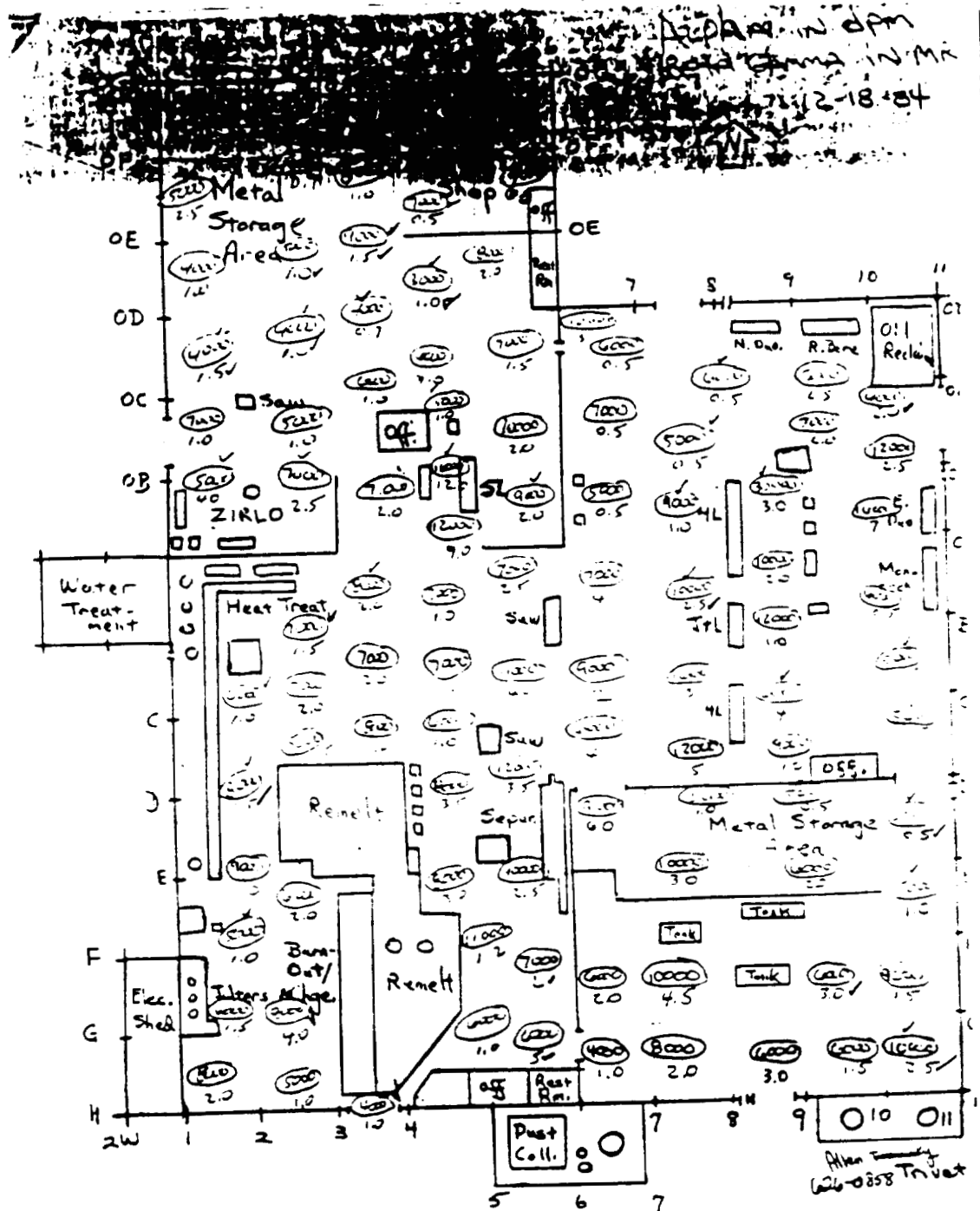
Location of sample



2
→



1114607



Alpha in dpm

Beta Gamma in MR

12-18-84

1114608

A-43

NLO, Inc.

A SUBSIDIARY OF NL INDUSTRIES, INC.
CINCINNATI, OHIO 45229

January 11, 1985

SUBJECT ANALYSIS OF PLANT 9 URINALYSIS, IN VIVO COUNTING, AND AIR SAMPLING DATA
TO R. B. Weidner
FROM S. L. Hinnefeld
REFERENCE

Recent events have prompted me to examine the results of BZ air samples collected from Plant 9 from 9/11/84 to 12/10/84 and results of urinalyses collected from Plant 9 employees during that period, and to compare them to the results obtained from the same period a year earlier. In neither case were the 1984 results significantly different (as measured by a Student's t-test) from the 1983 results. The geometric mean of air sample results was slightly lower for the 1984 period than for the 1983 period. The mean for 1984 urinalysis results was slightly higher than for the 1983 results, but as was stated before, these differences were not statistically significant. The mean urinalysis results from both years are within the range of values obtained for unexposed individuals (0-8 ug/L) as found in pre-employment samples.

In addition, the results of in vivo counts performed on Plant 9 chemical operators and machine tool operators in December, 1984, were compared to the previous counts of those individuals. The mean of the December, 1984 counts was not significantly different from that of the previous counts.

Air Sampling

The air sampling data were assumed to be log-normally distributed. The report from which the data were taken included BZ samples only and was run on 12/3/84. The last Plant 9 sampling date on that report was 11/19/84. I have not been able to access the data base to see if additional samples were taken between 11/19/84 and 12/10/84. For 1983, all BZ samples collected in Plant 9 between 9/11/83 and 12/10/83 were included in the analysis. The data are compared in Table 1.

A-46

1114609

JAN 17 1985

Table 1
Summary of BZ Air Sampling Results From Sept. 11 - Dec. 10,
1983 & 1984

	<u>1983</u>	<u>1984</u>
Number of samples	15	40
Geometric mean concentration	103 dpm/m ³	83 dpm/m ³
Geometric standard deviation	2.83	3.45
Mean of natural logs of concentrations	4.638	4.419
Standard deviation of natural logs of concentrations	1.039	1.238

A t-test for statistical significance was performed using the means and standard deviations of the natural logs of concentrations. The result was a t value of 0.609, which is not significant at the 90% confidence level. Therefore, the air sampling results from the period of the dust release are not significantly different from the results for the same period a year earlier.

Urinalysis

Urinary uranium levels in samples collected from Plant 9 chemical operators from 9/12/84 to 11/30/84 were compared to those collected from the same group during the same dates a year earlier. The data were plotted on both log and linear probability paper in an attempt to determine the distribution of the data. A log-normal distribution appears to represent the data better than a normal one, but means, standard deviations, and t statistics were calculated for both distributions. No matter which distribution is used, there is no significant difference between the 1983 and 1984 data. What's more, the means from both years are within the range of values found in unexposed individuals (0 - 8 µg/L), as measured in pre-employment samples. The data are summarized in Tables 2a and 2b.

Table 2a
Log-Normal Distribution

	<u>1983</u>	<u>1984</u>
Number of samples	32	24
Geometric mean concentration	5.0 µg/L	5.8 µg/L
Geometric standard deviation	1.9	2.1
Mean of natural logs of concentrations	1.611	1.751
Standard deviation of natural logs of concentrations	0.6585	0.7262

t = 0.753, which is not significant at the 90% confidence level

Table 2b
Normal Distribution

	<u>1983</u>	<u>1984</u>
Number of samples*	36	28
Mean concentration	5.4	6.1
Standard deviation	4.3	4.9

t = 0.608, which is not significant at the 90% confidence level.

*The result from four samples in each year was 0 µg/L. The natural log of 0 is indeterminate, so these samples were excluded from the log-normal analysis (Table 2a). Therefore, there were more samples in the normal distribution analysis than in the log-normal.

In Vivo Counting

Thirty-six Plant 9 chemical operators and machine tool operators underwent in vivo counting in the mobile In Vivo Radiation Monitoring Laboratory (IVRML) during December, 1984. Twenty-one of them had previously been counted during routine IVRML visits. The December, 1984 results for these 21 individuals were compared to their most recent previous counts. The dates of the previous counts ranged from 6/14/83 to 8/27/84. The data were plotted on both linear and log probability paper in an attempt to determine its distribution. Neither distribution was obviously superior to the other, so analyses were performed for both distributions. No matter which distribution is used, there was no significant difference between the 1984 and previous results. The data are summarized below.

Table 3a
Log-Normal Distribution

	<u>Previous</u>	<u>1984</u>
Number of samples*	19	17
Geometric mean lung burden	11.3% MPLB**	11.7% MPLB**
Geometric standard deviation	2.42	1.99
Mean of natural logs of lung burdens	2.426	2.462
Standard deviation of natural logs of lung burdens	0.8824	0.6894

t = 0.135, which is not significant at the 90% confidence level.

*Results that were 0% MPLB were excluded because the natural log of 0 is indeterminate.

**MPLB = Maximum Permissible Lung Burden.

Analysis of Plant 9 Urinalysis, In Vivo Counting, and
Air Sampling Data
R. B. Weidner
January 11, 1985

Page 5

Table 3b
Normal Distribution

	<u>Previous</u>	<u>1984</u>
Number of samples	21	21
Mean lung burden	13.4% MPLB*	11.8% MPLB*
Standard deviation	9.64	10.6

$t = 0.512$, which is not significant at the 90% confidence level.

*MPLB = Maximum Permissible Lung Burden.

If the release from the Plant 9 dust collector had resulted in significant exposure to Plant 9 employees, there should have been a statistically significant increase in these measures of internal exposure. At the very least, there should have been a consistent pattern of elevated measurements during the period of the release. Since there was no such pattern, it is reasonable to conclude that the dust release did not result in a significant exposure to Plant 9 employees.

S. L. Hinnefeld
S. L. Hinnefeld

SLH/vvs

cc: M. W. Boback
L. C. Dolan
✓ J. R. Martin - ORO
A. A. Schneider

1114613

NLO, Inc.

A SUBSIDIARY OF NL INDUSTRIES, INC.

CINCINNATI, OHIO 45239

January 9, 1985

SUBJECT CONTAMINATION SURVEY ON PADS
TO R. B. Weidner
FROM S. L. Minnefeld
REFERENCE

On January 3, I conducted a contamination survey on the pad east of Plant 8 and the pad east of Plant 2/3. The purpose of this survey was to determine general contamination levels to which the levels found around the Amerjet dust collector at Plant 9 on December 14 could be compared. The survey consisted of taking smears for removable alpha contamination, and making direct measurements with an Eberline PRM-6 scintillation alpha survey meter (serial # 553, calibrated 12/26/84) and a Ludlum model 3 G-M (serial # 18158, calibrated 12/3/84) with side-window probe.

The locations at which measurements were taken are shown on the attached sketches. The survey results are on Table 1. All G-M readings were taken at contact with the window open.

Table 2 compares these results to those obtained at ground level around the Plant 9 dust collector on December 14. The G-M meter readings at the Plant 9 pad are significantly higher ($p < .005$) than those taken at the Plant 8 pad. The higher results from smears taken at the Plant 9 pad are statistically significant at the 90% confidence level when compared to the pooled results from both the Plant 8 and Refinery pads, but is not significant when compared to the results from the Plant 8 pad only.

Since there is no record of similar surveys being conducted before the recent dust release, it is impossible to determine whether the higher contamination levels around Plant 9 are a result of the recent release. However, it is plausible to argue that removable contamination would have to be relatively recently deposited, or it would have been removed by rain, wind, etc. Therefore, the higher level of removable contamination, coupled with total contamination levels (as measured with an alpha survey meter) that while not significantly lower, are certainly no higher than at Plant 8 and the Refinery, might be indicative of a recent deposition in the vicinity of the Plant 9 dust collector. This would be consistent with the generally-held opinion that the dust that was released was deposited relatively close to the stack.

SLH/vvs
attach.

cc: M. W. Boback

✓ L. C. Dolan

D. A. Fleming

S. L. Minnefeld
S. L. Minnefeld

A-51

A. PRIME CONTRACTOR FOR THE DEPARTMENT OF ENERGY

1114614

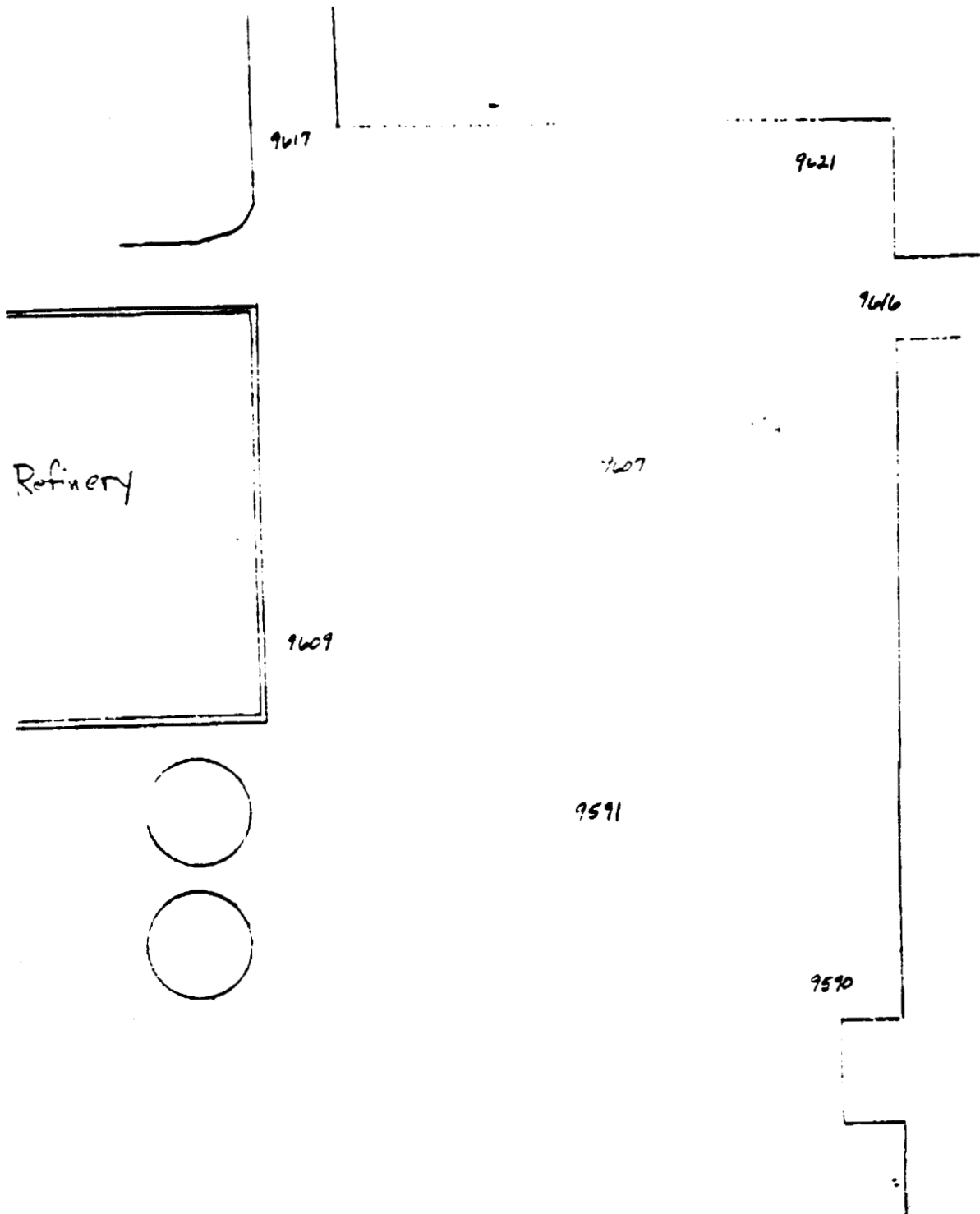


Table 1

Contamination Survey Results From Tests

East of Refinery and Plant 8. 1/3/55

	Smear Number	2 Smear Result (ml. sp.)	2 Meter Result (gm)	6-M Meter Result (ml. sp.)	
1		PLANT 8 PAD			1
2	9600	14	80	0.5	2
3	9543	14	200	0.8	3
4	9599	15	420	1.2	4
5	9611	602	1000	3	5
6	9601	172	1600	1.7	6
7	9602	42	120	1.1	7
8	9596	24	260	0.7	8
9	9595	49	1000	1.8	9
10					10
11					11
12		REFINERY PAD			12
13	9617	11	100	.17	13
14	9621	10	500	.1	14
15	9616	11	100	.13	15
16	9607	8	120	.25	16
17	9609	23	1200	.75	17
18	9591	75	1400	1.7	18
19	9590	322	3900	.8	19
20					20
21					21
22					22
23					23
24					24
25					25
26					26
27					27
28					28
29					29
30					30
31					31
	BACKGROUND		50	.05	

Comparison of December 14, 1984 and January 3, 1985 Contamination Survey
 (Log Normal distribution is assumed)

Location - Type (Units)	Geometric Mean, μ	Geometric Std Dev, σ	Number in Sample, n
1 Point 1 - Sewer (Det. flow)	42.0	3.74	34 #
2 Point 2 - Sewer (Det. flow)	44.4	3.88	9
3 Point 3 - Sewer (Det. flow)			
4 Point 4 - Sewer (Det. flow)			
5 Point 5 - Sewer (Det. flow)			
6 Point 6 - Sewer (Det. flow)	35.3	3.93	7
7 Point 7 - Sewer (Det. flow)			
8 Point 8 - Sewer (Det. flow)			
9 Point 9 - Sewer (Det. flow)			
10 Point 10 - Sewer (Det. flow)			
11 Point 11 - Sewer (Det. flow)	217	7.76	25 #
12 Point 12 - Sewer (Det. flow)	336	3.55	9
13 Point 13 - Sewer (Det. flow)	335	5.98	7
14 Point 14 - Sewer (Det. flow)			
15 Point 15 - Sewer (Det. flow)			
16 Point 16 - Sewer (Det. flow)			
17 Point 17 - Sewer (Det. flow)			
18 Point 18 - Sewer (Det. flow)			
19 Point 19 - Sewer (Det. flow)			
20 Point 20 - Sewer (Det. flow)	3.97	2.46	18 #
21 Point 21 - Sewer (Det. flow)	1.11	1.83	9
22 Point 22 - Sewer (Det. flow)	0.26	3.71	7
23 Point 23 - Sewer (Det. flow)			
24 Point 24 - Sewer (Det. flow)			
25 Point 25 - Sewer (Det. flow)			
26 Point 26 - Sewer (Det. flow)			
27 Point 27 - Sewer (Det. flow)			
28 Point 28 - Sewer (Det. flow)			
29 Point 29 - Sewer (Det. flow)			
30 Point 30 - Sewer (Det. flow)			
31 Point 31 - Sewer (Det. flow)			

1114618

NLO - FMPC MANUFACTURING STANDARDS

02

TITLE:			INDEX NO.:
SOP - DUST COLLECTORS			9-C-701
DIVISION & PLANT:	SUPERSEDED:	PREPARED BY:	DATE ISSUED:
Prod. 9	9-C-701 June 4, 1965	C. W. Baer	10-20-80

DESCRIPTION OF EQUIPMENT AND OPERATION

Four large dust collectors, supplemented by numerous blowers, three Hoffman vacuum cleaners, and three "small" electronic precipitators, are utilized to ventilate Plant 9 equipment and enclosures. The four dust collectors and the areas served by them are listed below:

Collector No. & Name	Type	Capacity (CFM)	Equipment Served
G9N1-1039 - American Air Filter	Blow Ring	19,160	NPR Remelt - Furnaces and Enclosures
G9E2400 - American Air Filter	Filter Blanket	32,000	Machining
G42A100 - Wheelabrator	Shaker	12,400	I&E Remelt Furnaces and Enclosures
G42615 - Turner Haws	Blow Ring	21,400	Reduction Area Enclosures

Collectors capture fumes and dust contaminated with particulate uranium compounds and metal, filter the dust from the air stream, and exhaust the fumes to the atmosphere. The dust settles in a hopper from which it may be drummed at a local drumming station or air conveyed to a Hoffman vacuum cleaner for drumming.

ENVIRONMENTAL CONSIDERATIONS

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

INDUSTRIAL SAFETY

1. Wear full face airline respirator when going into dust collectors except for AAF G9E2400, in which a dust-type respirator will be sufficient.
2. Use dust-type respirators when there is any contact with dust, as when opening the doors of the drumming station.
3. Load no more than 1000 lbs of material per drum or the quantity dictated by nuclear safety considerations. Do not stack drums more than three high. Use only one size container per lot.

1114619

4. Clean up spills of material immediately with vacuum equipment.
5. Turn off exhausters only when served equipment is not operating.
6. Turn off exhausters before entering access door.
7. Wear a dust-type respirator when handling Rollomatic blankets. To prevent skin irritation from glass particles, take a shower as soon as practical and then put on clean work clothes.
8. Before entering filter housing enclosure, secure a radiation work permit.
9. Any unusual occurrence which could have resulted in a significant intake of radioactive materials by inhalation, ingestion, or absorption will be immediately reported to a supervisor. The involved employees, wage or salary, will report to the Medical Department at the end of the shift to submit a urine sample and again report at the start of their next shift to submit another urine sample. The supervisor will inform the Fire and Safety Inspector of the unusual occurrence before the end of the shift during which it happened.

OPERATIONS

Section 1 - Shaker and Blow Ring Type Dust Collectors

Section 2 - Electromatic Air Filter G9E2400

PROCEDURE

SECTION 1: SHAKER AND BLOW RING TYPE DUST COLLECTORS

1. Starting and Operating

- 1.01 Replace the recorder chart at 8:00 A. M. every operation day.
- 1.02 Date removed chart and deliver to supervisor daily.
- 1.03 Turn on power to recorder.
- 1.04 Set recorder-controller to maintain differential pressure.

The bag cleaning operation should normally be within a 1" differential pressure range for the American Air filter and the Turner-Haws collectors. The desired range is between the low point of 3" and the high point of 4"; however, this may be adjusted by plant supervision when new bags are installed or older bags become blinded.

Similar conditions hold for the Wheelabrator collector, except that the desired operating range is 1" to 3".

- 1.05 Set Turner-Haws blow ring drive and blower on AUTO. Set American Air Filter reverse blower on AUTO.
- 1.06 Start main exhauster motor.
- 1.07 Start associated Hoffman vacuum system. If collector fails, exhaust vacuum cleaner to atmosphere. Inform H&S Extension 695 each time blast gates are changed.
- 1.08 Check differential pressure once per shift.

NOTE: Wheelabrator has four indicators for four separate chambers. One of the chambers will be cleaning at all times.

- 1.09 Notify supervisor if pressures are out-of-specification.
- 1.10 Check mercury manometer readings for vacuum cleaners daily.

<u>Vacuum Cleaner</u>	<u>Operating Level</u>
G42A-101	2" - 6"
G-42-512	6" - 9"
G-9N1-1039 (no instrument)	Unspecified

- 1.11 If Hoffman pressure is out-of-specification, notify area supervisor.
- 1.12 Check collectors daily for broken bags or any other obvious malfunctions. Prepare the necessary checklists for these inspections.
- 1.13 Perform full check on Turner-Haws weekly. Complete report NLO-PRO-1241 for General Supervisor.
- 1.14 Inspect Hoffmans for bag failures on Friday afternoons.
- 1.15 Check and shakedown Wheelabrator bags before inventory.
- 1.16 Adjust Wheelabrator bags monthly at inventory to decrease slack and remove cuffing.
- 1.17 Notify H&S Division (Extension 691) when bags are changed.

2. Emptying Dust Collector

- 2.01 Check collector dust levels every four hours (Wheelabrator every two hours). Nuclear Safety limits for material of given enrichment must be observed.
- 2.02 Discharge dust to color coded, identified drums.

1114621

Exception: Turner-Haws. With Hoffman G42-512 operating, open air swept valves under Turner-Haws dust bins one at a time. Close valves when bins are empty.

2.03 Weigh dust and complete identification.

3. Emptying Hoffman Vacuum Cleaners

3.01 Check dust levels every four hours (G-42A-100 every two hours), but note:

Nuclear safety limits for material of given enrichment must be observed.

3.02 Before emptying, check container for available space.

3.03 Shut off impeller.

3.04 Open feed valve(s).

3.05 Replace drums as necessary.

3.06 Operate debridgers and/or vibrators.

3.07 Shake bags lightly just before completing drumming.

3.08 When flow stops, close valve and restart blower.

3.09 Weigh dust and complete identification.

4. Responding to Low Level Differential Pressure Alarm

4.01 Press SILENCE button.

4.02 Shut down dust collector.

4.03 Look for collector door ajar or broken or burned bags.

4.04 Notify supervisor of any malfunction.

5. Responding to High Level Differential Pressure Alarm

5.01 Press SILENCE button.

5.02 Shut down blower and look for broken or bad hoses.

5.03 If none, try to operate by manual control and then return to automatic.

5.04 If unsuccessful, shut down and notify supervisor.

6. Releasing Jammed Blow Ring (American Air Filter)

- 6.01 Press SILENCE button.
- 6.02 Turn reverse blower selector switch to OFF.
- 6.03 Wait a few minutes and turn to manual.
- 6.04 If unsuccessful on manual, turn to AUTO.
- 6.05 If AUTO fails, shut down and notify supervisor.

7. Shutting Down Dust Collector

- 7.01 Turn off exhaustor, blower, and blow ring drive-motors.
- 7.02 Turn off motors of associated vacuum cleaners.
- 7.03 Turn off recorders.

NOTE 1: The Wheelabrator and Turner-Haws dust collectors are not in operation as of 8-7-80. However, this procedure should be used whenever these units are reactivated.

SECTION 2: ELECTROMATIC AIR FILTER G9E2-400

1. Starting and Operating

- 1.01 Close access doors and tighten safety locks.
- 1.02 Set sump pump on AUTO.
- 1.03 Check Rollomatic drive, operating it once per week manually.
- 1.04 Make certain blast gates in dust hoods are open.
- 1.05 Start blower motor.

2. Checking Filter

- 2.01 (Supervisor or Area Supervisor) Check Rollomatic blanket's condition weekly.
- 2.02 If media replacement is needed, call Mechanical Department.

Index No.	SOP - 9-C-701	Section	Issued	10-20-80	Rev	Page	6

The above Standard Operating Procedure has been approved by the Plants Department Superintendent, General Superintendent, H&S Division, the Production Technology, Nuclear Materials Control, and Quality Control Departments.

AUTHORIZED BY:

R. J. Sanchez
Assistant Manager

10/8/80
Date

SECTION 2 - ELECTROMATIC AIR FILTER G9E2-400

1. Starting and Operating

- 1.1 Close access doors and tighten safety locks.
- 1.2 Turn on power packs and check indicating lights.
- 1.3 Turn on control transformer and disconnect switches for Viscosine pump, which must be on manual position.
- 1.4 Set following selector switches on AUTO.

Sump pump
High voltage
Main switch
Rollo-Matic drive

- 1.5 Make certain blast gates in dust hoods are open.
- 1.6 Start blower motor.

2. Checking Filter

- 2.1 (Foreman or Area Foreman) Check Rollo-Matic blankets condition weekly.
- 2.2 If Replace-Media light is lit, call Mechanical Department.
- 2.3 (Mechanical Department) Determine if filter cartridges need to be replaced.

The above SOP was prepared in conformance with a rough draft which was approved by the Plant 9 Superintendent, the Director of Health & Safety and a representative of the Process Engineering Department.

AUTHORIZED BY:

C. R. Chapman
Director of Manufacturing

Index No. SOP - 9-C-701 Section 2 Issued 11-29-78 Page 2

--	--	--	--

CURRENT REVISION

<u>PAGE</u>	<u>DESCRIPTION AND AUTHORITY</u>
Section 1, Page 3	Item 1.4 revised to give some latitude in setting differential pressure points per Change in SOP No. 293, initiated by Ed. Schonegg.



Department of Energy
Oak Ridge Operations
P.O. Box E
Oak Ridge, Tennessee 37830

APR 13 1981

NLO, Inc.
ATTN: Mr. R. M. Spenceley
Manager
Post Office Box 39158
Cincinnati, Ohio 45239

Gentlemen:

ADVENT OF EPA'S CERCLA REPORTING REQUIREMENTS

The Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA, commonly known as "Superfund") contains requirements for reporting certain releases of hazardous substances into the environment and also notification of the existence of certain sites at which RCRA-regulated hazardous wastes are or have been stored, treated, or disposed of.

At this time, CERCLA regulations have not been promulgated and guidelines concerning what is required must come from the Act itself (Enclosure 1). EPA is expected to provide an interpretation in the Federal Register later this month.

Enclosure 2 describes requirements for notification of the existence of RCRA-regulated hazardous waste sites. This report should be delivered to ORO no later than May 15, 1981, in order to provide ORO sufficient review time to meet EPA's June 9, 1981, deadline.

Enclosure 3 explains the reporting requirements for hazardous substance releases into the environment, which are now in effect. It is worthy to note the broad CERCLA definitions of "hazardous substance," "release," and "environment." At this time, reporting of hazardous substance releases will be limited to accidental or episodic releases for which remedial action may be necessary.

1114627

Mr. R. M. Spenceley

-2-

APR 13 1981

If there are any questions concerning these CERCLA reporting requirements, please contact Chris Bird, Environmental Protection Branch, S&EC Division (ext. 6-0847).

Sincerely,

M.R. Theisen

M. R. Theisen, Director
Weapons Division

SE-331:JCB

Enclosures:
As stated

cc;

V. J. D'Amico, SE-30
Allen Moseley, CC-10

A-65

1114628

COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND LIABILITY ACT OF 1980

(Enacted by Public Law 96-510, December 11, 1980, 94 Stat. 2767)

TITLE I—HAZARDOUS SUBSTANCES RELEASES, LIABILITY, COMPENSATION

DEFINITIONS

Sec. 101. For purpose of this title, the term—

(1) "act of God" means an unanticipated grave natural disaster or other natural phenomenon of an exceptional, inevitable, and irresistible character, the effects of which could not have been prevented or avoided by the exercise of due care or foresight;

(2) "Administrator" means the Administrator of the United States Environmental Protection Agency;

(3) "barrel" means forty-two United States gallons at sixty degrees Fahrenheit;

(4) "claim" means a demand in writing for a sum certain;

(5) "claimant" means any person who presents a claim for compensation under this Act;

(6) "damages" means damages for injury or loss of natural resources as set forth in section 107(a) or 111(b) of this Act;

(7) "drinking water supply" means any raw or finished water source that is or may be used by a public water system (as defined in the Safe Drinking Water Act) or as drinking water by one or more individuals;

(8) "environment" means (A) the navigable waters, the waters of the contiguous zone, and the ocean waters of which the natural resources are under the exclusive management authority of the United States under the Fishery Conservation and Management Act of 1976, and (B) any other surface water, ground water, drinking water supply, land surface or subsurface strata, or ambient air within the United States or under the jurisdiction of the United States;

(9) "facility" means (A) any building, structure, installation, equipment, pipe or pipeline (including any pipe into a sewer or publicly owned treatment works), well, pit, pond, lagoon, impoundment, ditch, landfill, storage container, motor vehicle, rolling stock, or aircraft, or (B) any site or area where a hazardous substance has been deposited, stored, disposed of, or placed, or otherwise come to be located; but does not include any consumer product in consumer use or any vessel;

(10) "federally permitted release" means (A) discharges in compliance with a permit under section 402 of the Federal Water Pollution Control Act, (B) discharges resulting from circumstances identified and reviewed and made part of the public record with respect to a permit issued or modified under section 402 of the Federal Water Pollution Control Act and subject to a condition of such permit, (C) continuous or anticipated intermittent discharges from a point source, identified in a permit or permit application under section 402 of the Federal Water Pollution Control Act, which are caused by events occurring within the scope of relevant operating or treatment systems, (D) discharges in compliance with a legally enforceable permit under section 404 of the Federal Water Pollution Control Act, (E) releases in compliance with a legally enforceable final permit issued pursuant to section 3005 (a) through (d) of the Solid Waste Disposal Act from a hazardous waste treatment, storage, or disposal facility when such permit specifically identifies the hazardous substances and makes such substances subject to a standard of practice, control procedure or bioassay limitation or condition, or other control on the hazardous substances in such releases, (F) any release in compliance with a legally enforceable permit issued under section 102 of section 103 of the Marine Protection, Research, and Sanctuaries Act of 1972, (G) any injection of fluids authorized under Federal underground injection control programs or State programs submitted for Federal approval (and not disapproved by the Administrator of the Environmental Protection Agency) pursuant to part C of the Safe Drinking Water Act, (H) any emission into the air subject to a permit or control regulation under section 111, section 112, title I part C, title I part D, or State implementation plans submitted in accordance with section 110 of the Clean Air Act (and not

disapproved by the Administrator of the Environmental Protection Agency), including any schedule or waiver granted, promulgated, or approved under these sections, (I) any injection of fluid or other materials authorized under applicable State law (i) for the purpose of stimulating or treating wells for the production of crude oil, natural gas, or water, (ii) for the purpose of secondary, tertiary, or other enhanced recovery of crude oil or natural gas or (iii) which are brought to the surface in conjunction with the production of crude oil or natural gas and which are reinjected, (J) the introduction of any pollutant into a publicly owned treatment works when such pollutant is specified in and in compliance with applicable pretreatment standards of section 307 (b) or (c) of the Clean Water Act and enforceable requirements in a pretreatment program submitted by a State or municipality for Federal approval under section 402 of such Act, and (K) any release of source, special nuclear, or byproduct material, as those terms are defined in the Atomic Energy Act of 1954, in compliance with a legally enforceable license, permit, regulation, or order issued pursuant to the Atomic Energy Act of 1954;

(11) "Fund" or "Trust Fund" means the Hazardous Substance Response Fund established by section 221 of this Act or, in the case of a hazardous waste disposal facility for which liability has been transferred under section 107(k) of this Act, the Post-closure Liability Fund established by section 232 of this Act;

(12) "ground water" means water in a saturated zone of stratum beneath the surface of land or water;

(13) "guarantor" means any person, other than the owner or operator, who provides evidence of financial responsibility for a owner or operator under this Act;

(14) "hazardous substance" means (A) any substance designated pursuant to section 311(b)(2)(A) of the Federal Water Pollution Control Act, (B) any element, compound, mixture, solution, or substance designated pursuant to section 102 of this Act, (C) any hazardous waste having the characteristics identified under or listed pursuant to section 3001 of the Solid Waste Disposal Act, but not including any waste the regulation of which under the Solid Waste Disposal Act has been suspended by Act of Congress, (D) any toxic pollutant listed under section 307(a) of the Federal Water Pollution Control Act, (E) any hazardous air pollutant listed under section 112 of the Clean Air Act, and (F) any imminently hazardous chemical substance or mixture with respect to which the Administrator has taken action pursuant to section 7 of the Toxic Substances Control Act. The term does not include petroleum, including crude oil or any fraction thereof which is not otherwise specifically listed or designated as a hazardous substance under subparagraphs A through F of this paragraph, and the term does not include natural gas, natural gas liquids, liquefied natural gas, or synthetic gas usable for fuel, or mixtures of natural gas and such synthetic gas;

(15) "navigable waters" or "navigable waters of the United States" means the waters of the United States, including the territorial seas;

(16) "natural resources" means land, fish, wildlife, biota, air, water, ground water, drinking water supplies, and other such resources belonging to, managed by, held in trust by, appertaining to, or otherwise controlled by the United States (including the resources of the fishery conservation zone established by the Fishery Conservation and Management Act of 1976), any State or local government, or any foreign government;

(17) "offshore facility" means any facility of any kind located in, on, or under, any of the navigable waters of the United States and any facility of any kind which is subject to the jurisdiction of the United States and is located in, on, or under any other waters, other than a vessel or a public vessel;

(18) "onshore facility" means any facility (including, but not limited to, motor vehicles and rolling stock) of any kind located in, on, or under, any land or nonnavigable waters within the United States;

(19) "otherwise subject to the jurisdiction of the United States" means subject to the jurisdiction of the United States by virtue of United States citizenship, United States vessel documentation or numbering, or as provided by international agreement to which the United States is a party;

(20)(A) "owner or operator" means (i) in the case of a vessel, any person owning, operating, or chartering by demise, such vessel, (ii) in the case of an onshore facility or an offshore facility, any person owning or operating such facility, and (iii) in the case of any abandoned facility, any person who owned, operated, or otherwise controlled activities at such facility immediately prior to such abandonment. Such term does not include a person, who, without participating in the management of a vessel or facility, holds indicia of ownership primarily to protect his security interest in the vessel or facility;

(B) in the case of a hazardous substance which has been accepted for transportation by a common or contract carrier and except as provided in section 107(a) (3) or (4) of this Act, (i) the term "owner or operator" shall mean such common carrier or other bona fide hire carrier acting as an independent contractor during such transportation, (ii) the shipper of such hazardous substance shall not be considered to have caused or contributed to any release during such transportation which resulted solely from circumstances or conditions beyond his control;

(C) in the case of a hazardous substance which has been delivered by a common or contract carrier to a disposal or treatment facility and except as provided in section 107(a) (3) or (4) (i) the term "owner or operator" shall not include such common or contract carrier, and (ii) such common or contract carrier shall not be considered to have caused or contributed to any release at such disposal or treatment facility resulting from circumstances or conditions beyond its control;

(21) "person" means an individual, firm, corporation, association, partnership, consortium, joint venture, commercial entity, United States Government, State, municipality, commission, political subdivision of a State, or any interstate body;

(22) "release" means any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment, but excludes (A) any release which results in exposure to persons solely within a workplace, with respect to a claim which such persons may assert against the employer of such persons, (B) emissions from the engine exhaust of a motor vehicle, rolling stock, aircraft, vessel, or pipeline pumping station engine, (C) release of source, byproduct, or special nuclear material from a nuclear incident, as those terms are defined in the Atomic Energy Act of 1954, if such release is subject to requirements with respect to financial protection established by the Nuclear Regulatory Commission under section 170 of such Act, or, for the purposes of section 104 of this title or any other response action, any release of source byproduct, or special nuclear material from any processing site designated under section 102(a)(1) or 302(a) of the Uranium Mill Tailings Radiation Control Act of 1978, and (D) the normal application of fertilizer;

(23) "remove" or "removal" means the cleanup or removal of released hazardous substances from the environment, such actions as may be necessary taken in the event of the threat of release of hazardous substances into the environment, such actions as may be necessary to monitor, assess, and evaluate the release or threat of release of hazardous substances, the disposal of removed material, or the taking of such other actions as may be necessary to prevent, minimize, or mitigate damage to the public health or welfare or to the environment, which may otherwise result from a release or threat of release. The term includes, in addition, without being limited to, security fencing or other measures to limit access, provision of alternative water supplies, temporary evacuation and housing of threatened individuals not otherwise provided for, action taken under section 104(b) of this Act, and any emergency assistance which may be provided under the Disaster Relief Act of 1974;

(24) "remedy" or "remedial action" means those actions consistent with permanent remedy taken instead of or in addition to removal actions in the event of a release or threatened release of a hazardous substance into the environment, to prevent or minimize the release of hazardous substances so that they do not migrate to cause substantial danger to present or future public health or welfare or the environment. The term includes, but is not limited to, such actions at the location of the release as storage, confinement, perimeter protection using dikes, trenches, or ditches, clay cover, neutralization, cleanup of released hazard-

ous substances or contaminated materials, recycling or reuse, diversion, destruction, segregation of reactive wastes, dredging or encavations, repair or replacement of leaking containers, collection of leachate and runoff, onsite treatment or incineration, provision of alternative water supplies, and any monitoring reasonably required to assure that such actions protect the public health and welfare and the environment. The term includes the costs of permanent relocation of residents and businesses and community facilities where the President determines that, alone or in combination with other measures, such relocation is more cost-effective than and environmentally preferable to the transportation, storage, treatment, destruction, or secure disposition of hazardous substances, or may otherwise be necessary to protect the public health or welfare. The term does not include offsite transport of hazardous substances, or the storage, treatment, destruction, or secure disposition of such hazardous substances or contaminated materials unless the President determines that such actions (A) are more cost-effective than other remedial actions, (B) will create new capacity to manage, in compliance with subtitle C of the Solid Waste Disposal Act, hazardous substances in addition to those located at the affected facility, or (C) are necessary to protect public health or welfare or the environment from a present or potential risk which may be created by further exposure to the continued presence of such substances or materials;

(25) "respond" or "response" means remove, removal, remedy, and remedial action;

(26) "transport" or "transportation" means the movement of a hazardous substance by any mode, including pipeline (as defined in the Pipeline Safety Act), and in the case of a hazardous substance which has been accepted for transportation by a common or contract carrier, the term "transport" or "transportation" shall include any stoppage in transit which is temporary, incidental to the transportation movement, and at the ordinary operating convenience of a common or contract carrier, and any such stoppage shall be considered as a continuity of movement; and not as the storage of a hazardous substance;

(27) "United States" and "State" include the several States of the United States, the District of Columbia, the Commonwealth of Puerto Rico, Guam, American Samoa, the United States Virgin Islands, the Commonwealth of the Northern Mariana Islands, and any other territory or possession over which the United States has jurisdiction;

(28) "vessel" means every description of watercraft or other artificial contrivance used, or capable of being used, as a means of transportation on water;

(29) "disposal", "hazardous waste", and "treatment" shall have the meaning provided in section 1004 of the Solid Waste Disposal Act;

(30) "territorial sea" and "contiguous zone" shall have the meaning provided in section 502 of the Federal Water Pollution Control Act;

(31) "national contingency plan" means the national contingency plan published under section 311(c) of the Federal Water Pollution Control Act or revised pursuant to section 105 of this Act; and

(32) "liable" or "liability" under this title shall be construed to be the standard of liability which obtains under section 311 of the Federal Water Pollution Control Act.

REPORTABLE QUANTITIES AND ADDITIONAL DESIGNATIONS

Sec. 102. (a) The Administrator shall promulgate and revise as may be appropriate, regulations designating as hazardous substances, in addition to those referred to in section 101(14) of this title, such elements, compounds, mixtures, solutions, and substances which, when released into the environment may present substantial danger to the public health or welfare or the environment, and shall promulgate regulations establishing that quantity of any hazardous substance the release of which shall be reported pursuant to section 103 of this title. The Administrator may determine that one single quantity shall be the reportable quantity for any hazardous substance, regardless of the medium into which the hazardous substance is released.

(b) Unless and until superseded by regulations establishing a reportable quantity under subsection (a) of this section for any hazardous substance as defined in section 101(14) of this title, (1) a quantity of one pound, or (2) for those hazardous substances for which

reportable quantities have been established pursuant to section 311(b)(4) of the Federal Water Pollution Control Act, such reportable quantity, shall be deemed that quantity, the release of which requires notification pursuant to section 103 (a) or (b) of this title.

NOTICES, PENALTIES

Sec. 103. (a) Any person in charge of a vessel or an offshore or an onshore facility shall, as soon as he has knowledge of any release (other than a federally permitted release) of a hazardous substance from such vessel or facility in quantities equal to or greater than those determined pursuant to section 102 of this title, immediately notify the National Response Center established under the Clean Water Act of such release. The National Response Center shall convey the notification expeditiously to all appropriate Government agencies, including the Governor of any affected State.

(b) Any person—

(1) in charge of a vessel from which a hazardous substance is released, other than a federally permitted release, into or upon the navigable waters of the United States, adjoining shorelines, or into or upon the waters of the contiguous zone, or

(2) in charge of a vessel from which a hazardous substance is released, other than a federally permitted release, which may affect natural resources belonging to, appertaining to, or under the exclusive management authority of the United States (including resources under the Fishery Conservation and Management Act of 1976), and who is otherwise subject to the jurisdiction of the United States at the time of the release, or

(3) in charge of a facility from which a hazardous substance is released, other than a federally permitted release, in a quantity equal to or greater than that determined pursuant to section 102 of this title who fails to notify immediately the appropriate agency of the United States Government as soon as he has knowledge of such release shall, upon conviction, be fined not more than \$10,000 or imprisoned for not more than one year, or both. Notification received pursuant to this paragraph or information obtained by the exploitation of such notification shall not be used against any such person in any criminal case, except a prosecution for perjury or for giving a false statement.

(c) Within one hundred and eighty days after the enactment of this Act, any person who owns or operates or who at the time of disposal owned or operated, or who accepted hazardous substances for transport and selected, a facility at which hazardous substances (as defined in section 101(14)(C) of this title) are or have been stored, treated, or disposed of shall, unless such facility has a permit issued under, or has been accorded interim status under, subtitle C of the Solid Waste Disposal Act, notify the Administrator of the Environmental Protection Agency of the existence of such facility, specifying the amount and type of any hazardous substance to be found there, and any known, suspected, or likely releases of such substances from such facility. The Administrator may prescribe in greater detail the manner and form of the notice and the information included. The Administrator shall notify the affected State agency, or any department designated by the Governor to receive such notice, of the existence of such facility. Any person who knowingly fails to notify the Administrator of the existence of any such facility shall, upon conviction, be fined not more than \$10,000, or imprisoned for not more than one year, or both. In addition, any such person who knowingly fails to provide the notice required by this subsection shall not be entitled to any limitation of liability or to any defenses to liability set out in section 107 of this Act: *Provided, however*, That notification under this subsection is not required for any facility which would be reportable hereunder solely as a result of any stoppage in transit which is temporary, incidental to the transportation movement, or at the ordinary operating convenience of a common or contract carrier, and such stoppage shall be considered as a continuity of movement and not as the storage of a hazardous substance. Notification received pursuant to this subsection or information obtained by the exploitation of such notification shall not be used against any such person in any criminal case, except a prosecution for perjury or for giving a false statement.

(d)(1) The Administrator of the Environmental Protection Agency is authorized to promulgate rules and regulations specifying, with respect to—

(A) the location, title, or condition of a facility, and
(B) the identity, characteristics, quantity, origin, or condition (including containerization and previous treatment) of any hazardous substances contained or deposited in a facility; the records which shall be retained by any person required to provide the notification of a facility set out in subsection (c) of this section.

Such specification shall be in accordance with the provisions of this subsection.

(2) Beginning with the date of enactment of this Act, for fifty years thereafter or for fifty years after the date of establishment of a record (whichever is later), or at any such earlier time as a waiver is obtained under paragraph (3) of this subsection, it shall be unlawful for any such person knowingly to destroy, mutilate, erase, dispose of, conceal, or otherwise render unavailable or unreadable or falsify any records identified in paragraph (1) of this subsection. Any person who violates this paragraph shall, upon conviction, be fined not more than \$20,000, or imprisoned for not more than one year, or both.

(3) At any time prior to the date which occurs fifty years after the date of enactment of this Act, any person identified under paragraph (1) of this subsection may apply to the Administrator of the Environmental Protection Agency for a waiver of the provisions of the first sentence of paragraph (2) of this subsection. The Administrator is authorized to grant such waiver if, in his discretion, such waiver would not unreasonably interfere with the attainment of the purposes and provisions of this Act. The Administrator shall promulgate rules and regulations regarding such a waiver so as to inform parties of the proper application procedure and conditions for approval of such a waiver.

(4) Notwithstanding the provisions of this subsection, the Administrator of the Environmental Protection Agency may in his discretion require any such person to retain any record identified pursuant to paragraph (1) of this subsection for such a time period in excess of the period specified in paragraph (2) of this subsection as the Administrator determines to be necessary to protect the public health or welfare.

(e) This section shall not apply to the application of a pesticide product registered under the Federal Insecticide, Fungicide, and Rodenticide Act or to the handling and storage of such a pesticide product by an agricultural producer.

(f) No notification shall be required under subsection (a) or (b) of this section for any release of a hazardous substance—

(1) which is required to be reported (or specifically exempted from a requirement for reporting) under subtitle C of the Solid Waste Disposal Act or regulations thereunder and which has been reported to the National Response Center, or

(2) which is a continuous release, stable in quantity and rate, and is—

(A) from a facility for which notification has been given under subsection (c) of this section, or

(B) a release of which notification has been given under subsections (a) and (b) of this section for a period sufficient to establish the continuity, quantity, and regularity of such release.

Provided, That notification in accordance with subsections (a) and (b) of this paragraph shall be given for releases subject to this paragraph annually, or at such time as there is any statistically significant increase in the quantity of any hazardous substance or constituent thereof released, above that previously reported or occurring.

RESPONDER AUTHORITIES

Sec. 104. (a)(1) Whenever (A) any hazardous substance is released or there is a substantial threat of such a release into the environment, or (B) there is a release or substantial threat of release into the environment of any pollutant or contaminant which may present an imminent and substantial danger to the public health or welfare, the President is authorized to act, consistent with the national contingency plan, to remove or arrange for the removal of, and provide for remedial action relating to such hazardous substance, pollutant, or contaminant at any time (including its removal from any contaminated natural resource), or take any other response measure consistent with the national contingency plan which the President deems necessary to protect the public health or welfare or the environment, unless the President determines that such removal and remedial action will be done properly by the owner or operator of the vessel or facility from which the release or threat of release emanates, or by any other responsible party.

(2) For the purposes of this section, "pollutant or contaminant" shall include, but not be limited to, any element, substance, compound, or mixture, including disease-causing agents, which after release into the environment and upon exposure, ingestion, inhalation, or assimilation into any organism, either directly from the environment or indirectly by ingestion through food chains, will or may reasonably be anticipated to cause death, disease, behavioral abnormalities, cancer, genetic mutation, physiological malfunctions (including malfunctions in reproduction) or physical deformations, in such organisms or their offspring. The term does not include petro-

leams, including crude oil and any fraction thereof which is not otherwise specifically listed or designated as hazardous substances under section 101(14) (A) through (F) of this title, nor does it include natural gas, liquefied natural gas, or synthetic gas of pipeline quality (or mixtures of natural gas and such synthetic gas).

(b) Whenever the President is authorized to act pursuant to subsection (a) of this section, or whenever the President has reason to believe that a release has occurred or is about to occur, or that illness, disease, or complaints thereof may be attributable to exposure to a hazardous substance, pollutant, or contaminant and that a release may have occurred or be occurring, he may undertake such investigations, monitoring, surveys, testing, and other information gathering as he may deem necessary or appropriate to identify the existence and extent of the release or threat thereof, the source and nature of the hazardous substances, pollutants or contaminants involved, and the extent of danger to the public health or welfare or to the environment. In addition, the President may undertake such planning, legal, fiscal, economic, engineering, architectural, and other studies or investigations as he may deem necessary or appropriate to plan and direct response actions, to recover the costs thereof, and to enforce the provisions of this Act.

(c)(1) Unless (A) the President finds that (i) continued response actions are immediately required to prevent, limit, or mitigate an emergency, (ii) there is an immediate risk to public health or welfare or the environment, and (iii) such assistance will not otherwise be provided on a timely basis, or (B) the President has determined the appropriate remedial actions pursuant to paragraph (2) of this subsection and the State or States in which the source of the release is located have complied with the requirements of paragraph (3) of this subsection, obligations from the Fund, other than those authorized by subsection (b) of this section, shall not continue after \$1,000,000 has been obligated for response actions or six months has elapsed from the date of initial response to a release or threatened release of hazardous substances.

(2) The President shall consult with the affected State or States before determining any appropriate remedial action to be taken pursuant to the authority granted under subsection (a) of this section.

(3) The President shall not provide any remedial actions pursuant to this section unless the State in which the release occurs first enters into a contract or cooperative agreement with the President providing assurances deemed adequate by the President that (A) the State will assure all future maintenance of the removal and remedial actions provided for the expected life of such actions as determined by the President; (B) the State will assure the availability of a hazardous waste disposal facility acceptable to the President and in compliance with the requirements of subtitle C of the Solid Waste Disposal Act for any necessary offsite storage, destruction, treatment, or secure disposition of the hazardous substances; and (C) the State will pay or assure payment of (i) 10 per centum of the costs of the remedial action, including all future maintenance, or (ii) at least 50 per centum or such greater amount as the President may determine appropriate, taking into account the degree of responsibility of the State or political subdivision, of any sums expended in response to a release at a facility that was owned at the time of any disposal of hazardous substances therein by the State or a political subdivision thereof. The President shall grant the State a credit against the share of the costs for which it is responsible under this paragraph for any documented direct out-of-pocket non-Federal funds expended or obligated by the State or a political subdivision thereof after January 1, 1973, and before the date of enactment of this Act for cost-eligible response actions and claims for damages compensable under section 111 of this title relating to the specific release in question: *Provided, however*, That in no event shall the amount of the credit granted exceed the total response costs relating to the release.

(4) The President shall select appropriate remedial actions determined to be necessary to carry out this section which are to the extent practicable in accordance with the national contingency plan and which provide for that cost-effective response which provides a balance between the need for protection of public health and welfare and the environment at the facility under consideration, and the availability of amounts from the Fund established under title II of this Act to respond to other sites which present or may present a threat to public health or welfare or the environment, taking into consideration the need for immediate action.

(d)(1) Where the President determines that a State or political subdivision thereof has the capability to carry out any or all of the actions authorized in this section, the President may, in his discretion, enter into a contract or cooperative agreement with such State or political subdivision to take such actions in accordance with criteria and priorities established pursuant to section 105(b) of this title and to be reimbursed for the reasonable response costs thereof

from the Fund. Any contract made hereunder shall be subject to the cost-sharing provisions of subsection (c) of this section.

(2) If the President enters into a cost-sharing agreement pursuant to subsection (c) of this section or a contract or cooperative agreement pursuant to this subsection, and the State or political subdivision thereof fails to comply with any requirements of the contract, the President may, after providing sixty days notice, seek in the appropriate Federal district court to enforce the contract or to recover any funds advanced or any costs incurred because of the breach of the contract by the State or political subdivision.

(3) Where a State or a political subdivision thereof is acting in behalf of the President, the President is authorized to provide technical and legal assistance in the administration and enforcement of any contract or subcontract in connection with response actions assisted under this title, and to intervene in any civil action involving the enforcement of such contract or subcontract.

(4) Where two or more noncontiguous facilities are reasonably related on the basis of geography, or on the basis of the threat, or potential threat to the public health or welfare or the environment, the President may, in his discretion, treat these related facilities as one for purposes of this section.

(e)(1) For purposes of assisting in determining the need for response to a release under this title or enforcing the provisions of this title, any person who stores, treats, or disposes of, or, where necessary to ascertain facts not available at the facility where such hazardous substances are located, who generates, transports, or otherwise handles or has handled, hazardous substances shall, upon request of any officer, employee, or representative of the President, duly designated by the President, or upon request of any duly designated officer, employee, or representative of a State, where appropriate, furnish information relating to such substances and permit such person at all reasonable times to have access to, and to copy all records relating to such substances. For the purposes specified in the preceding sentence, such officers, employees, or representatives are authorized—

(A) to enter at reasonable times any establishment or other place where such hazardous substances are or have been generated, stored, treated, or disposed of, or transported from;

(B) to inspect and obtain samples from any portion of any such substance and samples of any containers or labeling for such substances. Each such inspection shall be commenced and completed with reasonable promptness. If the officer, employee, or representative obtains any samples, prior to leaving the premises, he shall give to the owner, operator, or person in charge a receipt describing the sample obtained and if requested a portion of each such sample equal in volume of weight to the portion retained. If any analysis is made of such samples, a copy of the results of such analysis shall be furnished promptly to the owner, operator, or person in charge.

(2)(A) Any records, reports, or information obtained from any person under this section (including records, reports, or information obtained by representatives of the President) shall be available to the public, except that upon a showing satisfactory to the President (or the State, as the case may be) by any person that records, reports, or information, or particular part thereof (other than health or safety effects data), to which the President (or the State, as the case may be) or any officer, employee, or representative has access under this section if made public would divulge information entitled to protection under section 1905 of title 18 of the United States Code, such information or particular portion thereof shall be considered confidential in accordance with the purposes of that section, except that such record, report, document or information may be disclosed to other officers, employees, or authorized representatives of the United States concerned with carrying out this Act, or when relevant in any proceeding under this Act.

(B) Any person not subject to the provisions of section 1905 of title 18 of the United States Code who knowingly and willfully divulges or discloses any information entitled to protection under this subsection shall, upon conviction, be subject to a fine of not more than \$5,000 or to imprisonment not to exceed one year, or both.

(C) In submitting data under this Act, a person required to provide such data may (i) designate the data which such person believes is entitled to protection under this subsection and (ii) submit such designated data separately from other data submitted under this Act. A designation under this paragraph shall be made in writing and in such manner as the President may prescribe by regulation.

(D) Notwithstanding any limitation contained in this section or any other provision of law, all information reported to or otherwise obtained by the President (or any representative of the President) under this Act shall be made available, upon written request of any duly authorized committee of the Congress, to such committee.

(f) In awarding contracts to any person engaged in response actions, the President or the State, in any case where it is awarding contracts pursuant to a contract entered into under subsection (d) of this section, shall require compliance with Federal health and safety standards established under section 301(f) of this Act by contractors and subcontractors as a condition of such contracts.

(g)(1) All laborers and mechanics employed by contractors or subcontractors in the performance of construction, repair, or alteration work funded in whole or in part under this section shall be paid wages at rates not less than those prevailing on projects of a character similar in the locality as determined by the Secretary of Labor in accordance with the Davis-Bacon Act. The President shall not approve any such funding without first obtaining adequate assurance that required labor standards will be maintained upon the construction work.

(2) The Secretary of Labor shall have, with respect to the labor standards specified in paragraph (1), the authority and functions set forth in Reorganization Plan Numbered 14 of 1950 (15 F.R. 3176; 54 Stat. 1267) and section 276c of title 40 of the United States Code.

(b) Notwithstanding any other provision of law, subject to the provisions of section 111 of this Act, the President may authorize the use of such emergency procurement powers as he deems necessary to effect the purpose of this Act. Upon determination that such procedures are necessary, the President shall promulgate regulations prescribing the circumstances under which such authority shall be used and the procedures governing the use of such authority.

(i) There is hereby established within the Public Health Service an agency, to be known as the Agency for Toxic Substances and Disease Registry, which shall report directly to the Surgeon General of the United States. The Administrator of said Agency shall, with the cooperation of the Administrator of the Environmental Protection Agency, the Commissioner of the Food and Drug Administration, the Directors of the National Institute of Medicine, National Institute of Environmental Health Sciences, National Institute of Occupational Safety and Health, Centers for Disease Control, the Administrator of the Occupational Safety and Health Administration, and the Administrator of the Social Security Administration, effectuate and implement the health related authorities of this Act. In addition, said Administrator shall—

(1) in cooperation with the States, establish and maintain a national registry of serious diseases and illnesses and a national registry of persons exposed to toxic substances;

(2) establish and maintain inventory of literature, research, and studies on the health effects of toxic substances;

(3) in cooperation with the States, and other agencies of the Federal Government, establish and maintain a complete listing of areas closed to the public or otherwise restricted in use because of toxic substance contamination;

(4) in cases of public health emergencies caused or believed to be caused by exposure to toxic substances, provide medical care and testing to exposed individuals, including but not limited to tissue sampling, chromosomal testing, epidemiological studies, or any other assistance appropriate under the circumstances; and

(5) either independently or as part of other health status survey, conduct periodic survey and screening programs to determine relationships between exposure to toxic substances and illness. In cases of public health emergencies, exposed persons shall be eligible for admission to hospitals and other facilities and services operated or provided by the Public Health Service.

NATIONAL CONTINGENCY PLAN

Sec. 105. Within one hundred and eighty days after the enactment of this Act, the President shall, after notice and opportunity for public comments, revise and republish the national contingency plan for the removal of oil and hazardous substances, originally prepared and published pursuant to section 311 of the Federal Water Pollution Control Act, to reflect and effectuate the responsibilities and powers created by this Act, in addition to those matters specified in section 311(c)(2). Such revision shall include a section of the plan to be known as the national hazardous substance response plan which shall establish procedures and standards for responding to releases of hazardous substances, pollutants, and contaminants, which shall include at a minimum:

(1) methods for discovering and investigating facilities at which hazardous substances have been disposed of or otherwise come to be located;

(2) methods for evaluating, including analyses of relative cost, and remedying any releases or threats of releases from facilities

which pose substantial danger to the public health or the environment;

(3) methods and criteria for determining the appropriate extent of removal, remedy, and other measures authorized by this Act;

(4) appropriate roles and responsibilities for the Federal, State, and local governments and for interstate and nongovernmental entities in effectuating the plan;

(5) provision for identification, procurement, maintenance, and storage of response equipment and supplies;

(6) a method for and assignment of responsibility for reporting the existence of such facilities which may be located on federally owned or controlled properties and any releases of hazardous substances from such facilities;

(7) means of assuring that remedial action measures are cost-effective over the period of potential exposure to the hazardous substances or contaminated materials;

(8)(A) criteria for determining priorities among releases or threatened releases throughout the United States for the purpose of taking remedial action and, to the extent practicable, taking into account the potential urgency of such action, for the purpose of taking removal action. Criteria and priorities under this paragraph shall be based upon relative risk or danger to public health or welfare or the environment, in the judgment of the President, taking into account to the extent possible the population at risk, the hazard potential of the hazardous substances at such facilities, the potential for contamination of drinking water supplies, the potential for direct human contact, the potential for destruction of sensitive ecosystems, State preparedness to assume State costs and responsibilities, and other appropriate factors;

(B) based upon the criteria set forth in subparagraph (A) of this paragraph, the President shall list as part of the plan national priorities among the known releases or threatened releases throughout the United States and shall revise the list no less often than annually. Within one year after the date of enactment of this Act, and annually thereafter, each State shall establish and submit for consideration by the President priorities for remedial action among known releases and potential releases in that State based upon the criteria set forth in subparagraph (A) of this paragraph. In assembling or revising the national list, the President shall consider any priorities established by the States. To the extent practicable, at least four hundred of the highest priority facilities shall be designated individually and shall be referred to as the "top priority among known response targets" and, to the extent practicable, shall include among the one hundred highest priority facilities at least one such facility from each State which shall be the facility designated by the State as presenting the greatest danger to public health or welfare or the environment among the known facilities in such State. Other priority facilities or incidents may be listed singly or grouped for response priority purposes; and

(9) specified roles for private organizations and entities in preparation for response and in responding to releases of hazardous substances, including identification of appropriate qualifications and capacity therefor.

The plan shall specify procedures, techniques, materials, equipment, and methods to be employed in identifying, removing, or remedying releases of hazardous substances comparable to those required under section 311(c)(2)(F) and (G) and (H)(1) of the Federal Water Pollution Control Act. Following publication of the revised national contingency plan, the response to and actions to minimize damage from hazardous substances releases shall, to the greatest extent possible, be in accordance with the provisions of the plan. The President may, from time to time, revise and republish the national contingency plan.

ABATEMENT ACTION

Sec. 106. (a) In addition to any other action taken by a State or local government, when the President determines that there may be an imminent and substantial endangerment to the public health or welfare or the environment because of an actual or threatened release of a hazardous substance from a facility, he may require the Attorney General of the United States to secure such relief as may be necessary to abate such danger or threat, and the district court of the United States in the district in which the threat occurs shall have jurisdiction to grant such relief as the public interest and the equities of the case may require. The President may also, after notice to the affected State, take other action under this section including, but not

limited to, issuing such orders as may be necessary to protect public health and welfare and the environment.

(b) Any person who willfully violates, or fails or refuses to comply with, any order of the President under subsection (a) may, in an action brought in the appropriate United States district court to enforce such order, be fined not more than \$3,000 for each day in which such violation occurs or such failure to comply continues.

(c) Within one hundred and eighty days after enactment of this Act, the Administrator of the Environmental Protection Agency shall, after consultation with the Attorney General, establish and publish guidelines for using the imminent hazard, enforcement, and emergency response authorities of this section and other existing statutes administered by the Administrator of the Environmental Protection Agency to effectuate the responsibilities and powers created by this Act. Such guidelines shall to the extent practicable be consistent with the national hazardous substance response plan, and shall include, at a minimum, the assignment of responsibility for coordinating response actions with the issuance of administrative orders, enforcement of standards and permits, the gathering of information, and other imminent hazard and emergency powers authorized by (1) sections 311(c)(2), 308, 309, and 504(a) of the Federal Water Pollution Control Act, (2) sections 3007, 3008, 3013, and 7003 of the Solid Waste Disposal Act, (3) sections 1445 and 1451 of the Safe Drinking Water Act, (4) sections 113, 114, and 303 of the Clean Air Act, and (5) section 7 of the Toxic Substances Control Act.

LIABILITY

Sec. 107. (a) Notwithstanding any other provision or rule of law, and subject only to the defenses set forth in subsection (b) of this section—

(1) the owner and operator of a vessel (otherwise subject to the jurisdiction of the United States) or a facility,

(2) any person who at the time of disposal of any hazardous substance owned or operated any facility at which such hazardous substances were disposed of,

(3) any person who by contract, agreement, or otherwise arranged for disposal or treatment, or arranged with a transporter for transport for disposal or treatment, of hazardous substances owned or possessed by such person, by any other party or entity, at any facility owned or operated by another party or entity and containing such hazardous substances, and

(4) any person who accepts or accepted any hazardous substances for transport to disposal or treatment facilities or sites selected by such person, from which there is a release, or a threatened release which causes the incurrence of response costs, of a hazardous substance, shall be liable for—

(A) all costs of removal or remedial action incurred by the United States Government or a State not inconsistent with the national contingency plan;

(B) any other necessary costs of response incurred by any other person consistent with the national contingency plan; and

(C) damages for injury to, destruction of, or loss of natural resources, including the reasonable costs of assessing such injury, destruction, or loss resulting from such a release.

(b) There shall be no liability under subsection (a) of this section for a person otherwise liable who can establish by a preponderance of the evidence that the release or threat of release of a hazardous substance and the damages resulting therefrom were caused solely by—

(1) an act of God;

(2) an act of war;

(3) an act or omission of a third party other than an employee or agent of the defendant, or than one whose act or omission occurs in connection with a contractual relationship, existing directly or indirectly, with the defendant (except where the sole contractual arrangement arises from a published tariff and acceptance for carriage by a common carrier by rail, if the defendant establishes by a preponderance of the evidence that (a) he exercised due care with respect to the hazardous substance concerned, taking into consideration the characteristics of such hazardous substance, in light of all relevant facts and circumstances, and (b) he took precautions against foreseeable acts or omissions of any such third party and the consequences that could foreseeably result from such acts or omissions; or

(4) any combination of the foregoing paragraphs.

(c)(1) Except as provided in paragraph (2) of this subsection, the liability under this section of an owner or operator or other responsible person for each release of a hazardous substance or incident involving release of a hazardous substance shall not exceed—

(A) for any vessel which carries any hazardous substance as cargo or residue, \$300 per gross ton, or \$3,000,000, whichever is greater;

(B) for any other vessel, \$300 per gross ton, or \$500,000, whichever is greater;

(C) for any motor vehicle, aircraft, pipeline (as defined in the Hazardous Liquid Pipeline Safety Act of 1979), or rolling stock, \$50,000,000 or such lesser amount as the President shall establish by regulation, but in no event less than \$3,000,000 (or, for releases of hazardous substances as defined in section 101(14)(A) of this title into the navigable waters, \$3,000,000). Such regulations shall take into account the size, type, location, storage, and handling capacity and other matters relating to the likelihood of release in each such class and to the economic impact of such limits on each such class; or

(D) for any facility other than those specified in subparagraph (C) of this paragraph, the total of all costs of response plus \$50,000,000 for any damages under this title.

(2) Notwithstanding the limitations in paragraph (1) of this subsection, the liability of an owner or operator or other responsible person under this section shall be the full and total costs of response and damages, if (A) the release or threat of release of a hazardous substance was the result of willful misconduct or willful negligence within the privity or knowledge of such person, or (B) the primary cause of the release was a violation (within the privity or knowledge of such person) of applicable safety, construction, or operating standards or regulations; or (C) such person fails or refuses to provide all reasonable cooperation and assistance requested by a responsible public official in connection with response activities under the national contingency plan with respect to regulated carriers subject to the provisions of title 49 of the United States Code or vessels subject to the provisions of title 33 or 46 of the United States Code, subparagraph (A)(D) of this paragraph shall be deemed to refer to Federal standards or regulations.

(3) If any person who is liable for a release or threat of release of a hazardous substance fails without sufficient cause to properly provide removal or remedial action upon order of the President pursuant to section 104 or 106 of this Act, such person may be liable to the United States for punitive damages in an amount at least equal to, and not more than three times, the amount of any costs incurred by the Fund as a result of such failure to take proper action. The President is authorized to commence a civil action against any such person to recover the punitive damages, which shall be in addition to any costs recovered from such person pursuant to section 112(c) of this Act. Any moneys received by the United States pursuant to this subsection shall be deposited in the Fund.

(d) No person shall be liable under this title for damages as a result of actions taken or omitted in the course of rendering care, assistance, or advice in accordance with the national contingency plan or at the direction of an onscene coordinator appointed under such plan, with respect to an incident creating a danger to public health or welfare or the environment as a result of any release of a hazardous substance or the threat thereof. This subsection shall not preclude liability for damages as the result of gross negligence or intentional misconduct on the part of such person. For the purposes of the preceding sentence, reckless, willful, or wanton misconduct shall constitute gross negligence.

(e)(1) No indemnification, hold harmless, or similar agreement or conveyance shall be effective to transfer from the owner or operator of any vessel or facility or from any person who may be liable for a release or threat of release under this section, to any other person the liability imposed under this section. Nothing in this subsection shall bar any agreement to insure, hold harmless, or indemnify a party to such agreement for any liability under this section.

(2) Nothing in this title, including the provisions of paragraph (1) of this subsection, shall bar a cause of action that an owner or operator or any other person subject to liability under this section, or a guarantor, has or would have, by reason of subrogation or otherwise against any person.

(3) In the case of an injury to, destruction of, or loss of natural resources under subparagraph (C) of subsection (a) liability shall be to the United States Government and to any State for natural resources within the State or belonging to, managed by, controlled by, or appertaining to such State. Provided, However, That no liability to the United States or State shall be imposed under subparagraph (C) of subsection (a), where the party sought to be charged has demonstrated that the damages to natural resources complained of were specifically identified as an irreversible and irretrievable commitment of natural resources in an environmental impact statement, or other

comparable environment analysis, and the decision to grant a permit or license authorizes such commitment of natural resources, and the facility or project was otherwise operating within the terms of its permit or license. The President, or the authorized representative of any State, shall act on behalf of the public as trustee of such natural resources to recover for such damages. Sums recovered shall be available for use to restore, rehabilitate, or acquire the equivalent of such natural resources by the appropriate agencies of the Federal Government or the State government, but the measure of such damages shall not be limited by the sums which can be used to restore or replace such resources. There shall be no recovery under the authority of subparagraph (C) of subsection (a) where such damages and the release of a hazardous substance from which such damages resulted have occurred wholly before the enactment of this Act.

(g) Each department, agency, or instrumentality of the executive, legislative, and judicial branches of the Federal Government shall be subject to, and comply with, this Act in the same manner and to the same extent, both procedurally and substantively, as any nongovernmental entity, including liability under this section.

(h) The owner or operator of a vessel shall be liable in accordance with this section and as provided under section 114 of this Act notwithstanding any provision of the Act of March 3, 1851 (46 U.S.C. 1838).

(i) No person (including the United States or any State) may recover under the authority of this section for any response costs or damages resulting from the application of a pesticide product registered under the Federal Insecticide, Fungicide, and Rodenticide Act. Nothing in this paragraph shall affect or modify in any way the obligations or liability of any person under any other provision of State or Federal law, including common law, for damages, injury, or loss resulting from a release of any hazardous substance or for removal or remedial action or the costs of removal or remedial action of such hazardous substance.

(j) Recovery by any person (including the United States or any State) for response costs or damages resulting from a federally permitted release shall be pursuant to existing law in lieu of this section. Nothing in this paragraph shall affect or modify in any way the obligations or liability of any person under any other provision of State or Federal law, including common law, for damages, injury, or loss resulting from a release of any hazardous substance or for removal or remedial action or the costs of removal or remedial action of such hazardous substance. In addition, costs of response incurred by the Federal Government in connection with a discharge specified in section 101(10)(B) or (C) shall be recoverable in an action brought under section 309(b) of the Clean Water Act.

(k)(1) The liability established by this section or any other law for the owner or operator of a hazardous waste disposal facility which has received a permit under subtitle C of the Solid Waste Disposal Act, shall be transferred to and assumed by the Post-closure Liability Fund established by section 232 of this Act when—

(A) such facility and the owner and operator thereof has complied with the requirements of subtitle C of the Solid Waste Disposal Act and regulations issued thereunder, which may affect the performance of such facility after closure; and

(B) such facility has been closed in accordance with such regulations and the conditions of such permit, and such facility and the surrounding area have been monitored as required by such regulations and permit conditions for a period not to exceed five years after closure to demonstrate that there is no substantial likelihood that any migration offsite or release from confinement of any hazardous substance or other risk to public health or welfare will occur.

(2) Such transfer of liability shall be effective ninety days after the owner or operator of such facility notifies the Administrator of the Environmental Protection Agency (and the State where it has an authorized program under section 3006(b) of the Solid Waste Disposal Act) that the conditions imposed by this subsection have been satisfied. If within such ninety-day period the Administrator of the Environmental Protection Agency or such State determines that any such facility has not complied with all the conditions imposed by this subsection or that insufficient information has been provided to demonstrate such compliance, the Administrator or such State shall so notify the owner and operator of such facility and the administrator of the Fund established by section 232 of this Act, and the owner and operator of such facility shall continue to be liable with respect to such facility under this section and other law until such time as the Administrator and such State determines that such facility has complied with all conditions imposed by this subsection. A determination by the Administrator or such State that a facility has not complied with all conditions imposed by this subsection or that

insufficient information has been supplied to demonstrate compliance, shall be a final administrative action for purposes of judicial review. A request for additional information shall state in specific terms the data required.

(3) In addition to the assumption of liability of owners and operators under paragraph (1) of this subsection, the Post-closure Liability Fund established by section 232 of this Act may be used to pay costs of monitoring and care and maintenance of a site incurred by other persons after the period of monitoring required by regulations under subtitle C of the Solid Waste Disposal Act for hazardous waste disposal facilities meeting the conditions of paragraph (1) of this subsection.

(4)(A) Not later than one year after the date of enactment of this Act, the Secretary of the Treasury shall conduct a study and shall submit a report thereon to the Congress on the feasibility of establishing or qualifying an optional system of private insurance for post-closure financial responsibility for hazardous waste disposal facilities to which this subsection applies. Such study shall include a specification of adequate and realistic minimum standards to assure that any such privately placed insurance will carry out the purposes of this subsection in a reliable, enforceable, and practical manner. Such a study shall include an examination of the public and private incentives, programs, and actions necessary to make privately placed insurance a practical and effective option to the financing system for the Post-closure Liability Fund provided in title II of this Act.

(B) Not later than eighteen months after the date of enactment of this Act and after a public hearing, the President shall by rule determine whether or not it is feasible to establish or qualify an optional system of private insurance for post-closure financial responsibility for hazardous waste disposal facilities to which this subsection applies. If the President determines the establishment or qualification of such a system would be infeasible, he shall promptly publish an explanation of the reasons for such a determination. If the President determines the establishment or qualification of such a system would be feasible, he shall promptly publish notice of such determination. Not later than six months after an affirmative determination under the preceding sentence and after a public hearing, the President shall by rule promulgate adequate and realistic minimum standards which must be met by any such privately placed insurance, taking into account the purposes of this Act and this subsection. Such rules shall also specify reasonably expected procedures by which privately placed insurance plans can qualify as meeting such minimum standards.

(C) In the event any privately placed insurance plan qualifies under subparagraph (B), any person enrolled in, and complying with the terms of, such plan shall be excluded from the provisions of paragraphs (1), (2), and (3) of this subsection and exempt from the requirements to pay any tax or fee to the Post-closure Liability Fund under title II of this Act.

(D) The President may issue such rules and take such other actions as are necessary to effectuate the purposes of this paragraph.

FINANCIAL RESPONSIBILITY

SEC. 108. (a)(1) The owner or operator of each vessel (except a non-self-propelled barge that does not carry hazardous substances as cargo) over three hundred gross tons that uses any port or place in the United States or the navigable waters or any offshore facility, shall establish and maintain, in accordance with regulations promulgated by the President, evidence of financial responsibility of \$300 per gross ton (or for a vessel carrying hazardous substances as cargo, or \$5,000,000, whichever is greater). Financial responsibility may be established by any one, or any combination, of the following: insurance, guarantee, surety bond, or qualification as a self-insurer. Any bond filed shall be issued by a bonding company authorized to do business in the United States. In cases where an owner or operator owns, operates, or charters more than one vessel subject to this subsection, evidence of financial responsibility need be established only to meet the maximum liability applicable to the largest of such vessels.

(2) The Secretary of the Treasury shall withhold or revoke the clearance required by section 4197 of the Revised Statutes of the United States of any vessel subject to this subsection that does not have certification furnished by the President that the financial responsibility provisions of paragraph (1) of this subsection have been complied with.

(3) The Secretary of Transportation, in accordance with regulations issued by him, shall (A) deny entry to any port or place in the United States or navigable waters to, and (B) detain at the port or place in the United States from which it is about to depart for any other port

or place in the United States, any vessel subject to this subsection that, upon request, does not produce certification furnished by the President that the financial responsibility provisions of paragraph (1) of this subsection have been complied with.

(b)(1) Beginning not earlier than five years after the date of enactment of this Act, the President shall promulgate requirements (for facilities in addition to those under subtitle C of the Solid Waste Disposal Act and other Federal law) that classes of facilities establish and maintain evidence of financial responsibility consistent with the degree and duration of risk associated with the production, transportation, treatment, storage, or disposal of hazardous substances. Not later than three years after the date of enactment of the Act, the President shall identify those classes for which requirements will be first developed and publish notice of such identification in the Federal Register. Priority in the development of such requirements shall be accorded to those classes of facilities, owners, and operators which the President determines present the highest level of risk of injury.

(2) The level of financial responsibility shall be initially established, and, when necessary, adjusted to protect against the level of risk which the President in his discretion believes is appropriate based on the payment experience of the Fund, commercial insurers, courts settlements and judgments, and voluntary claims satisfaction. To the maximum extent practicable, the President shall cooperate with and seek the advice of the commercial insurance industry in developing financial responsibility requirements.

(3) Regulations promulgated under this subsection shall incrementally impose financial responsibility requirements over a period of not less than three and no more than six years after the date of promulgation. Where possible, the level of financial responsibility which the President believes appropriate as a final requirement shall be achieved through incremental, annual increases in the requirements.

(4) Where a facility is owned or operated by more than one person, evidence of financial responsibility covering the facility may be established and maintained by one of the owners or operators, or, in consolidated form, by or on behalf of two or more owners or operators. When evidence of financial responsibility is established in a consolidated form, the proportional share of each participant shall be shown. The evidence shall be accompanied by a statement authorizing the applicant to act for and in behalf of each participant in submitting and maintaining the evidence of financial responsibility.

(5) The requirements for evidence of financial responsibility for motor carriers covered by this Act shall be determined under section 30 of the Motor Carrier Act of 1980, Public Law 96-296.

(c) Any claim authorized by section 107 or 111 may be asserted directly against any guarantor providing evidence of financial responsibility as required under this section. In defending such a claim, the guarantor may invoke all rights and defenses which would be available to the owner or operator under this title. The guarantor may also invoke the defense that the incident was caused by the willful misconduct of the owner or operator, but such guarantor may not invoke any other defense that such guarantor might have been entitled to invoke in a proceeding brought by the owner or operator against him.

(d) Any guarantor acting in good faith against which claims under this Act are asserted as a guarantor shall be liable under section 107 or section 112(c) of this title only up to the monetary limits of the policy of insurance or indemnity contract such guarantor has undertaken or of the guaranty of other evidence of financial responsibility furnished under section 108 of this Act, and only to the extent that liability is not excluded by restrictive endorsement. Provided, That this subsection shall not alter the liability of any person under section 107 of this Act.

PENALTY

Sec. 109. Any person who, after notice and an opportunity for a hearing, is found to have failed to comply with the requirements of section 108, the regulations issued thereunder, or with any denial or detection order shall be liable to the United States for a civil penalty, not to exceed \$10,000 for each day of violation.

EMPLOYER PROTECTION

Sec. 110. (a) No person shall fire or in any other way discriminate against, or cause to be fired or discriminated against, any employee or any authorized representative of employees by reason of the fact that such employee or representative has provided information to a State or to the Federal Government, filed, instituted, or caused to be filed or instituted any proceeding under this Act, or has testified or is

about to testify in any proceeding resulting from the administration or enforcement of the provisions of this Act.

(b) Any employee or a representative of employees who believes that he has been fired or otherwise discriminated against by any person in violation of subsection (a) of this section may, within thirty days after such alleged violation occurs, apply to the Secretary of Labor for a review of such firing or alleged discrimination. A copy of the application shall be sent to such person, who shall be the respondent. Upon receipt of such application, the Secretary of Labor shall cause such investigation to be made as he deems appropriate. Such investigation shall provide an opportunity for a public hearing at the request of any party to such review to enable the parties to present information relating to such alleged violation. The parties shall be given written notice of the time and place of the hearing at least five days prior to the hearing. Any such hearing shall be of record and shall be subject to section 554 of title 5, United States Code. Upon receiving the report of such investigation, the Secretary of Labor shall make findings of fact. If he finds that such violation did occur, he shall issue a decision, incorporating an order thereon and his findings, requiring the party committing such violation to take such affirmative action to abate the violation as the Secretary of Labor deems appropriate, including, but not limited to, the rehiring or reinstatement of the employee or representative of employees to his former position with compensation. If he finds that there was no such violation, he shall issue an order denying the application. Such order issued by the Secretary of Labor under this subparagraph shall be subject to judicial review in the same manner as orders and decisions are subject to judicial review under this Act.

(c) Whenever an order is issued under this section to abate such violation, at the request of the applicant a sum equal to the aggregate amount of all costs and expenses (including the attorney's fees) determined by the Secretary of Labor to have been reasonably incurred by the applicant for, or in connection with, the institution and prosecution of such proceedings, shall be assessed against the person committing such violation.

(d) This section shall have no application to any employee who acting without discretion from his employer (or his agent) deliberately violates any requirement of this Act.

(e) The President shall conduct continuing evaluations of potential loss of shifts of employment which may result from the administration or enforcement of the provisions of this Act, including, where appropriate, investigating threatened plant closures or reductions in employment allegedly resulting from such administration or enforcement. Any employee who is discharged, or laid off, threatened with discharge or layoff, or otherwise discriminated against by any person because of the alleged results of such administration or enforcement, or any representative of such employee, may request the President to conduct a full investigation of the matter and, at the request of any party, shall hold public hearings, require the parties, including the employer involved, to present information relating to the actual or potential effect of such administration or enforcement on employment and any alleged discharge, layoff, or other discrimination, and the detailed reasons or justification therefore. Any such hearing shall be of record and shall be subject to section 554 of title 5, United States Code. Upon receiving the report of such investigation, the President shall make findings of fact as to the effect of such administration or enforcement on employment and on the alleged discharge, layoff, or discrimination and shall make such recommendations as he deems appropriate. Such report, findings, and recommendations shall be available to the public. Nothing in this subsection shall be construed to require or authorize the President or any State to modify or withdraw any action, standard, limitation, or any other requirement of this Act.

USE OF FUND

Sec. 111. (a) The President shall use the money in the Fund for the following purposes:

(1) payment of governmental response costs incurred pursuant to section 104 of this title, including costs incurred pursuant to the Intervention on the High Seas Act;

(2) payment of any claim for necessary response costs incurred by any other person as a result of carrying out the national contingency plan established under section 311(c) of the Clean Water Act and amended by section 106 of this title. Provided, However, That such costs must be approved under said plan and certified by the responsible Federal official;

(3) payment of any claim authorized by subsection (b) of this section and finally decided pursuant to section 112 of this title.

including those costs set out in subsection 112(c)(3) of this title; and

(4) payment of costs specified, under subsection (c) of this section.

The President shall not pay for any administrative costs or expenses out of the Fund unless such costs and expenses are reasonably necessary for and incidental to the implementation of this title.

(b) Claims asserted and compensable but unsatisfied under provisions of section 311 of the Clean Water Act, which are modified by section 304 of this Act may be asserted against the Fund under this title and other claims resulting from a release or threat of release of a hazardous substance from a vessel or a facility may be asserted against the Fund under this title for injury to, or destruction or loss of, natural resources, including cost for damage assessment. Provided, however, That any such claim may be asserted only by the President, as trustee, for natural resources over which the United States has sovereign rights, or natural resources within the territory or the fishery conservation zone of the United States to the extent they are managed or protected by the United States, or by any State for natural resources within the boundary of that State belonging to, managed by, controlled by, or appertaining to the State.

(c) Uses of the Fund under subsection (a) of this section include—

(1) the costs of assessing both short-term and long-term injury to, destruction of, or loss of any natural resources resulting from a release of a hazardous substance;

(2) the costs of Federal or State efforts in the restoration, rehabilitation, or replacement or acquiring the equivalent of any natural resources injured, destroyed, or lost as a result of a release of a hazardous substance;

(3) subject to such amounts as are provided in appropriation Acts, the costs of a program to identify, investigate, and take enforcement and abatement action against releases of hazardous substances;

(4) the costs of epidemiologic studies, development and maintenance of a registry of persons exposed to hazardous substances to allow long-term health effect studies, and diagnostic services not otherwise available to determine whether persons in populations exposed to hazardous substances in connection with a release or a suspected release are suffering from long-latency diseases;

(5) subject to such amounts as are provided in appropriation Acts, the costs of providing equipment and similar overhead, related to the purposes of this Act and section 311 of the Clean Water Act, and needed to supplement equipment and services available through contractors or other non-Federal entities, and of establishing and maintaining damage assessment capability, for any Federal agency involved in strike forces, emergency task forces, or other response teams under the national contingency plan; and

(6) subject to such amounts as are provided in appropriation Acts, the costs of a program to protect the health and safety of employees involved in response to hazardous substance releases. Such program shall be developed jointly by the Environmental Protection Agency, the Occupational Safety and Health Administration, and the National Institute for Occupational Safety and Health and shall include, but not be limited to, measures for identifying and assessing hazards to which persons engaged in removal, remedy, or other response to hazardous substances may be exposed, methods to protect workers from such hazards, and necessary regulatory and enforcement measures to assure adequate protection of such employees.

(d)(1) No money in the Fund may be used under subsection (c) (1) and (2) of this section, nor for the payment of any claim under subsection (b) of this section, where the injury, destruction, or loss of natural resources and the release of a hazardous substance from which such damages resulted have occurred wholly before the enactment of this Act.

(2) No money in the Fund may be used for the payment of any claim under subsection (b) of this section where such expenses are associated with injury or loss resulting from long-term exposure to ambient concentrations of air pollutants from multiple or diffuse sources.

(e)(1) Claims against or presented to the Fund shall not be valid or paid in excess of the total money in the Fund at any one time. Such claims become valid only when additional money is collected, appropriated, or otherwise added to the Fund. Should the total claims outstanding at any time exceed the current balance of the Fund, the President shall pay such claims, to the extent authorized under this section, in full in the order in which they were finally determined.

(2) In any fiscal year, 85 percent of the money credited to the Fund under title II of this Act shall be available only for the purposes specified in paragraphs (1), (2), and (4) of subsection (a) of this section.

(3) No money in the Fund shall be available for remedial action, other than actions specified in subsection (c) of this section, with respect to federally owned facilities.

(4) Paragraphs (1) and (4) of subsection (a) of this section shall in the aggregate be subject to such amounts as are provided in appropriation Acts.

(f) The President is authorized to promulgate regulations designating one or more Federal officials who may obligate money in the Fund in accordance with this section or portions thereof. The President is also authorized to delegate authority to obligate money in the Fund or to settle claims to officials of a State operating under a contract or cooperative agreement with the Federal Government pursuant to section 104(d) of this title.

(g) The President shall provide for the promulgation of rules and regulations with respect to the notice to be provided to potential injured parties by an owner and operator of any vessel, or facility from which a hazardous substance has been released. Such rules and regulations shall consider the scope and form of the notice which would be appropriate to carry out the purposes of this title. Upon promulgation of such rules and regulations, the owner and operator of any vessel or facility from which a hazardous substance has been released shall provide notice in accordance with such rules and regulations. With respect to releases from public vessels, the President shall provide such notification as is appropriate to potential injured parties. Until the promulgation of such rules and regulations, the owner and operator of any vessel or facility from which a hazardous substance has been released shall provide reasonable notice to potential injured parties by publication in local newspapers serving the affected area.

(h)(1) In accordance with regulations promulgated under section 301(c) of this Act, damages for injury to, destruction of, or loss of natural resources resulting from a release of a hazardous substance, for the purposes of this Act and section 311(f)(4) and (5) of the Federal Water Pollution Control Act, shall be assessed by Federal officials designated by the President under the national contingency plan published under section 105 of the Act, and such officials shall act for the President as trustee under this section and section 311(f)(5) of the Federal Water Pollution Control Act.

(2) Any determination or assessment of damages for injury to, destruction of, or loss of natural resources for the purposes of this Act and section 311(f)(4) and (5) of the Federal Water Pollution Control Act shall have the force and effect of a rebuttable presumption on behalf of any claimant involving a trustee under section 107 of this Act or a Federal agency in any judicial or adjudicatory administrative proceeding under this Act or section 311 of the Federal Water Pollution Control Act.

(i) Except in a situation requiring action to avoid an irreversible loss of natural resources or to prevent or reduce any continuing danger to natural resources or similar need for emergency action, funds may not be used under this Act for the restoration, rehabilitation, or replacement or acquisition of the equivalent of any natural resources until a plan for the use of such funds for such purposes has been developed and adopted by affected Federal agencies and the Governor or Governors of any State having sustained damage to natural resources within its borders, belonging to, managed by or appertaining to such State, after adequate public notice and opportunity for hearing and consideration of all public comment.

(j) The President shall use the money in the Post-closure Liability Fund for any of the purposes specified in subsection (a) of this section with respect to a hazardous waste disposal facility for which liability has transferred to such fund under section 107(k) of this Act, and, in addition, for payment of any claim or appropriate request for costs of response, damages, or other compensation for injury or loss under section 107 of this Act or any other State or Federal law, resulting from a release of a hazardous substance from such a facility.

(k) The Inspector General of each department or agency to which responsibility to obligate money in the Fund is delegated shall provide an audit review team to audit all payments, obligations, reimbursements, or other uses of the Fund, to assure that the Fund is being properly administered and that claims are being appropriately and expeditiously considered. Each such Inspector General shall submit to the Congress an interim report one year after the establishment of the Fund and a final report two years after the establishment of the Fund. Each such Inspector General shall thereafter provide such auditing of the Fund as is appropriate. Each Federal agency shall cooperate with the Inspector General in carrying out this subsection.

(D) To the extent that the provisions of this Act permit, a foreign claimant may assert a claim to the same extent that a United States claimant may assert a claim if—

- (1) the release of a hazardous substance occurred (A) in the navigable waters or (B) in or on the territorial sea or adjacent shoreline of a foreign country of which the claimant is a resident;
- (2) the claimant is not otherwise compensated for his loss;
- (3) the hazardous substance was released from a facility or from a vessel located adjacent to or within the navigable waters or was discharged in connection with activities conducted under the Outer Continental Shelf Lands Act, as amended (43 U.S.C. 1331 et seq.) or the Deepwater Port Act of 1974, as amended (33 U.S.C. 1501 et seq.); and

(4) recovery is authorized by a treaty or an executive agreement between the United States and foreign country involved, or if the Secretary of State, in consultation with the Attorney General and other appropriate officials, certifies that such country provides a comparable remedy for United States claimants.

CLAIMS PROCEDURE

Sec. 112. (a) All claims which may be asserted against the Fund pursuant to section 111 of this title shall be presented in the first instance to the owner, operator, or guarantor of the vessel or facility from which a hazardous substance has been released, if known to the claimant, and to any other person known to the claimant who may be liable under section 107 of this title. In any case where the claim has not been satisfied within sixty days of presentation in accordance with this subsection, the claimant may elect to commence an action in court against such owner, operator, guarantor, or other person or to present the claim to the Fund for payment.

(b)(1) The President shall prescribe appropriate forms and procedures for claims filed hereunder, which shall include a provision requiring the claimant to make a sworn verification of the claim to the best of his knowledge. Any person who knowingly gives or causes to be given any false information as a part of any such claim shall, upon conviction, be fined up to \$5,000 or imprisoned for not more than one year, or both.

(2)(A) Upon receipt of any claim, the President shall as soon as practicable inform any known affected parties of the claim and shall attempt to promote and arrange a settlement between the claimant and any person who may be liable. If the claimant and alleged liable party or parties can agree upon a settlement, it shall be final and binding upon the parties thereto, who will be deemed to have waived all recourse against the Fund.

(B) Where a liable party is unknown or cannot be determined, the claimant and the President shall attempt to arrange settlement of any claim against the Fund. The President is authorized to award and make payment of such a settlement, subject to such proof and procedures as he may promulgate by regulation.

(C) Except as provided in subparagraph (D) of this paragraph, the President shall use the facilities and services of private insurance and claims adjusting organizations or State agencies in implementing this subsection and may contract to pay compensation for those facilities and services. Any contract made under the provisions of this paragraph may be made without regard to the provisions of section 3709 of the Revised Statutes, as amended (41 U.S.C. 5), upon a showing by the President that advertising is not reasonably practicable. When the services of a State agency are used hereunder, no payment may be made on a claim asserted on behalf of that State or any of its agencies or subdivisions unless the payment has been approved by the President.

(D) To the extent necessitated by extraordinary circumstances, where the services of such private organizations or State agencies are inadequate, the President may use Federal personnel to implement this subsection.

(3) If no settlement is reached within forty-five days of filing of a claim through negotiation pursuant to this section, the President may, if he is satisfied that the information developed during the processing of the claim warrants it, make and pay an award of the claim. If the claimant is dissatisfied with the award, he may appeal it in the manner provided for in subparagraph (G) of paragraph (4) of this subsection. If the President declines to make an award, he shall submit the claim for decision to a member of the Board of Arbitrators established pursuant to paragraph (4).

(4)(A) Within ninety days of the enactment of this Act, the President shall establish a Board of Arbitrators to implement this subsection. The Board shall consist of as many members as the President may determine will be necessary to implement this subsection expeditiously, and he may increase or decrease the size of the Board

at any time in his discretion in order to enable it to respond to the demands of such implementation. Each member of the Board shall be selected through utilization of the procedures of the American Arbitration Association: *Provided, however*, That no regular employee of the President or any of the Federal departments, administrations, or agencies to whom he delegated responsibilities under this Act shall act as a member of the Board.

(B) Hearings conducted hereunder shall be public and shall be held in such place as may be agreed upon by the parties thereto, or, in the absence of such agreement, in such place as the President determines, in his discretion, will be most convenient for the parties thereto.

(C) Hearings before a member of the Board shall be informal, and the rules of evidence prevailing in judicial proceedings need not be required. Each member of the Board shall have the power to administer oaths and to subpoena the attendance and testimony of witnesses and the production of books, records, and other evidence relative or pertinent to the issues presented to him for decision. Testimony may be taken by interrogatory or deposition. Each person appearing before a member of the Board shall have the right to counsel. Subpoenas shall be issued and enforced in accordance with procedures in subsection (d) of section 555 of title 5, United States Code, and rules promulgated by the President. If a person fails or refuses to obey a subpoena, the President may invoke the aid of the district court of the United States where the person is found, resides, or transacts business in requiring the attendance and testimony of the person and the production by him of books, papers, documents, or any tangible things.

(D) In any proceeding before a member of the Board, the claimant shall bear the burden of proving his claim. Should a member of the Board determine that further investigations, monitoring, surveys, testing, or other information gathering would be useful and necessary in deciding the claim, he may request the President in writing to undertake such activities pursuant to section 104(b) of this title. The President shall dispose of such a request in his sole discretion, taking into account various competing demands and the availability of the technical and financial capacity to conduct such studies, monitoring, and investigations. Should the President decide to undertake the requested actions, all time requirements for the processing and deciding of claims hereunder shall be suspended until the President reports the results thereof to the member of the Board.

(E) All costs and expenses approved by the President attributable to the employment of any member of the Board shall be payable from the Fund, including fees and mileage expenses for witnesses summoned by such members on the same basis and to the same extent as if such witnesses were summoned before a district court of the United States.

(F) All decisions rendered by members of the Board shall be in writing, with notification to all appropriate parties, and shall be rendered within ninety days of submission of a claim to a member, unless all the parties to the claim agree in writing to an extension or unless the President extends the time limit pursuant to subparagraph (D) of this subsection.

(G) All decisions rendered by members of the Board shall be final, and any party to the proceeding may appeal such a decision within thirty days of notification of the award or decision. Any such appeal shall be made to the Federal district court for the district where the arbitral hearing took place. In any such appeal, the award or decision of the member of the Board shall be considered binding and conclusive, and shall not be overturned except for arbitrary or capricious abuse of the member's discretion: *Provided, however*, That no such award or decision shall be admissible as evidence of any issue of fact or law in any proceeding brought under any other provision of this Act or under any other provision of law. Nor shall any prearbitral settlement reached pursuant to subsection (b)(2)(A) of this section be admissible as evidence in any such proceeding.

(H) Within twenty days of the expiration of the appeal period for any arbitral award or decision, or within twenty days of the final judicial determination of any appeal taken pursuant to this subsection, the President shall pay any such award from the Fund. The President shall determine the method, terms, and time of payment.

(I) If at any time the President determines that, because of a large number of claims arising from any incident or set of incidents, it is in the best interests of the parties concerned, he may extend the time for prearbitral negotiation or for rendering an arbitral decision pursuant to this subsection by a period not to exceed sixty days. He may also group such claims for submission to a member of the Board of Arbitrators.

(c)(1) Payment of any claim by the Fund under this section shall be subject to the United States Government acquiring by subrogation

the rights of the claimant to recover those costs of removal or damages for which it has compensated the claimant from the person responsible or liable for such release.

(2) Any person, including the Fund, who pays compensation pursuant to this Act to any claimant for damages or costs resulting from a release of a hazardous substance shall be subrogated to all rights, claims, and causes of action for such damages and costs of removal that the claimant has under this Act or any other law.

(3) Upon request of the President, the Attorney General shall commence an action on behalf of the Fund to recover any compensation paid by the Fund to any claimant pursuant to this title, and, without regard to any limitation of liability, all interest, administrative and adjudicative costs, and attorney's fees incurred by the Fund by reason of the claim. Such an action may be commenced against any owner, operator, or guarantor, or against any other person who is liable, pursuant to any law, to the compensated claimant or to the Fund, for the damages or costs for which compensation was paid.

(d) No claim may be presented, nor may an action be commenced for damages under this title, unless that claim is presented or action commenced within three years from the date of the discovery of the loss or the date of enactment of this Act, whichever is later. *Provided, However, That the time limitations contained herein shall not begin to run against a minor until he reaches eighteen years of age or a legal representative is duly appointed for him, nor against an incompetent person until his incompetency ends or a legal representative is duly appointed for him.*

(e) Regardless of any State statutory or common law to the contrary, no person who asserts a claim against the Fund pursuant to this title shall be deemed or held to have waived any other claim not covered or assertable against the Fund under this title arising from the same incident, transaction, or set of circumstances, nor to have split a cause of action. Further, no person asserting a claim against the Fund pursuant to this title shall as a result of any determination of a question of fact or law made in connection with that claim be deemed or held to be collaterally estopped from raising such question in connection with any other claim not covered or assertable against the Fund under this title arising from the same incident, transaction, or set of circumstances.

LITIGATION, JURISDICTION AND VENUE

Sec. 413. (a) Review of any regulation promulgated under this Act may be had upon application by any interested person only in the Circuit Court of Appeals of the United States for the District of Columbia. Any such application shall be made within ninety days from the date of promulgation of such regulations. Any matter with respect to which review could have been obtained under this subsection shall not be subject to judicial review in any civil or criminal proceeding for enforcement or to obtain damages or recovery of response costs.

(b) Except as provided in subsection (a) of this section, the United States district courts shall have exclusive original jurisdiction over all controversies arising under this Act, without regard to the citizenship of the parties or the amount in controversy. Venue shall lie in any district in which the release or damages occurred, or in which the defendant resides, may be found, or has his principal office. For the purposes of this section, the Fund shall reside in the District of Columbia.

(c) The provisions of subsections (a) and (b) of this section shall not apply to any controversy or other matter resulting from the assessment of collection of any tax, as provided by title II of this Act, or to the review of any regulation promulgated under the Internal Revenue Code of 1954.

(d) No provision of this Act shall be deemed or held to moot any litigation concerning any release of any hazardous substance, or any damages associated therewith, commenced prior to enactment of this Act.

RELATIONSHIP TO OTHER LAW

Sec. 114. (a) Nothing in this Act shall be construed or interpreted as preempting any State from imposing any additional liability or requirements with respect to the release of hazardous substances within such State.

(b) Any person who receives compensation for removal costs or damages or claims pursuant to this Act shall be precluded from recovering compensation for the same removal costs or damages or claims pursuant to any other State or Federal law. Any person who receives compensation for removal costs or damages or claims pursuant to any other Federal or State law shall be precluded from

receiving compensation for the same removal costs or damages or claims as provided in this Act.

(c) Except as provided in this Act, no person may be required to contribute to any fund, the purpose of which is to pay compensation for claims for any costs of response or damages or claims which may be compensated under this title. Nothing in this section shall preclude any State from using general revenues for such a fund, or from imposing a tax or fee upon any person or upon any substance in order to finance the purchase or prepositioning of hazardous substance response equipment or other preparations for the response to a release of hazardous substances which affects such State.

(d) Except as provided in this title, no owner or operator of a vessel or facility who establishes and maintains evidence of financial responsibility in accordance with this title shall be required under any State or local law, rule, or regulation to establish or maintain any other evidence of financial responsibility in connection with liability for the release of a hazardous substance from such vessel or facility. Evidence of compliance with the financial responsibility requirements of this title shall be accepted by a State in lieu of any other requirement of financial responsibility imposed by such State in connection with liability for the release of a hazardous substance from such vessel or facility.

AUTHORITY TO DELEGATE, ISSUE REGULATIONS

Sec. 115. The President is authorized to delegate and assign any duties or powers imposed upon or assigned to him and to promulgate any regulations necessary to carry out the provisions of this title.

TITLE II—HAZARDOUS SUBSTANCE RESPONSE REVENUE ACT OF 1980

SEC. 201. SHORT TITLE; AMENDMENT OF 1954 CODE.

(a) **SHORT TITLE.**—This title may be cited as the "Hazardous Substance Response Revenue Act of 1980".

(b) **AMENDMENT OF 1954 CODE.**—Except as otherwise expressly provided, whenever in this title an amendment or repeal is expressed in terms of an amendment to, or repeal of, a section or other provision, the reference shall be considered to be made to a section or other provision of the Internal Revenue Code of 1954.

Subtitle A—Imposition of Taxes on Petroleum and Certain Chemicals

SEC. 211. IMPOSITION OF TAXES.

(a) **GENERAL RULE.**—Subtitle D (relating to miscellaneous excise taxes) is amended by inserting after chapter 37 the following new chapter:

"CHAPTER 38—ENVIRONMENTAL TAXES

"Subchapter A. Tax on petroleum.
"Subchapter B. Tax on certain chemicals.

"Subchapter A—Tax on Petroleum

"Sec. 4611. Imposition of tax.
"Sec. 4612. Deviations and special rules.

"SEC. 4611. IMPOSITION OF TAX.

"(a) **GENERAL RULE.**—There is hereby imposed a tax of 0.79 cent a barrel on—

"(1) crude oil received at a United States refinery, and
"(2) petroleum products entered into the United States for consumption, use, or warehousing.

"(b) **TAX ON CERTAIN USES AND EXPORTATION.**—

"(1) **IN GENERAL.**—If—

"(A) any domestic crude oil is used in or exported from the United States, and

"(B) before such use or exportation, no tax was imposed on such crude oil under subsection (a),
then a tax of 0.79 cent a barrel is hereby imposed on such crude oil.

"(2) **EXCEPTION FOR USE ON PREMISES WHERE PRODUCED.**—Paragraph (1) shall not apply to any use of crude oil for extracting oil

1114639

(c) PERSONS LIABLE FOR TAX.—

(d) **TERMINATION.**—The taxes imposed by this section shall not apply after September 30, 1985, except that if on September 30, 1983, or September 30, 1984—

the Environmental Protection Agency, which shall be set unobligated balance will exceed \$500,000,000 on September 30 of the following year if no tax is imposed under section 4611 or 4612 during the calendar year following the date referred to above, then no tax shall be imposed by this section during the first calendar year beginning after the date referred to in paragraph (1).

SEC. 402. DEFINITIONS AND SPECIAL RULES.

(3) **PETROLEUM PRODUCT.**—The term 'petroleum product' includes crude oil.

(c) **DEPOSITION OF REVENUES FROM PUERTO RICO AND THE VIRGIN ISLANDS.**—The provisions of subsections (a)(3) and (b)(3) of section 7552 shall not apply to any tax imposed by section 4611.

***Sec. 4001. Imposition of tax.**
***Sec. 4002. Definitions and special rules.**

THE AML DEPOSITION OF TAJ

"(b) AMOUNT OF TAX.—The amount of the tax imposed by subsection (a) shall be determined in accordance with the following table:

"In the case of	The unit is the following amount per ton	\$U.S.
Arsenious _____		4.87
Bismuth _____		4.87
Cadmium _____		4.87
Cerite _____		4.57
Chalcocite _____		4.57
Dibasic _____		4.57
Manganese _____		3.64
Nephthalene _____		4.37
Propylene _____		4.37
Tellurium _____		4.37
Zinc _____		4.37
Ammonia _____		2.84
Antimony _____		4.37
Antimony trioxide _____		2.75
Arsenic _____		2.41
Arsenic trioxide _____		2.90
Barium sulfide _____		4.45
Bromine _____		4.45
Cadmium _____		2.70
Chlorine _____		4.44
Cyanide _____		1.50
Potassium dichromate _____		1.50
Sodium dichromate _____		1.50
Cobalt _____		4.45
Copper sulfate _____		1.50
Copper oxide _____		2.84
Copper oxide _____		3.59
Hydrochloric acid _____		0.75
Hydrogen fluoride _____		4.50
Iodine oxide _____		4.44
Magnesium _____		4.44
Nickel _____		4.44
Phosphorus _____		2.84
Stannous chloride _____		2.11
Stannous chloride _____		2.25
Zinc chloride _____		1.30
Zinc sulfate _____		1.30
Potassium hydroxide _____		0.12
Sodium hydroxide _____		0.12
Sulfuric acid _____		0.20
Sulfuric acid _____		3.00

"(c) **TERMINATION.**—No tax shall be imposed under this section during any period during which no tax is imposed under section 4611(a).

SEC. 1402. DEFINITIONS AND SPECIAL RULES.

(iii) sold for use by the purchaser in a qualified use, or

"(C) QUALIFIED USE.—For purposes of this subsection, the term 'qualified use' means any use in the manufacture or production of a fertilizer.

"(3) SULFURIC ACID PRODUCED AS A BYPRODUCT OF AIR POLLUTION CONTROL.—In the case of sulfuric acid produced solely as a byproduct of and on the same site as air pollution control equipment, no tax shall be imposed under section 4661.

"(4) SUBSTANCES DERIVED FROM COAL.—For purposes of this subchapter, the term 'taxable chemical' shall not include any substance to the extent derived from coal.

"(c) USE BY MANUFACTURER, ETC., CONSIDERED SALE.—If any person manufactures, produces, or imports a taxable chemical and uses such chemical, then such person shall be liable for tax under section 4661 in the same manner as if such chemical were sold by such person.

"(d) REFUND OR CREDIT FOR CERTAIN USES.—

"(1) IN GENERAL.—Under regulations prescribed by the Secretary, if—

"(A) a tax under section 4661 was paid with respect to any taxable chemical, and

"(B) such chemical was used by any person in the manufacture or production of any other substance the sale of which by such person would be taxable under such section, then an amount equal to the tax so paid shall be allowed as a credit or refund (without interest) to such person in the same manner as if it were an overpayment of tax imposed by such section. In any case to which this paragraph applies, the amount of any such credit or refund shall not exceed the amount of tax imposed by such section on the other substance manufactured or produced.

"(2) USE AS FERTILIZER.—Under regulations prescribed by the Secretary, if—

"(A) a tax under section 4661 was paid with respect to nitric acid, sulfuric acid, ammonia, or methane used to make ammonia without regard to subsection (b)(2), and

"(B) any person uses such substance, or sells such substance for use, as a qualified substance,

then an amount equal to the excess of the tax so paid over the tax determined with regard to subsection (b)(2) shall be allowed as a credit or refund (without interest) to such person in the same manner as if it were an overpayment of tax imposed by this section.

"(e) DISPOSITION OF REVENUES FROM PUERTO RICO AND THE VIRGIN ISLANDS.—The provisions of subsections (a)(3) and (b)(3) of section 7652 shall not apply to any tax imposed by section 4661."

"(b) CLERICAL AMENDMENT.—The table of chapters for subtitle D is amended by inserting after the item relating to chapter 37 the following new item:

"CHAPTER 38. Environmental taxes."

"(c) EFFECTIVE DATE.—The amendments made by this section shall take effect on April 1, 1981.

Subtitle B—Establishment of Hazardous Substance Response Trust Fund

SEC. 221. ESTABLISHMENT OF HAZARDOUS SUBSTANCE RESPONSE TRUST FUND.

"(a) CREATION OF TRUST FUND.—There is established in the Treasury of the United States a trust fund to be known as the "Hazardous Substance Response Trust Fund" (hereinafter in this subtitle referred to as the "Response Trust Fund"), consisting of such amounts as may be appropriated or transferred to such Trust Fund as provided in this section.

"(b) TRANSFERS TO RESPONSE TRUST FUND.—

"(1) AMOUNTS EQUIVALENT TO CERTAIN TAXES, ETC.—There are hereby appropriated, out of any money in the Treasury not otherwise appropriated, to the Response Trust Fund amounts determined by the Secretary of the Treasury (hereinafter in this subtitle referred to as the "Secretary") to be equivalent to—

"(A) the amounts received in the Treasury under section 4611 or 4661 of the Internal Revenue Code of 1964,

"(B) the amounts recovered on behalf of the Response Trust Fund under this Act,

"(C) all moneys recovered or collected under section 311(b)(6)(B) of the Clean Water Act,

"(D) penalties assessed under title I of this Act, and

"(E) punitive damages under section 107(c)(8) of this Act.

"(2) AUTHORIZATION FOR APPROPRIATIONS.—There is authorized to be appropriated to the Emergency Response Trust Fund for fiscal year—

"(A) 1981, \$44,000,000,

"(B) 1982, \$44,000,000,

"(C) 1983, \$44,000,000,

"(D) 1984, \$44,000,000, and

"(E) 1985, \$44,000,000, plus an amount equal to so much of the aggregate amount authorized to be appropriated under subparagraphs (A), (B), (C), and (D) as has not been appropriated before October 1, 1984.

"(3) TRANSFER OF FUNDS.—There shall be transferred to the Response Trust Fund—

"(A) one-half of the unobligated balance remaining before the date of the enactment of this Act under the fund in section 311 of the Clean Water Act, and

"(B) the amounts appropriated under section 504(b) of the Clean Water Act during any fiscal year.

"(c) EXPENDITURES FROM RESPONSE TRUST FUND.—

"(1) IN GENERAL.—Amounts in the Response Trust Fund shall be available in connection with releases or threats of releases of hazardous substances into the environment only for purposes of making expenditures which are described in section 111 (other than subsection (j) thereof) of this Act, as in effect on the date of the enactment of this Act, including—

"(A) response costs,

"(B) claims asserted and compensable but unsatisfied under section 311 of the Clean Water Act,

"(C) claims for injury to, or destruction or loss of, natural resources, and

"(D) related costs described in section 111(c) of this Act.

"(2) LIMITATIONS ON EXPENDITURES.—At least 55 percent of the amounts appropriated to the Response Trust Fund under subsection (b)(1)(A) and (2) shall be reserved—

"(A) for the purposes specified in paragraphs (1), (2), and (4) of section 111(a) of this Act, and

"(B) for the repayment of advances made under section 223(c), other than advances subject to the limitation of section 223(c)(2)(C).

SEC. 222. LIABILITY OF UNITED STATES LIMITED TO AMOUNT IN TRUST FUND.

"(a) GENERAL RULE.—Any claim filed against the Response Trust Fund may be paid only out of such Trust Fund. Nothing in this Act or in any amendment made by this Act shall authorize the payment by the United States Government of any additional amount with respect to any such claim out of any source other than the Response Trust Fund.

"(b) ORDER IN WHICH UNPAID CLAIMS ARE TO BE PAID.—If at any time the Response Trust Fund is unable (by reason of subsection (a) or the limitation of section 221(c)(2)) to pay all of the claims payable out of such Trust Fund at such time, such claims shall, to the extent permitted under subsection (a), be paid in full in the order in which they were finally determined.

SEC. 223. ADMINISTRATIVE PROVISIONS.

"(a) METHOD OF TRANSFER.—The amounts appropriated by section 221(b)(1) shall be transferred at least monthly from the general fund of the Treasury to the Response Trust Fund on the basis of estimates made by the Secretary of the amounts referred to in such section. Proper adjustments shall be made in the amount subsequently transferred to the extent prior estimates were in excess of or less than the amounts required to be transferred.

"(b) MANAGEMENT OF TRUST FUND.—

"(1) REPORT.—The Secretary shall be the trustee of the Response Trust Fund, and shall report to the Congress for each fiscal year ending on or after September 30, 1981, on the financial condition and the results of the operations of such Trust Fund during such fiscal year and on its expected condition and operations during the next 5 fiscal years. Such report shall be printed as a House document of the session of the Congress to which the report is made.

"(2) INVESTMENT.—It shall be the duty of the Secretary to invest such portion of such Trust Fund as is not, in his judgment, required to meet current withdrawals. Such investments shall be in public debt securities with maturities suitable for the needs of such Trust Fund and bearing interest at rates determined by the Secretary, taking into consideration current market yields on outstanding marketable obligations of the United States or

comparable maturities. The income on such investments shall be credited to and form a part of such Trust Fund.

(c) AUTHORITY TO BORROW.—

(1) IN GENERAL.—There are authorized to be appropriated to the Response Trust Fund, as repayable advances, such sums as may be necessary to carry out the purposes of such Trust Fund.

(2) LIMITATIONS ON ADVANCES TO RESPONSE TRUST FUND.—

(A) AGGREGATE ADVANCES.—The maximum aggregate amount of repayable advances to the Response Trust Fund which is outstanding at any one time shall not exceed an amount which the Secretary estimates will be equal to the sum of the amounts which will be appropriated or transferred to such Trust Fund under paragraph (1)(A) of section 221(b) of this Act for the following 12 months, and

(B) ADVANCES FOR PAYMENT OF RESPONSE COSTS.—No amount may be advanced after March 31, 1963, to the Response Trust Fund for the purpose of paying response costs described in section 111(a) (1), (2), or (4), unless such costs are incurred incident to any spill the effects of which the Secretary determines to be catastrophic.

(C) ADVANCES FOR OTHER COSTS.—The maximum aggregate amount advanced to the Response Trust Fund which is outstanding at any one time for the purpose of paying costs other than costs described in section 111(a) (1), (2), or (4) shall not exceed one-third of the amount of the estimate made under subparagraph (A).

(D) FINAL REPAYMENT.—No advance shall be made to the Response Trust Fund after September 30, 1965, and all advances to such Fund shall be repaid on or before such date.

(3) REPAYMENT OF ADVANCES.—Advances made pursuant to this subsection shall be repaid, and interest on such advances shall be paid, to the general fund of the Treasury when the Secretary determines that moneys are available for such purposes in the Trust Fund to which the advance was made. Such interest shall be at rates computed in the same manner as provided in subsection (b) and shall be compounded annually.

Subtitle C—Post-Closure Tax and Trust Fund

SEC. 231. DEPOSITION OF TAX.

(a) IN GENERAL.—Chapter 38, as added by section 211, is amended by adding at the end thereof the following new subchapter:

"Subchapter C—Tax on Hazardous Wastes

"Sec. 4681. Imposition of tax.
"Sec. 4682. Definitions and special rules.

"SEC. 4681. DEPOSITION OF TAX.

"(a) GENERAL RULE.—There is hereby imposed a tax on the receipt of hazardous waste at a qualified hazardous waste disposal facility.

"(b) AMOUNT OF TAX.—The amount of the tax imposed by subsection (a) shall be equal to \$2.13 per dry weight ton of hazardous waste.

"SEC. 4682. DEFINITIONS AND SPECIAL RULES.

"(a) DEFINITIONS.—For purposes of this subchapter—

"(1) HAZARDOUS WASTE.—The term 'hazardous waste' means any waste—

"(A) having the characteristics identified under section 3001 of the Solid Waste Disposal Act, as in effect on the date of the enactment of this Act (other than waste the regulation of which under such Act has been suspended by Act of Congress on that date), or

"(B) subject to the reporting or recordkeeping requirements of sections 3002 and 3004 of such Act, as so in effect.

"(2) QUALIFIED HAZARDOUS WASTE DISPOSAL FACILITY.—The term 'qualified hazardous waste disposal facility' means any facility which has received a permit or is accorded interim status under section 3005 of the Solid Waste Disposal Act.

"(b) TAX IMPOSED ON OWNER OR OPERATOR.—The tax imposed by section 4681 shall be imposed on the owner or operator of the qualified hazardous waste disposal facility.

"(c) TAX NOT TO APPLY TO CERTAIN WASTES.—The tax imposed by section 4681 shall not apply to any hazardous waste which will not remain at the qualified hazardous waste disposal facility after the facility is closed.

"(d) APPLICABILITY OF SECTION.—The tax imposed by section 4681 shall apply to the receipt of hazardous waste after September 30, 1963, except that if, as of September 30 of any subsequent calendar year, the unobligated balance of the Post-closure Liability Trust Fund exceeds \$200,000,000, no tax shall be imposed under such section during the following calendar year."

"(b) CONFORMATIVE AMENDMENT.—The table of subchapters for chapter 38 is amended by adding at the end thereof the following new item:

"Subchapter C—Tax on Hazardous Wastes."

SEC. 232. POST-CLOSURE LIABILITY TRUST FUND.

(a) CREATION OF TRUST FUND.—There is established in the Treasury of the United States a trust fund to be known as the "Post-closure Liability Trust Fund", consisting of such amounts as may be appropriated, credited, or transferred to such Trust Fund.

(b) EXPENDITURES FROM POST-CLOSURE LIABILITY TRUST FUND.—Amounts in the Post-closure Liability Trust Fund shall be available only for the purposes described in sections 107(k) and 111(d) of this Act (as in effect on the date of the enactment of this Act).

(c) ADMINISTRATIVE PROVISIONS.—The provisions of sections 222 and 223 of this Act shall apply with respect to the Trust Fund established under this section, except that the amount of any repayable advances outstanding at any one time shall not exceed \$200,000,000.

TITLE III—MISCELLANEOUS PROVISIONS

REPORTS AND STUDIES

Sec. 301. (a)(1) The President shall submit to the Congress, within four years after enactment of this Act, a comprehensive report on experience with the implementation of this Act, including, but not limited to—

(A) the extent to which the Act and Fund are effective in enabling Government to respond to and mitigate the effects of releases of hazardous substances;

(B) a summary of past receipts and disbursements from the Fund;

(C) a projection of any future funding needs remaining after the expiration of authority to collect taxes, and of the threat to public health, welfare, and the environment posed by the projected releases which create any such needs;

(D) the record and experience of the Fund in recovering Fund disbursements from liable parties;

(E) the record of State participation in the system of response, liability, and compensation established by this Act;

(F) the impact of the taxes imposed by title II of this Act on the Nation's balance of trade with other countries;

(G) an assessment of the feasibility and desirability of a schedule of taxes which would take into account one or more of the following: the likelihood of a release of a hazardous substance, the degree of hazard and risk of harm to public health, welfare, and the environment resulting from any such release, incentives to proper handling, recycling, incineration, and neutralization of hazardous wastes, and disincentives to improper or illegal handling or disposal of hazardous materials, administrative and reporting burdens on Government and industry, and the extent to which the tax burden falls on the substances and parties which create the problems addressed by this Act. In preparing the report, the President shall consult with appropriate Federal, State, and local agencies, affected industries and claimants, and such other interested parties as he may find useful. Based upon the analyses and consultation required by this subsection, the President shall also include in the report any recommendations for legislative changes he may deem necessary for the better effectuation of the purposes of this Act, including but not limited to recommendations concerning authorization levels, taxes, State participation, liability and liability limits, and financial responsibility provisions for the Response Trust Fund and the Post-closure Liability Trust Fund;

(H) an exemption from or an increase in the substances or the amount of taxes imposed by section 4681 of the Internal Revenue Code of 1954 for copper, lead, and zinc oxide, and for feedstocks when used in the manufacture and production of fertilizers, based upon the expenditure experience of the Response Trust Fund;

(I) the economic impact of taxing coal-derived substances and recycled metals.

(2) The Administrator of the Environmental Protection Agency (in consultation with the Secretary of the Treasury) shall submit to the Congress (i) within four years after enactment of this Act, a report identifying additional wastes designated by rule as hazardous after the effective date of this Act and pursuant to section 3001 of the Solid Waste Disposal Act and recommendations on appropriate tax rates for such wastes for the Post-closure Liability Trust Fund. The report shall, in addition, recommend a tax rate, considering the quantity and potential danger to human health and the environment posed by the disposal of any wastes which the Administrator, pursuant to subsection 3001(b)(2)(B) and subsection 3001(b)(3)(A) of the Solid Waste Disposal Act of 1980, has determined should be subject to regulation under subtitle C of such Act. (ii) within three years after enactment of this Act, a report on the necessity for and the adequacy of the revenue raised, in relation to estimated future requirements, of the Post-closure Liability Trust Fund.

(3) The President shall conduct a study to determine (1) whether adequate private insurance protection is available on reasonable terms and conditions to the owners and operators of vessels and facilities subject to liability under section 107 of this Act, and (2) whether the market for such insurance is sufficiently competitive to assure purchasers of features such as a reasonable range of deductibles, coinsurance provisions, and exclusions. The President shall submit the results of his study, together with his recommendations, within two years of the date of enactment of this Act, and shall submit an interim report on his study within one year of the date of enactment of this Act.

(c)(1) The President, acting through Federal officials designated by the National Contingency Plan published under section 105 of this Act, shall study and, not later than two years after the enactment of this Act, shall promulgate regulations for the assessment of damages for injury to, destruction of, or loss of natural resources resulting from a release of oil or a hazardous substance for the purposes of this Act and section 311(d) (4) and (5) of the Federal Water Pollution Control Act.

(2) Such regulations shall specify (A) standard procedures for simplified assessments requiring minimal field observation, including establishing measures of damages based on units of discharge or release or units of affected area, and (B) alternative protocols for conducting assessments in individual cases to determine the type and extent of short- and long-term injury, destruction, or loss. Such regulations shall identify the best available procedures to determine such damages, including both direct and indirect injury, destruction, or loss and shall take into consideration factors including, but not limited to, replacement value, use value, and ability of the ecosystem or resource to recover.

(3) Such regulations shall be reviewed and revised as appropriate every two years.

(d) The Administrator of the Environmental Protection Agency shall, in consultation with other Federal agencies and appropriate representatives of State and local governments and nongovernmental agencies, conduct a study and report to the Congress within two years of the date of enactment of this Act on the issues, alternatives, and policy considerations involved in the selection of locations for hazardous waste treatment, storage, and disposal facilities. This study shall include—

(A) an assessment of current and projected treatment, storage, and disposal capacity needs and shortfalls for hazardous waste by management category on a State-by-State basis;

(B) an evaluation of the appropriateness of a regional approach to siting and designing hazardous waste management facilities and the identification of hazardous waste management regions, interstate or intrastate, or both, with similar hazardous waste management needs;

(C) solicitation and analysis of proposals for the construction and operation of hazardous waste management facilities by nongovernmental entities, except that no proposal solicited under terms of this subsection shall be analyzed if it involves cost to the United States Government or fails to comply with the requirements of subtitle C of the Solid Waste Disposal Act and other applicable provisions of law;

(D) recommendations on the appropriate balance between public and private sector involvement in the siting, design, and operation of new hazardous waste management facilities;

(E) documentation of the major reasons for public opposition to new hazardous waste management facilities; and

(F) an evaluation of the various options for overcoming obstacles to siting new facilities, including needed legislation for implementing the most suitable option or options.

(e)(1) In order to determine the adequacy of existing common law and statutory remedies in providing legal redress for harm to man and the environment caused by the release of hazardous substances into the environment, there shall be submitted to the Congress a study within twelve months of enactment of this Act.

(2) This study shall be conducted with the assistance of the American Bar Association, the American Law Institute, the Association of American Trial Lawyers, and the National Association of State Attorneys General with the President of each entity selecting three members from each organization to conduct the study. The study chairman and one reporter shall be elected from among the twelve members of the study group.

(3) As part of their review of the adequacy of existing common law and statutory remedies, the study group shall evaluate the following:

(A) the nature, adequacy, and availability of existing remedies under present law in compensating for harm to man from the release of hazardous substances;

(B) the nature of barriers to recovery (particularly with respect to burdens of going forward and of proof and relevancy) and the role such barriers play in the legal system;

(C) the scope of the evidentiary burdens placed on the plaintiff in proving harm from the release of hazardous substances, particularly in light of the scientific uncertainty over causation with respect to—

(i) carcinogens, mutagens, and teratogens, and

(ii) the human health effects of exposure to low doses of hazardous substances over long periods of time;

(D) the nature and adequacy of existing remedies under present law in providing compensation for damages to natural resources from the release of hazardous substances;

(E) the scope of liability under existing law and the consequences, particularly with respect to obtaining insurance, of any changes in such liability;

(F) barriers to recovery posed by existing statutes of limitations.

(4) The report shall be submitted to the Congress with appropriate recommendations. Such recommendations shall explicitly address—

(A) the need for revisions in existing statutory or common law and

(B) whether such revisions should take the form of Federal statutes or the development of a model code which is recommended for adoption by the States.

(5) The Fund shall pay administrative expenses incurred for the study. No expenses shall be available to pay compensation, except expenses on a per diem basis for the one reporter, but in no case shall the total expenses of the study exceed \$300,000.

(f) The President, acting through the Administrator of the Environmental Protection Agency, the Secretary of Transportation, the Administrator of the Occupational Safety and Health Administration, and the Director of the National Institute for Occupational Safety and Health shall study and, not later than two years after the enactment of this Act, shall modify the national contingency plan to provide for the protection of the health and safety of employees involved in response actions.

EFFECTIVE DATES, SAVINGS PROVISION

Sec. 302. (a) Unless otherwise provided, all provisions of this Act shall be effective on the date of enactment of this Act.

(b) Any regulation issued pursuant to any provisions of section 311 of the Clean Water Act which is repealed or superseded by this Act and which is in effect on the date immediately preceding the effective date of this Act shall be deemed to be a regulation issued pursuant to the authority of this Act and shall remain in full force and effect unless or until superseded by new regulations issued thereunder.

(c) Any regulation—

(1) respecting financial responsibility,

(2) issued pursuant to any provision of law repealed or superseded by this Act, and

(3) in effect on the date immediately preceding the effective date of this Act shall be deemed to be a regulation issued pursuant to the authority of this Act and shall remain in full force and effect unless or until superseded by new regulations issued thereunder.

(d) Nothing in this Act shall affect or modify in any way the obligations or liabilities of any person under other Federal or State law, including common law, with respect to releases of hazardous

1114643

substances or other pollutants or contaminants. The provisions of this Act shall not be considered, interpreted, or construed in any way as reflecting a determination, in part or whole, of policy regarding the inapplicability of strict liability, or strict liability doctrines, to activities relating to hazardous substances, pollutants, or contaminants or other such activities.

EXPIRATION, SUNSET PROVISION

Sec. 303. Unless reauthorized by the Congress, the authority to collect taxes conferred by this Act shall terminate on September 30, 1985, or when the sum of the amounts received in the Treasury under section 4611 and under 4661 of the Internal Revenue Code of 1954 total \$1,380,000,000, whichever occurs first. The Secretary of the Treasury shall estimate when this level of \$1,380,000,000 will be reached and shall by regulation, provide procedures for the termination of the tax authorized by this Act and imposed under sections 4611 and 4661 of the Internal Revenue Code of 1954.

CONFORMING AMENDMENTS

Sec. 304. (a) Subsection (b) of section 504 of the Federal Water Pollution Control Act is hereby repealed.

(b) One-half of the unobligated balance remaining before the date of the enactment of this Act under subsection (k) of section 311 of the Federal Water Pollution Control Act and all sums appropriated under section 504(b) of the Federal Water Pollution Control Act shall be transferred to the Fund established under title II of this Act.

(c) In any case in which any provision of section 311 of the Federal Water Pollution Control Act is determined to be in conflict with any provisions of this Act, the provisions of this Act shall apply.

LEGISLATIVE VETO

Sec. 305. (a) Notwithstanding any other provision of law, simultaneously with promulgation or repromulgation of any rule or regulation under authority of title I of this Act, the head of the department, agency, or instrumentality promulgating such rule or regulation shall transmit a copy thereof to the Secretary of the Senate and the Clerk of the House of Representatives. Except as provided in subsection (b) of this section, the rule or regulation shall not become effective, if—

(1) within ninety calendar days of continuous session of Congress after the date of promulgation, both Houses of Congress adopt a concurrent resolution, the matter after the resolving clause of which is as follows: "That Congress disapproves the rule or regulation promulgated by the _____ dealing with the matter of _____, which rule or regulation was transmitted to Congress on _____, the blank spaces therein being appropriately filled; or

(2) within sixty calendar days of continuous session of Congress after the date of promulgation, one House of Congress adopts such a concurrent resolution and transmits such resolution to the other House, and such resolution is not disapproved by such other House within thirty calendar days of continuous session of Congress after such transmittal.

(b) If, at the end of sixty calendar days of continuous session of Congress after the date of promulgation of a rule or regulation, no committee of either House of Congress has reported or been discharged from further consideration of a concurrent resolution disapproving the rule or regulation and neither House has adopted such a resolution, the rule or regulation may go into effect immediately. If, within such sixty calendar days, such a committee has reported or been discharged from further consideration of such a resolution, or either House has adopted such a resolution, the rule or regulation may go into effect not sooner than ninety calendar days of continuous session of Congress after such rule is prescribed unless disapproved as provided in subsection (a) of this section.

(c) For purposes of subsections (a) and (b) of this section—

(1) continuity of session is broken only by an adjournment of Congress sine die; and

(2) the days on which either House is not in session because of an adjournment of more than three days to a day certain are excluded in the computation of thirty, sixty, and ninety calendar days of continuous session of Congress.

(d) Congressional inaction on, or rejection of, a resolution of disapproval shall not be deemed an expression of approval of such rule or regulation.

TRANSPORTATION

Sec. 306. (a) Each hazardous substance which is listed or designated as provided in section 101(14) of this Act shall, within ninety days after the date of enactment of this Act or at the time of such listing or designation, whichever is later, be listed as a hazardous material under the Hazardous Materials Transportation Act.

(b) A common or contract carrier shall be liable under other law in lieu of section 107 of this Act for damages or remedial action resulting from the release of a hazardous substance during the course of transportation which commenced prior to the effective date of the listing of such substance as a hazardous material under the Hazardous Materials Transportation Act, or for substances listed pursuant to subsection (a) of this section, prior to the effective date of such listing: *Provided, however*, That this subsection shall not apply where such a carrier can demonstrate that he did not have actual knowledge of the identity or nature of the substance released.

(c) Section 11961 of title 49, United States Code, is amended by—

(1) redesignating subsection (b) as subsection (d);

(2) by inserting "and subsection (h)" after "subsection (g)" in subsection (i)(2) as so redesignated by paragraph (1) of this subsection; and

(3) by inserting the following new subsection (h):

"(h) A person subject to the jurisdiction of the Commission under subchapter II of chapter 105 of this title, or an officer, agent, or employee of that person, and who is required to comply with section 10921 of this title but does not so comply with respect to the transportation of hazardous wastes as defined by the Environmental Protection Agency pursuant to section 3001 of the Solid Waste Disposal Act (but not including any waste the regulation of which under the Solid Waste Disposal Act has been suspended by Congress) shall, in any action brought by the Commission, be liable to the United States for a civil penalty not to exceed \$20,000 for each violation."

ASSISTANT ADMINISTRATOR FOR SOLID WASTE

Sec. 307. (a) Section 2001 of the Solid Waste Disposal Act is amended by striking out "a Deputy Assistant" and inserting in lieu thereof "an Assistant".

(b) The Assistant Administrator of the Environmental Protection Agency appointed to head the Office of Solid Waste shall be in addition to the five Assistant Administrators of the Environmental Protection Agency provided for in section 1(c) of Reorganization Plan Numbered 3 of 1970 and the additional Assistant Administrator provided by the Toxic Substances Control Act, shall be appointed by the President by and with the advice and consent of the Senate, and shall be compensated at the rate provided for Level IV of the Executive Schedule pay rates under section 5315 of title 5, United States Code.

(c) The amendment made by subsection (a) shall become effective ninety days after the date of the enactment of this Act.

SEPARABILITY

Sec. 308. If any provision of this Act, or the application of any provision of this Act to any person or circumstance, is held invalid, the application of such provision to other persons or circumstances and the remainder of this Act shall not be affected thereby.

ENCLOSURE 2

Section 103(c): Notification of Sites
Containing RCRA-Regulated Hazardous Wastes

This section requires that by June 9, 1981, notification must be given to EPA concerning the existence of any known sites at which RCRA-regulated hazardous wastes are or have been stored, treated, or disposed of. DOE's position is that the AEA activities exemption provided by RCRA also applies to CERCLA. Therefore, at this time, only information concerning sites containing RCRA-regulated hazardous wastes is requested.

In order to fulfill the Section 103(c) requirement, I am asking that you provide ORO with a report, no later than May 15, 1981, describing the existence of any facilities where RCRA-regulated hazardous wastes are or have been stored, treated, or disposed of. This report should be based on best available information, specifying (where known) the types and amounts of RCRA-regulated hazardous wastes that are or have been stored, treated, or disposed of at the site. Also to be described is whether or not there are any known or suspected releases of these materials into the environment, and the date when such a release was first known or suspected.

If information pertaining to a particular site is not available to the extent required, it should be so stated. Sites at which both RCRA-regulated and AEA-exempt or classified wastes are or have been stored, treated, or disposed of are to be included in the report. For these RCRA-regulated wastes, an estimate of quantity and percent of the total waste handled at the site should be included.

For the purpose of this report, a "site" would be a specific landfill, burial ground, lagoon, treatment facility, etc.

The Section 103(c) reports are to be delivered to ORO no later than May 15, 1981. If any delays are anticipated, the Environmental Protection Branch should be notified substantially before this date.

1114645

ENCLOSURE 3

Section 103(a): Notification of Releases of Hazardous Substances Into The Environment

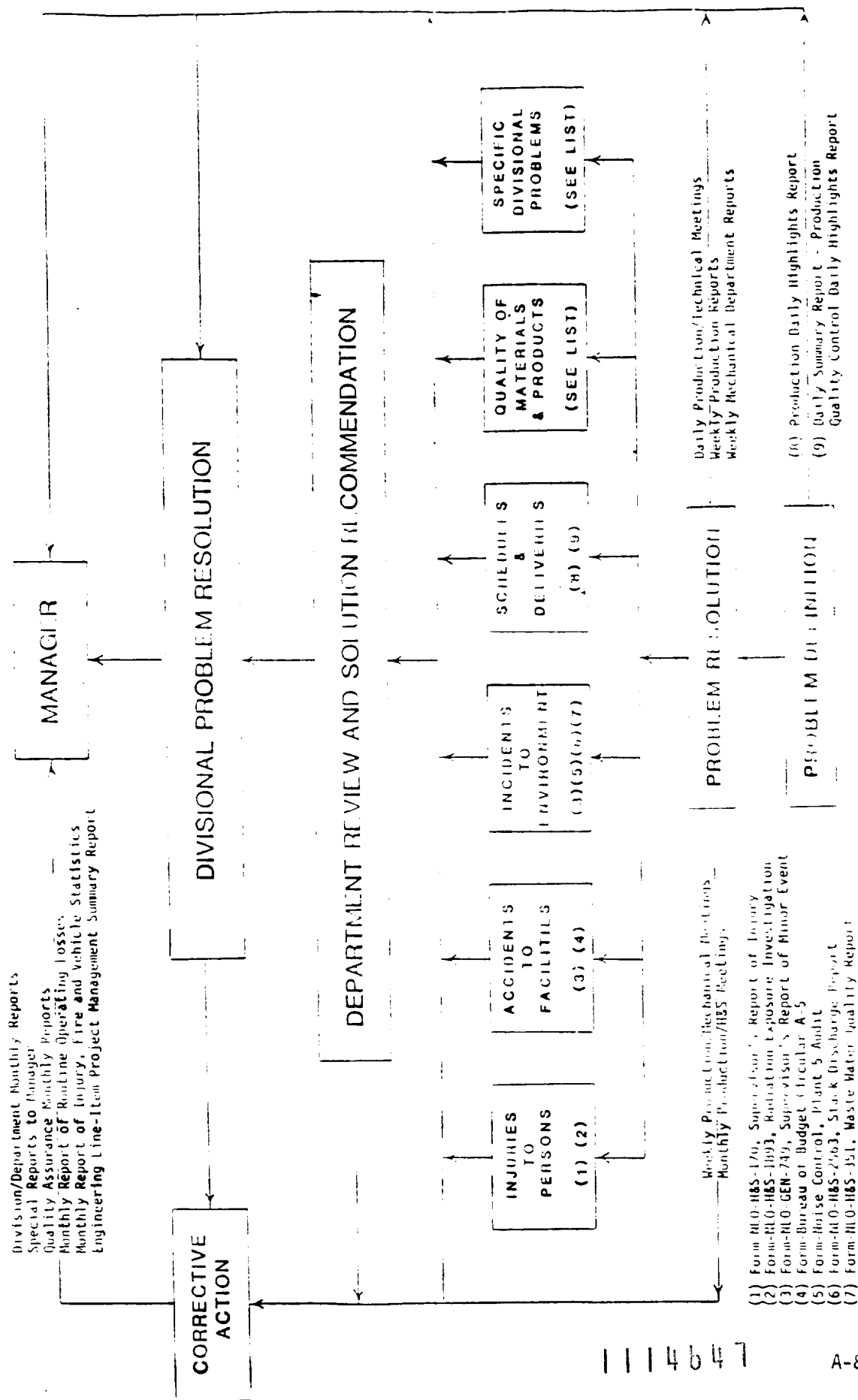
The CERCLA definitions of "hazardous substances" and "releases" are extremely broad. At this time, CERCLA hazardous substances include substances designated by Sections 307(a) and 311(b)(2)(A) of the Clean Water Act, hazardous wastes regulated by RCRA, and hazardous air pollutants listed under Section 112 of the Clean Air Act. The definition may be expanded to include either substances from Section 7 of TSCA, or additional substances designated as hazardous by EPA.

A CERCLA "release" generally means any escaping of a hazardous substance into the environment, including air, land (surface and subsurface), surface water, and ground water contaminations. There are exemptions provided for "federally permitted" releases which include releases of substances which are regulated (and in compliance) with other legislation, including the Clean Water Act, the Clean Air Act, RCRA, and the Atomic Energy Act (AEA). However, the exemption granted to AEA releases appears to be much more limited than the AEA exemption granted under RCRA, and pertains only to source, special nuclear, and by-product materials (not to all AEA activities). Currently, the CERCLA release reporting format is modeled after the existing Clean Water Act, Section 311 regulations, with reportable quantities (RQ) provisions, and telephone notification to the National Response Center.

A reportable quantity is based on the release in a 24 hour period. Therefore, the same format will follow in regards to reporting releases at a DOE facility (i.e., person detecting a release reports it to the facility Environmental Coordinator, who in turn reports it to the (RC) Environmental Protection Branch, who in turn reports it to the National Response Center).

Because of the burden that a literal interpretation of the CERCLA 103(a) reporting requirements would place on both the regulated community and the regulators, EPA at this time is requiring immediate notification only for releases of hazardous substances which are accidental or episodic and for which immediate government attention and response may be necessary. Notification is not required at this time for routine, anticipated releases which are incidental to normal business operations. It is expected that EPA will eventually require a written notification of routine, anticipated releases, but this is not required at this time.

NLO COMMUNICATION FLOW DIAGRAM



1114647

Figure 1
Feed Materials
Production Center,
Area Map

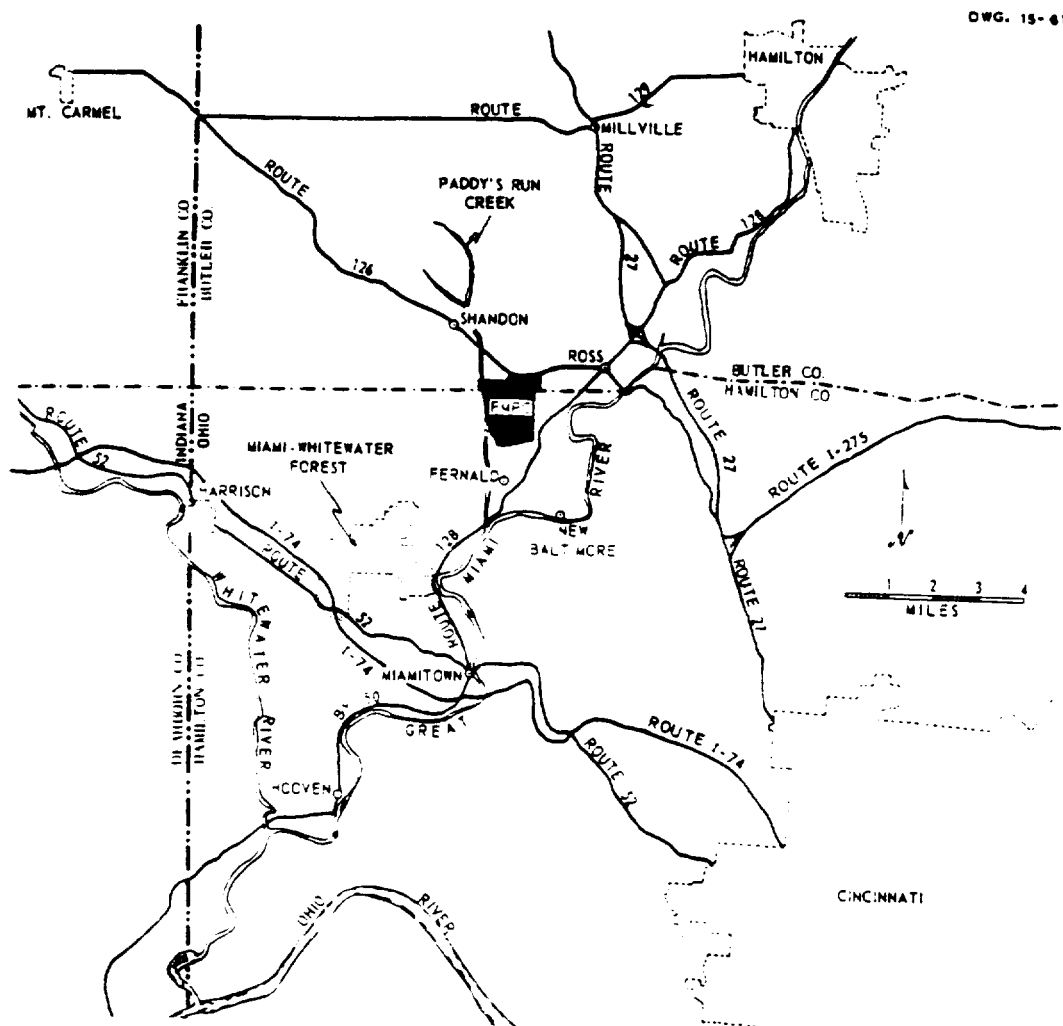
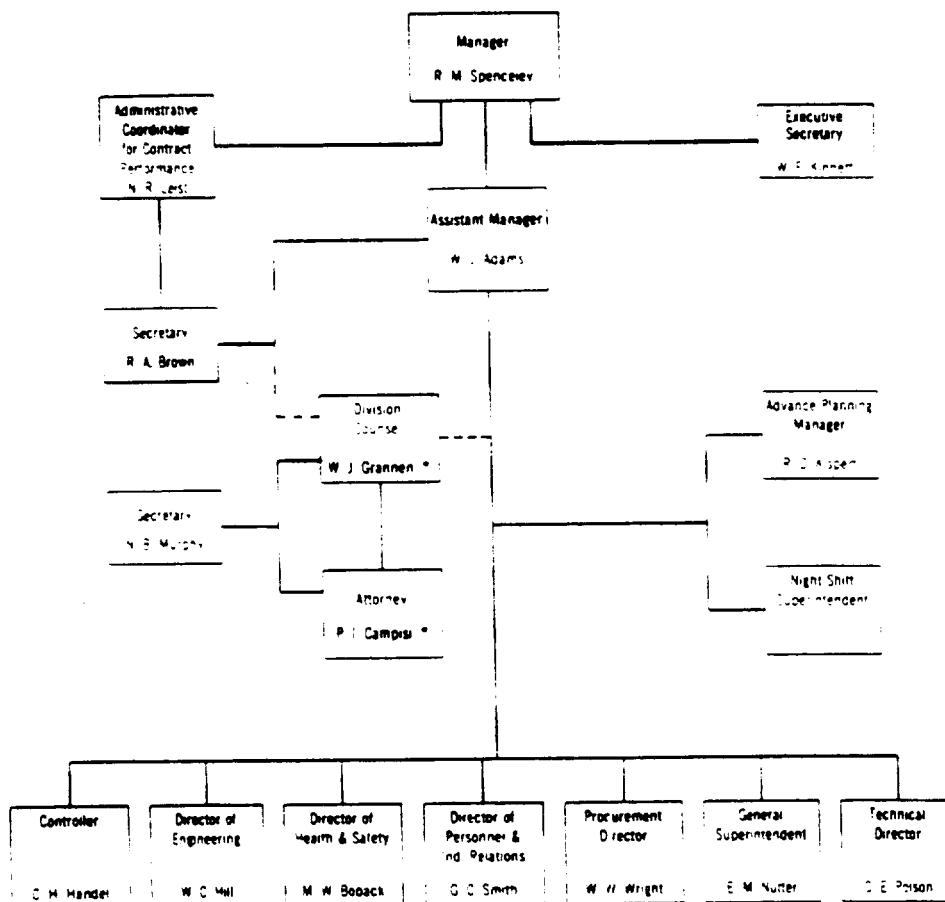


Figure 2
NLO Management Chain,
"Executive Group"

SALARY	394
WAGE	470
TOTAL	864

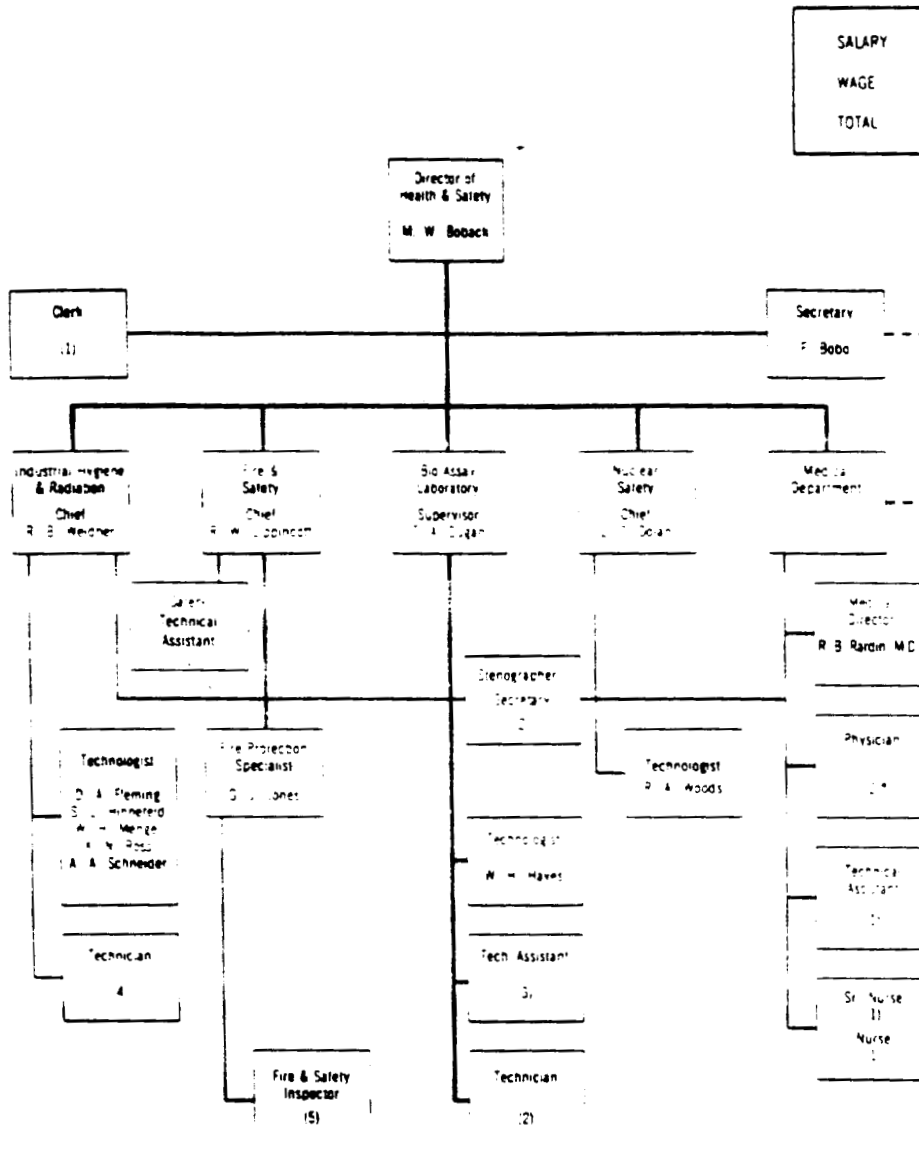


* Assigned from NLI DGC — Not included in plant totals

1114649

COMPANY	NLO Inc. Ternaid Plant
	Executive Group
DATE	January 1, 1984

Figure 3
NLO Management Chain,
Health and Safety Division



* Part time on contract. Not included in totals

COMPANY	NLO, Inc. Farmington, Conn.
DIVISION	Health & Safety
DATE	January 1, 1984

Figure 4
NLO Management Chain,
Production Group
Hierarchy for Plant 9
(first tier,

SALARY	58
WAGE	198
TOTAL	256

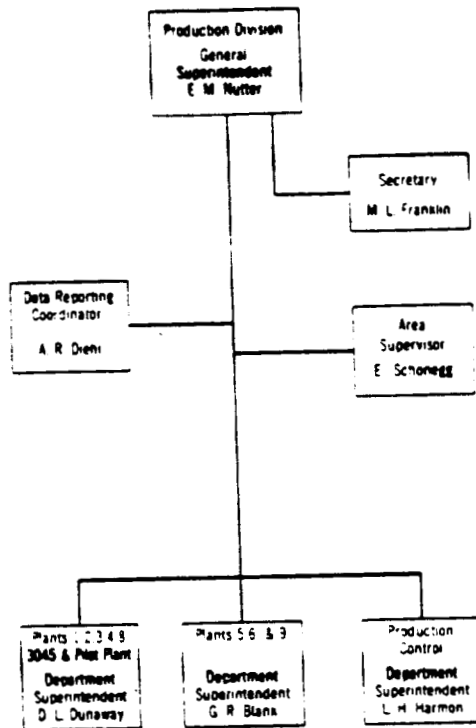
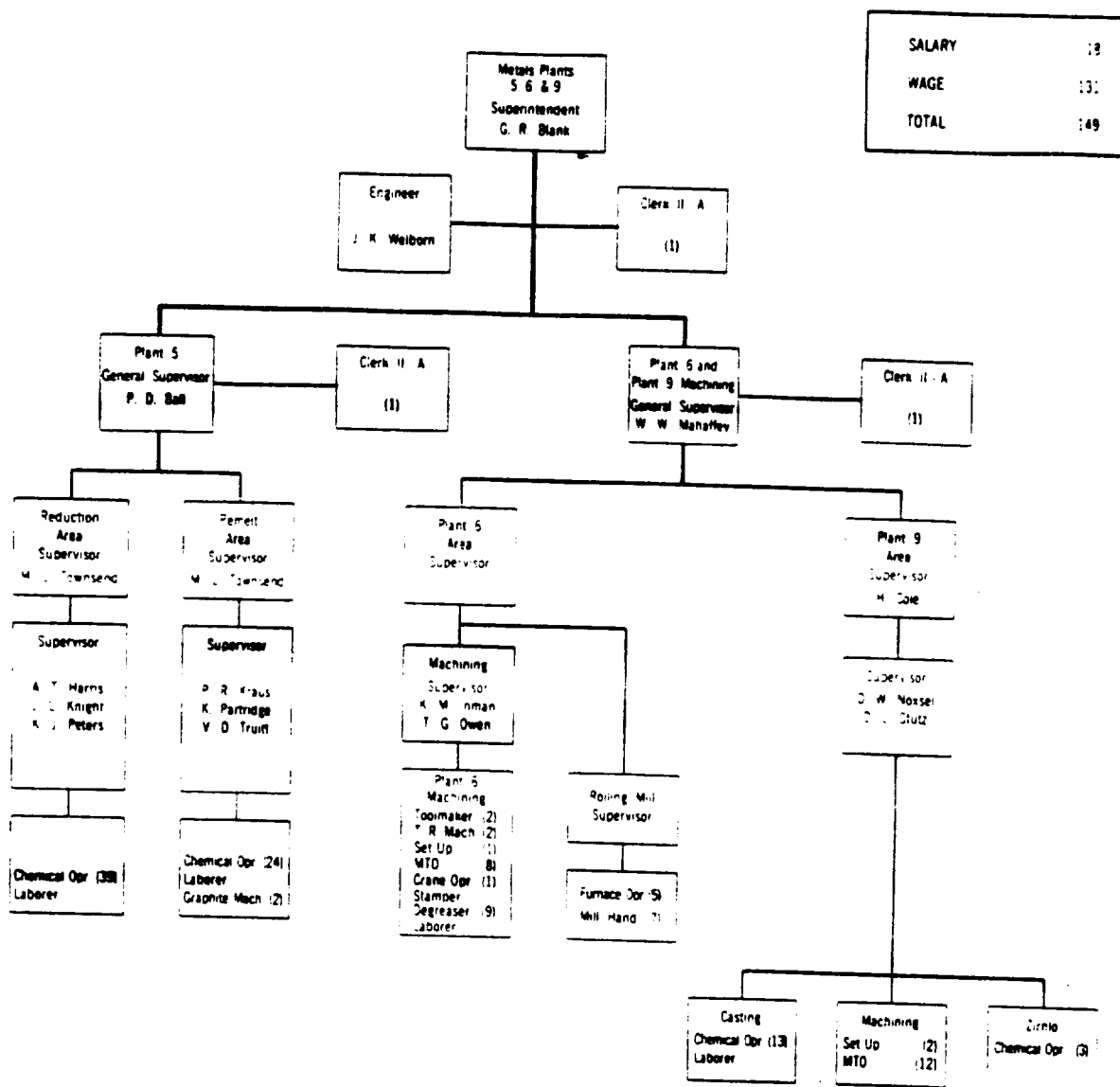


Figure 5
NLO Management Chain,
Production Group
Hierarchy for Plant 9
(second tier)



1114652

COMPANY:	NLO, Inc. Fernald Project
DIVISION:	Production
DEPARTMENT:	Metals Production
DATE:	January 1, 1984

Figure 6
NLO Management Chain,
Quality Control
Department within the
Technical Division

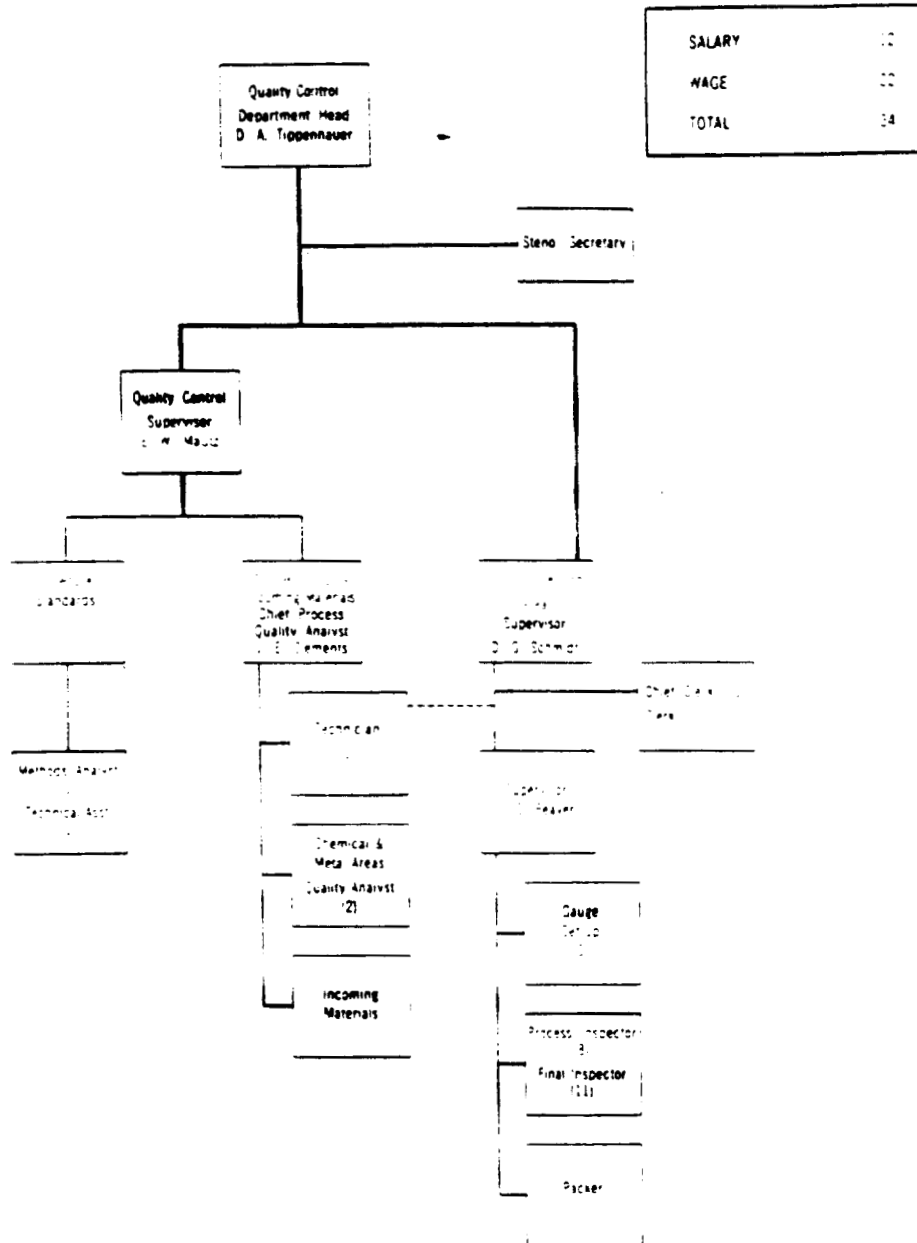
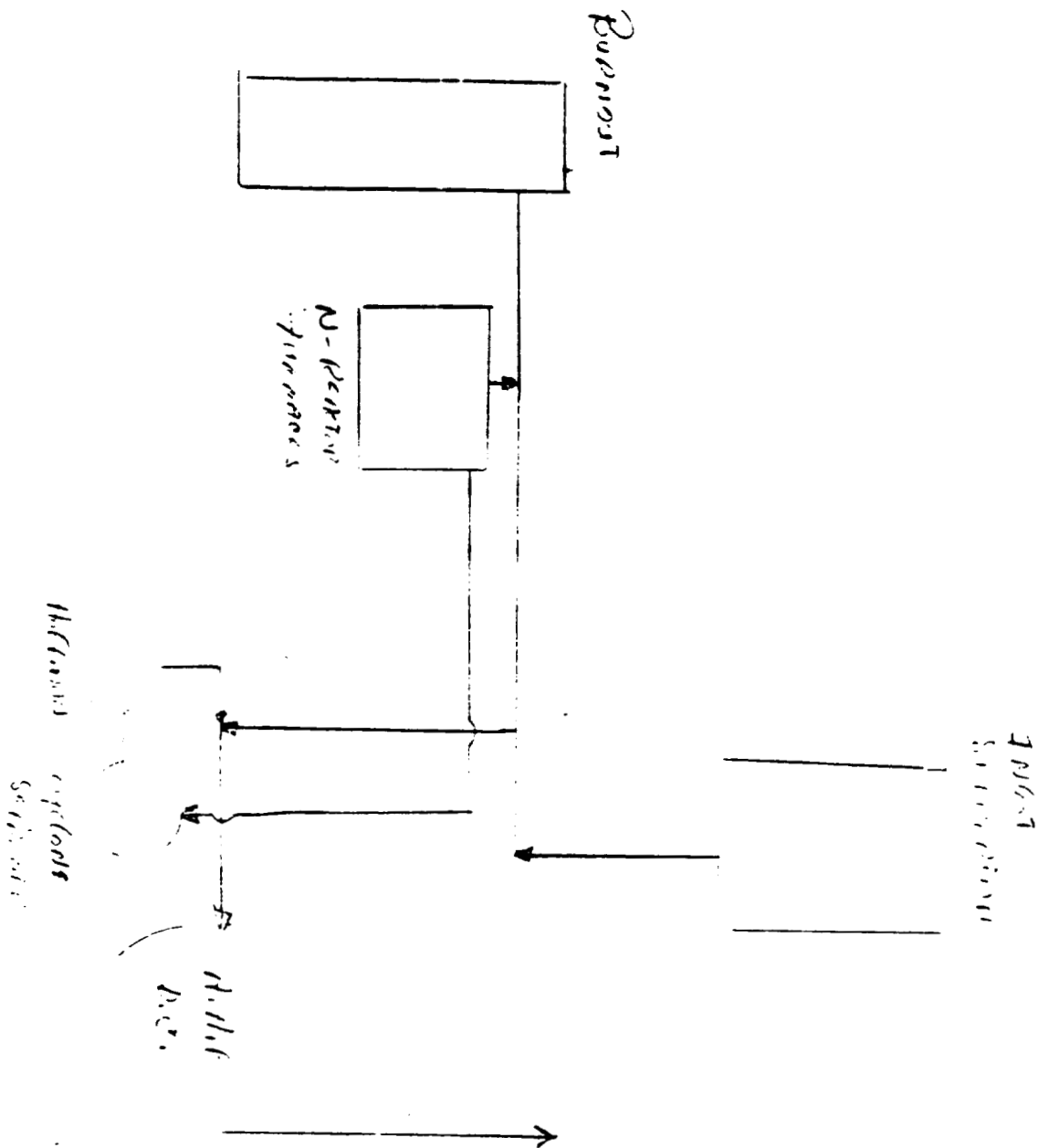
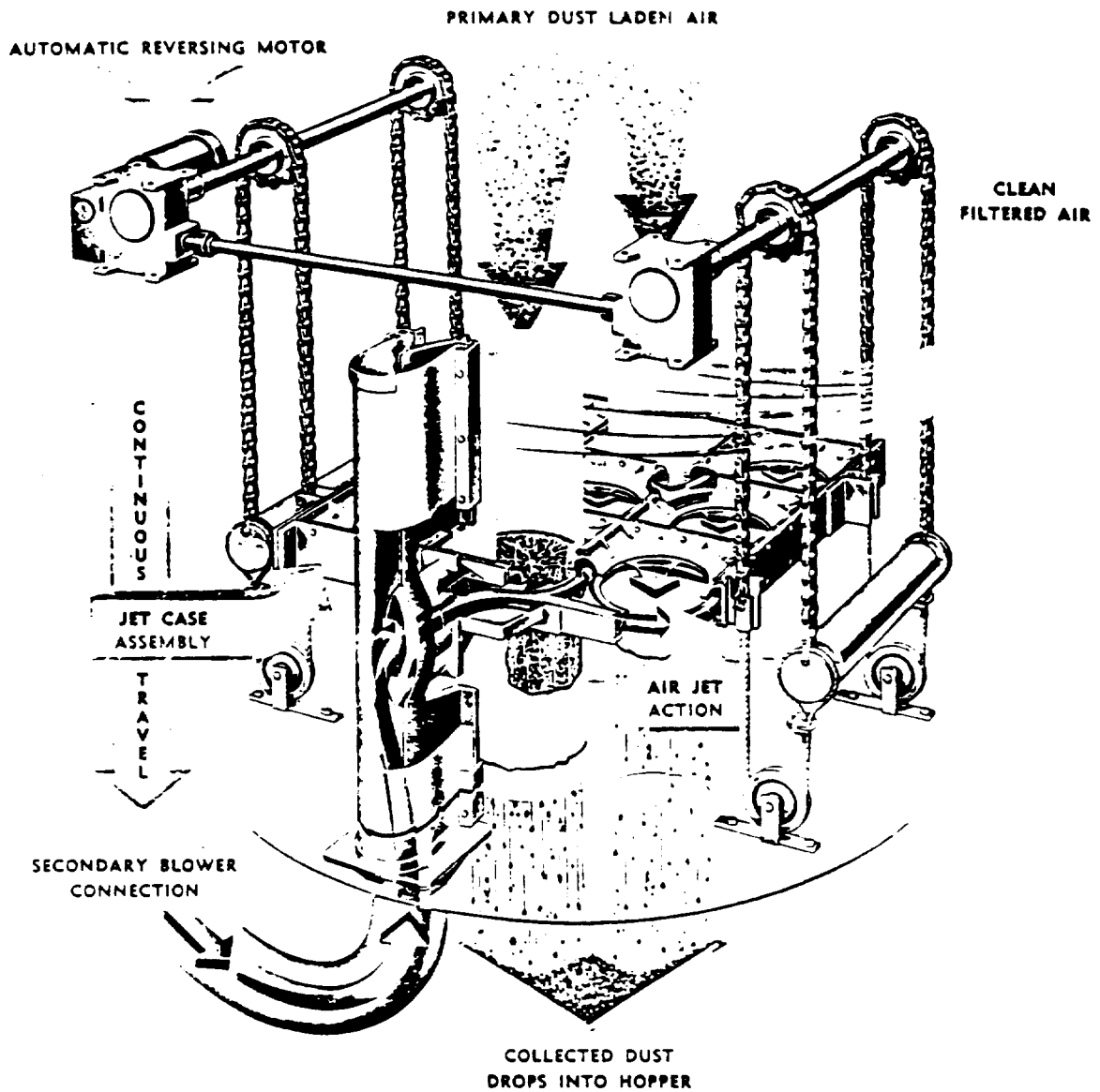


Figure 7
Plant 9 Remelt Furnaces and
Support Operations Process
Flow Diagram



→ n

Figure 8
Plant 9 Remelt Furnaces
Baghouse, Cutaway



H-3075 Cutaway illustration of Model B AMERjet showing operating principle and reverse-jet action.

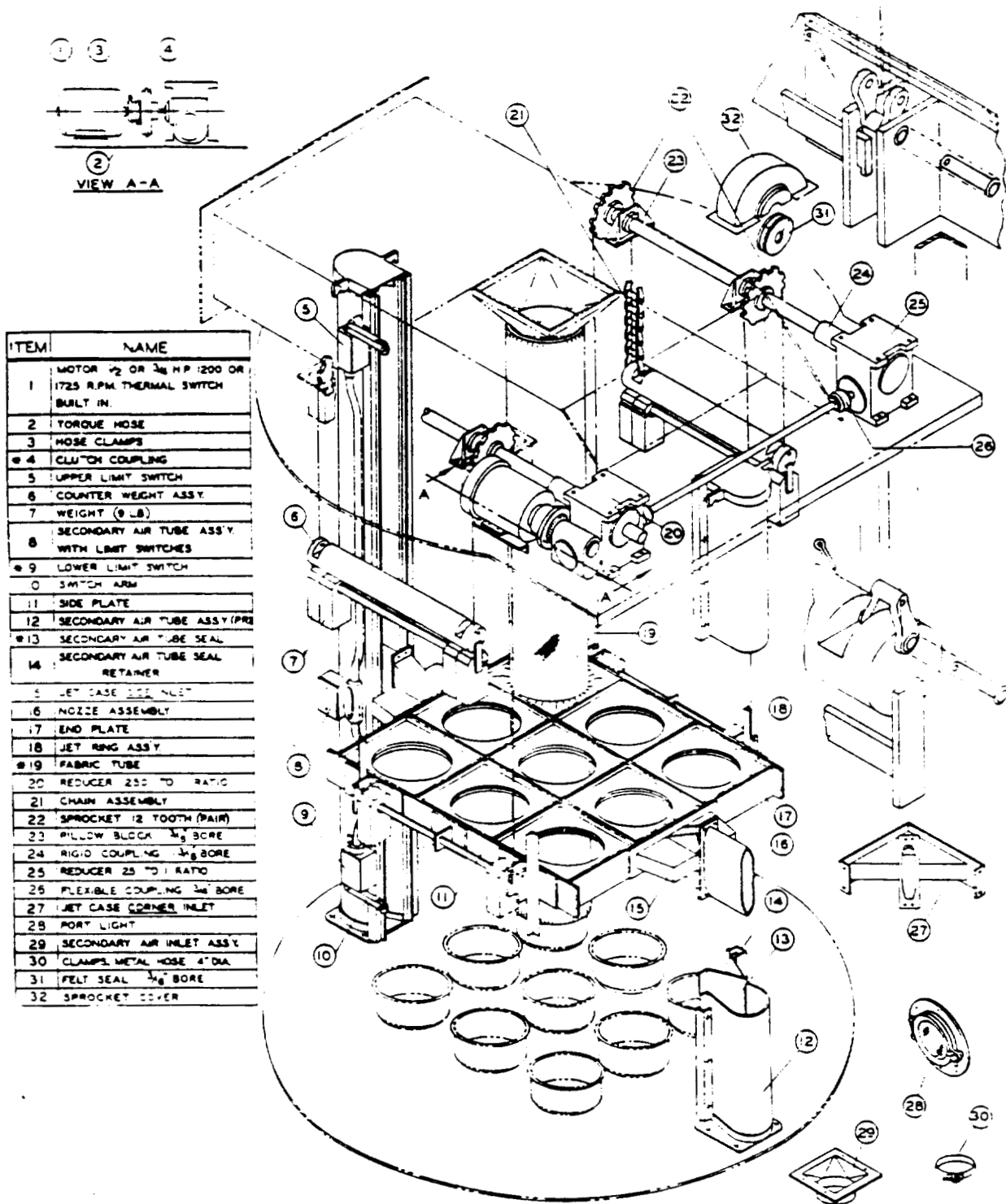


American Air Filter

COMPANY, INC.

215 CENTRAL AVENUE, LOUISVILLE 8, KENTUCKY

Figure 9
Plant 9 Remelt Furnaces
Baghouse, Mechanical Details



PARTS LIST

SPARE PARTS

*Recommended Spare Parts to be Stocked:

- One (1) complete set of filter bags (specify material and bag length)
- One (1) Dodge Flexidyne No. 5-C Clutch
- One (1) Bottom Limit Switch #E-2400

CHART A

Staplex Filters

for Staplex Model TFIA, TFIA-2, TFIA-4
High Volume Air Samplers

Staplex
High Volume Air Samplers
TFIA, TFIA-2, TFIA-4

TYPE FILTERS	FLOW RATE, C.F.M.	CHARACTERISTICS
TFIA-4 Diameter	55-70 approx.	Pleated cellulose paper filter. High flow rate. Physically strong. Low resistance buildup. For particulate matter size 10 microns and over. Outstanding for Gamma radiation. Especially recommended wherever long sampling periods are required at low dust loading. Can be operated continuously with the filter changed every 72 hours. A normal sample was obtained when using this paper for 72 hours and represents a concentration of as low as 10^{-6} mg. of the material of interest in a cubic foot of air.

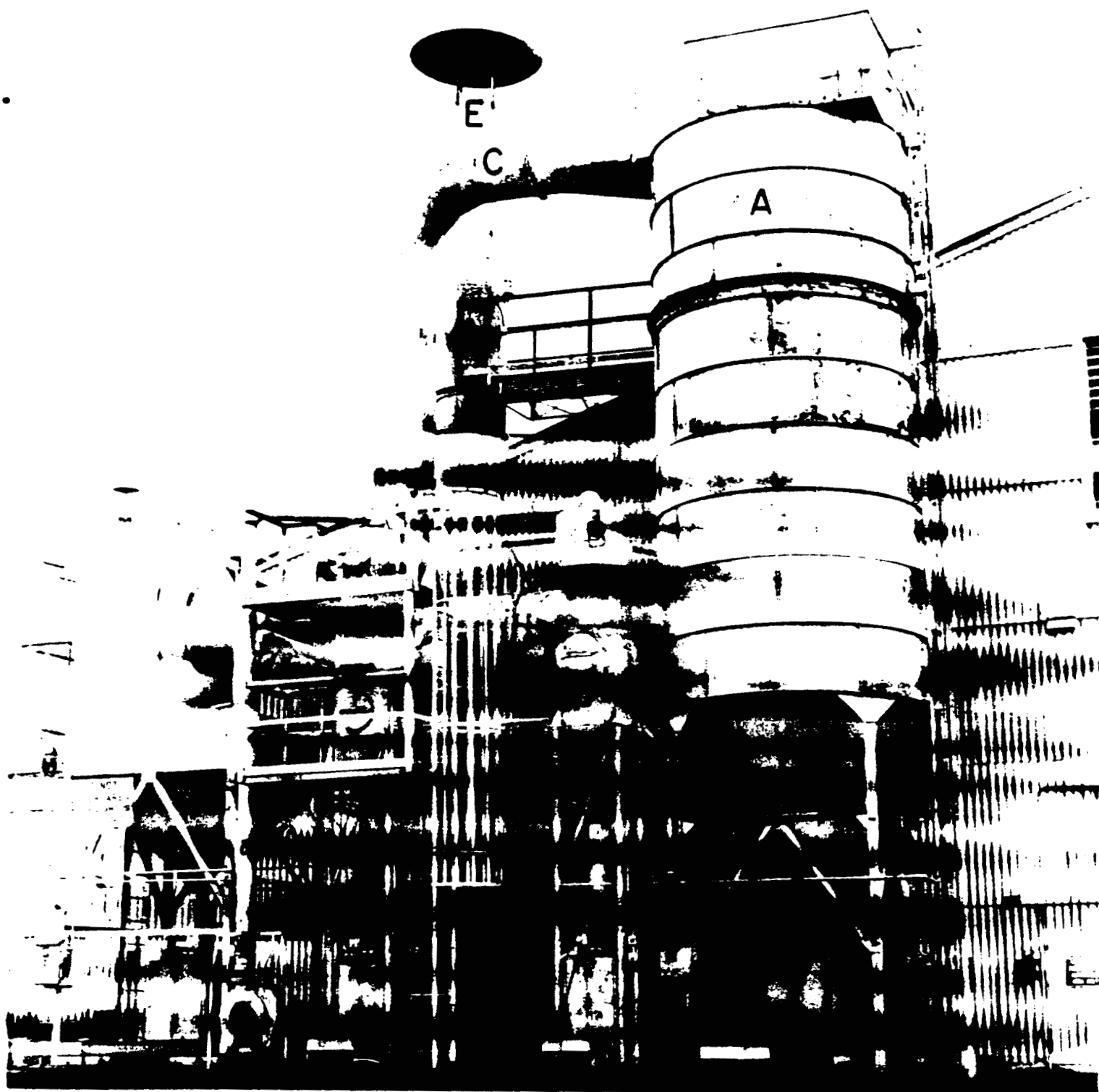


Photo 1 The Plant 9 Remelt Furnaces Area Air Cleaning Facilities

- 1. American Air Filter baghouse
- 2. Hoffman High Vacuum Cyclone
- 3. Inlet Duct
- 4. Outlet Duct
- 5. Emission Stack

1114658

1114659

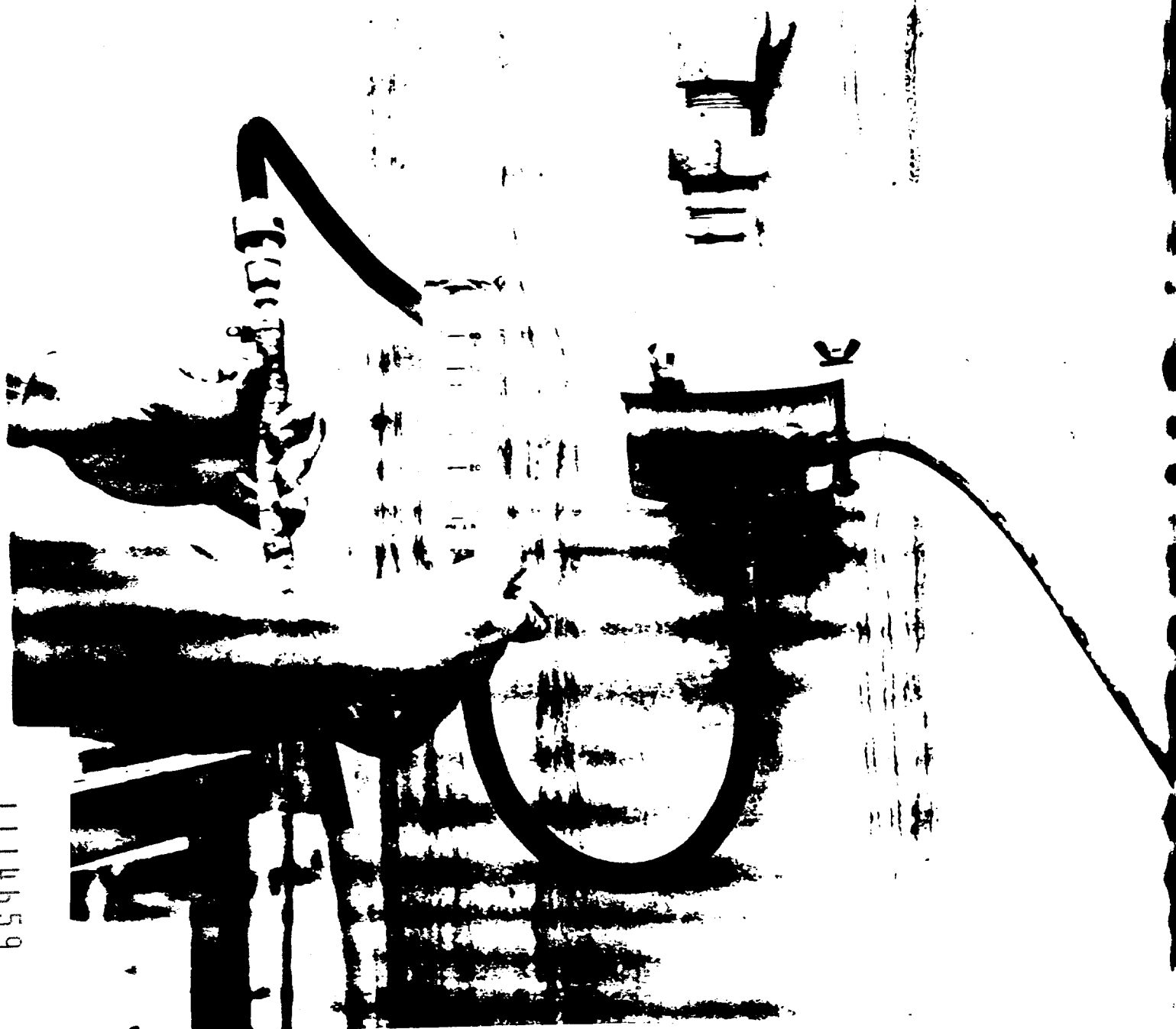


Photo 2 Plant 9 Baghouse Stack With In Stack Sampler.

1114659 Calibration Procedure.

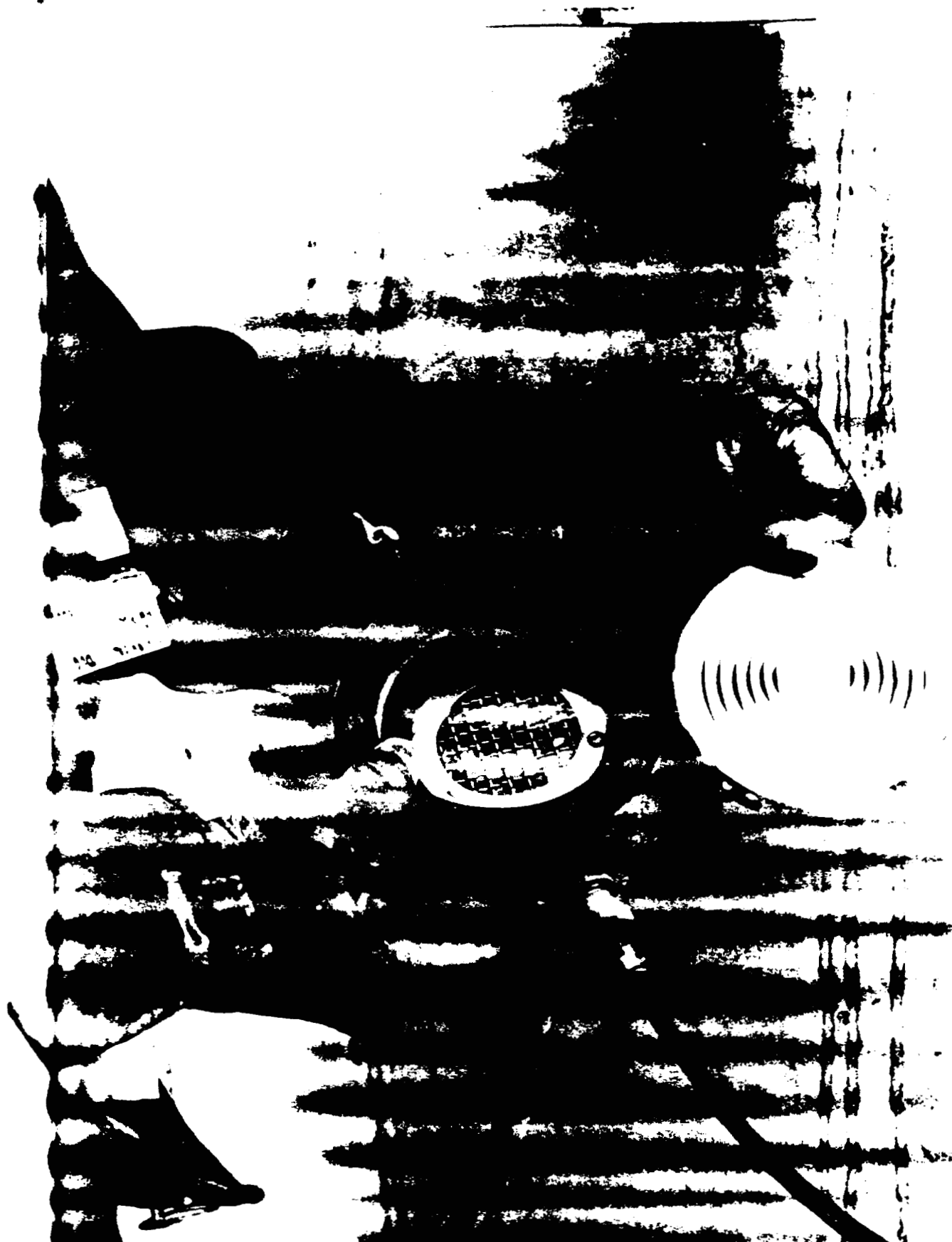


Photo 3 Plant 9 Stack Sampler.
(Filter Removed Showing Thin Window "Pancake" Beta Particle Sensor
(Scintillation Counter Probe) Within)

1114660

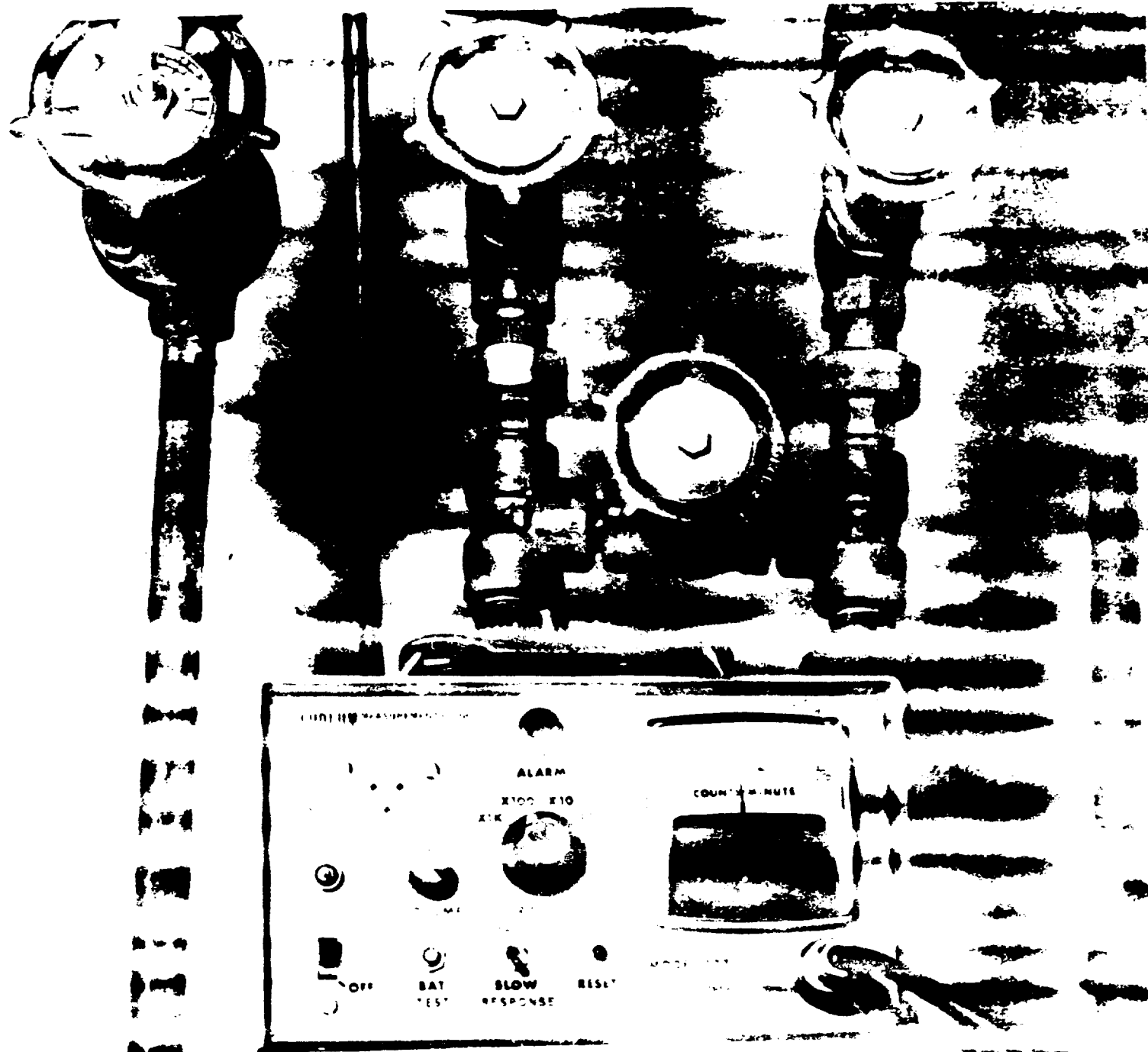


Photo 4 Baghouse Monitor. Close-up of the Geiger Counter.
Note Scales, Small Red Light "Alarm", Holes for Audible Alarm,
Sensitivity Selector Switch, ("Range").

1114661

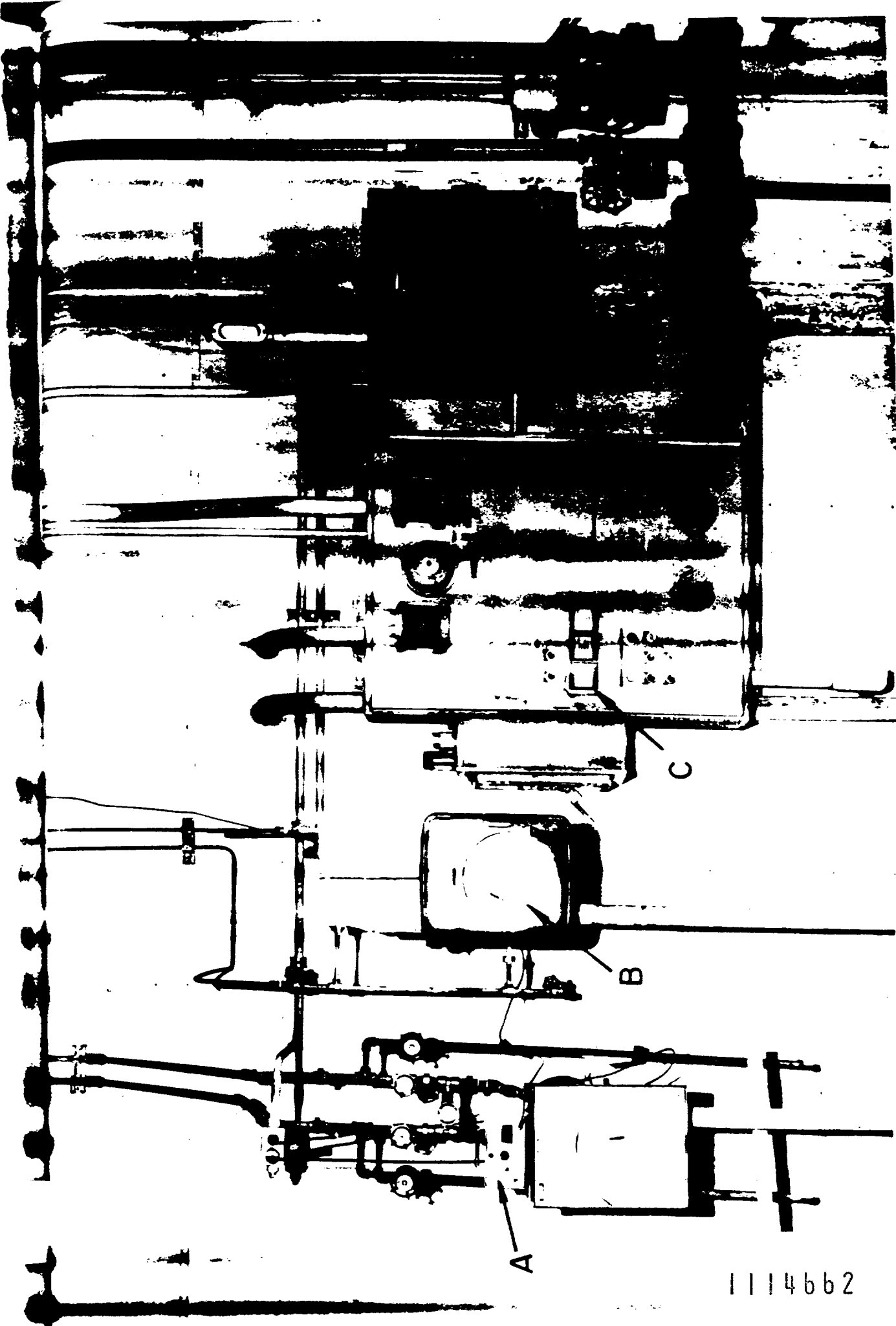


Photo 5 The Plant 9 Baghouse Control and Monitoring Center.

A. Geiger Counter Electronics Package and Alarm

B. Differential Pressure Recording Chart

C. Main Control Panel

1114662

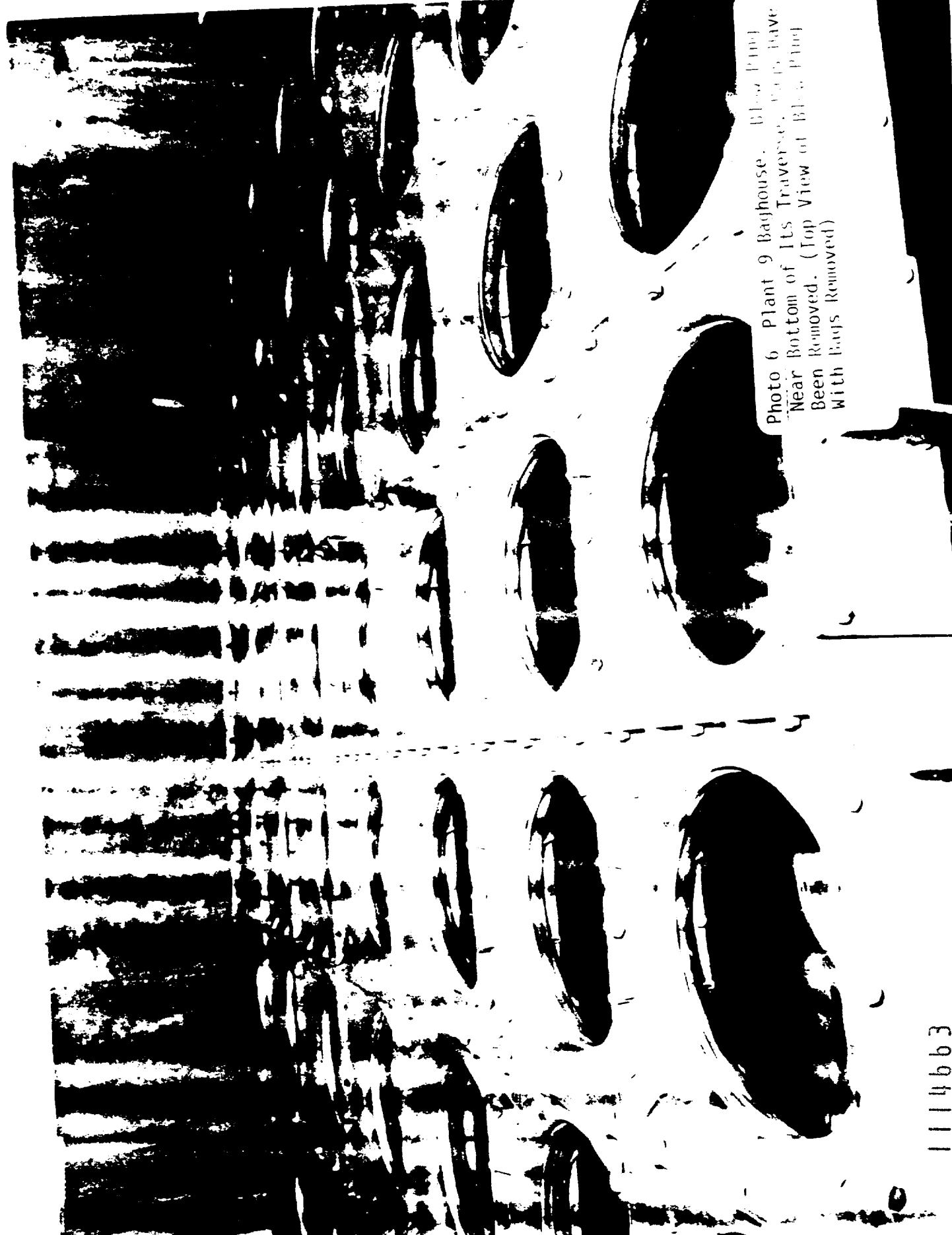


Photo 6 Plant 9 Baghouse. Blow Piped
Near Bottom of Its Traverse. Bags Have
Been Removed. (Top View of Blow Piped
With Bags Removed)

1114663

Photo 7 Plant 9 Baghouse, Detail of
Bags and Blow Ring. Bags were deflated
Because Air Flow Was not Inside View
of Blow Ring with Bags Deflated

4994111

Photo 8. Blow Ping Nozzle Penetrating Rubber Seal.
A. Nozzle Assembly
B. Rubber Air Seal
C. Seal Retainer

C

B

A

B

C

1114665

Photo 9 "Mock Up" of Blow Ring
Nozzle Assembly Moving Past Rubber
Seal

1114666

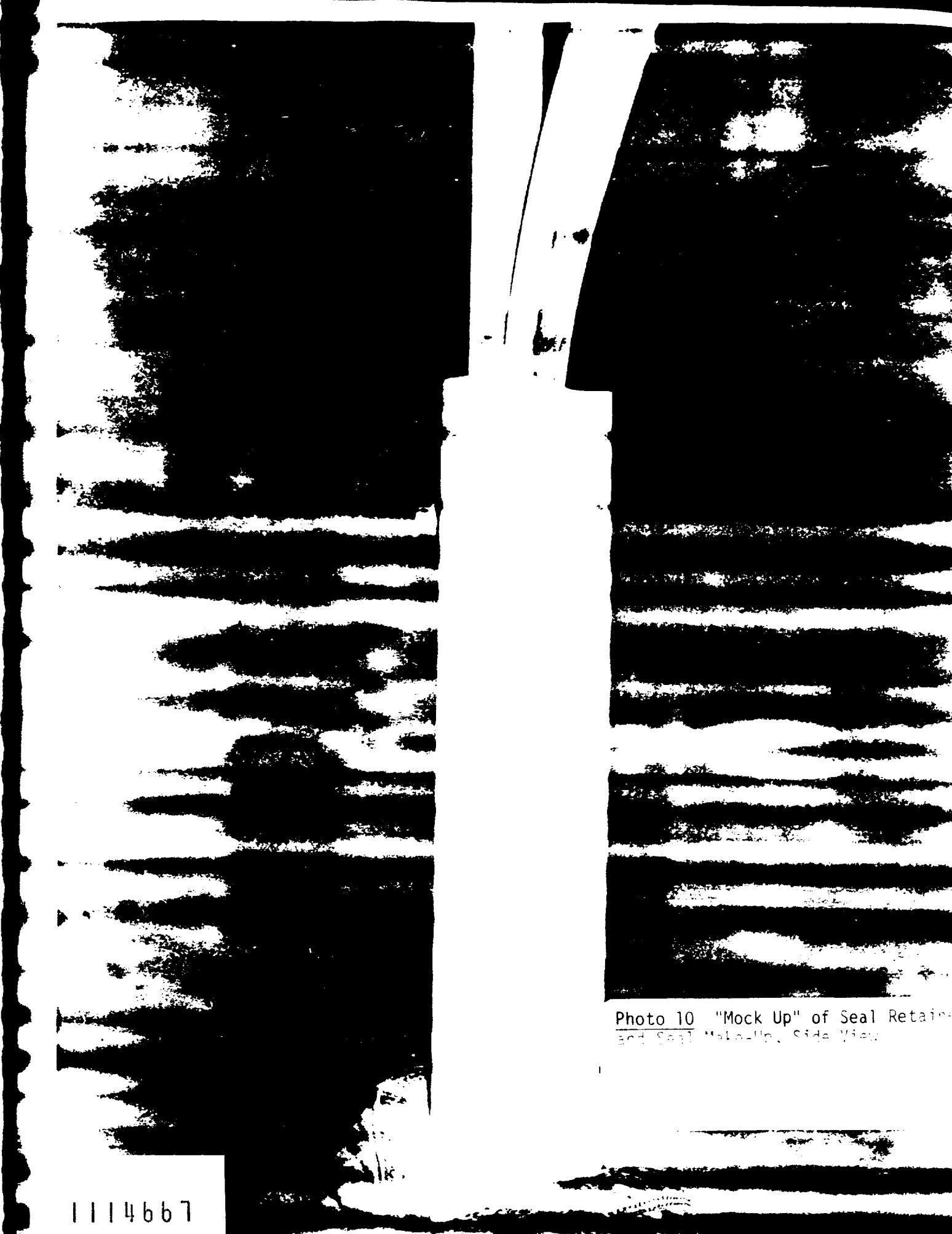


Photo 10 "Mock Up" of Seal Retainer
and Seal Make-Up, Side View

1114667

Photo 11 "Bent" Seal Retainer (One of
Two) Found on Baghouse West Floor on
November 9.

1114668



Photo 12 Detail of Bent Seal Retainer



Photo 13 Plant 9 Baghouse Control
The Differential Pressure Gauge
Recorder.

1114670



Photo 14 Bags as Viewed from Bottom
Lower Access Door.

1114671

Lower Access Door.

Photo 15 Plant 9 Baghouse, Upper
Tube Sheet Flanges. (Note Chain Drive
For Blow Ring in Rear and Air Columns
With Rubber Seals).

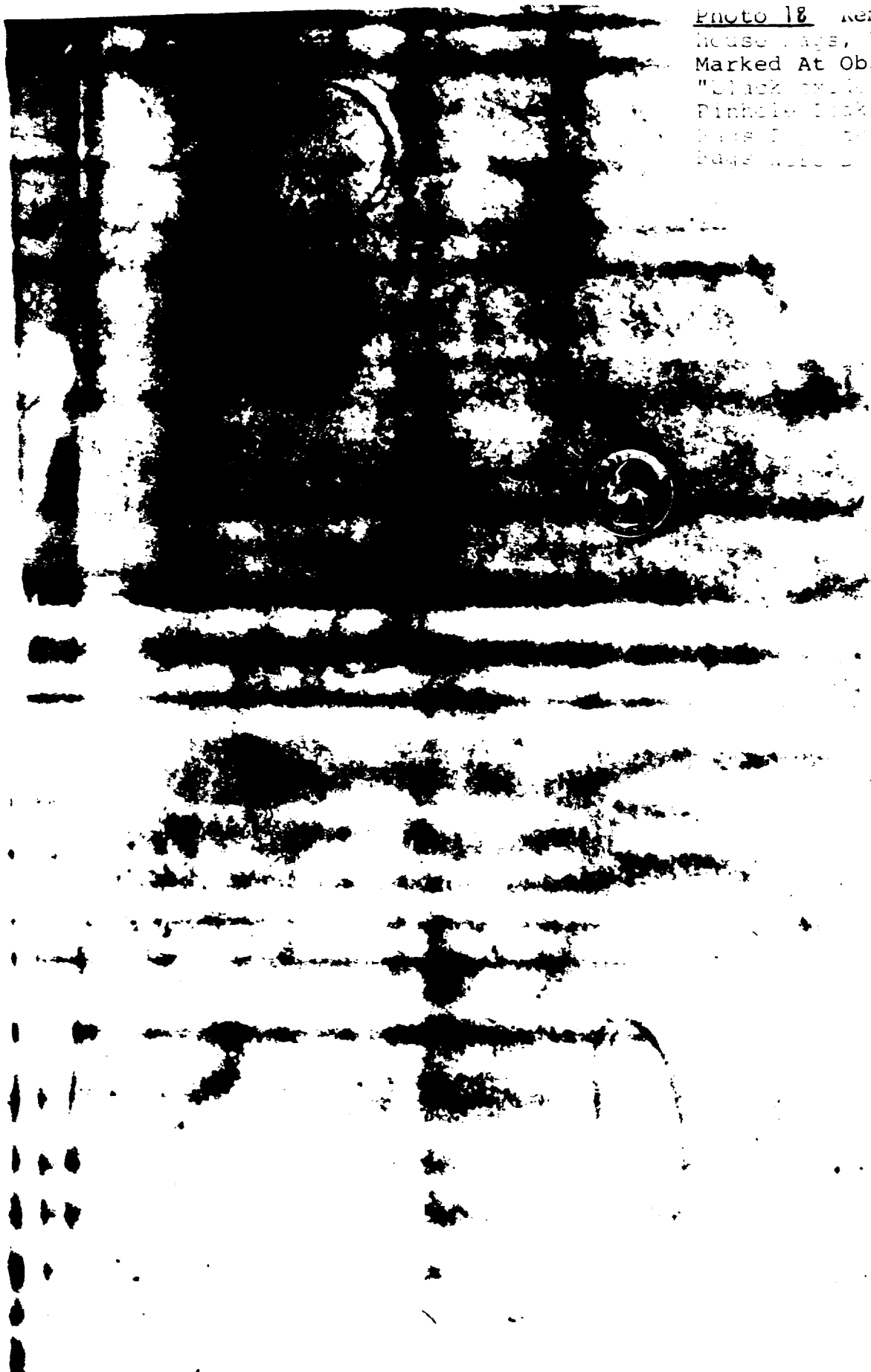
Photo 16 Plant 9 Baghouse. Lower
Tube Sheet Flanges for Bag Attachment.

1114673

Photo 17 Plant 9 Backhouse Pans
Removed, Placed on Ply. for
Inspection.

1114674

Photo 18 Removed Plant 9 Bag-
house Bags, Detail. Circles Are
Marked At Observation of U_3O_8
"Black Oxide", Indicating
Pinhole Leaks. Other Stains
Have Been Removed.
Bags Were Being Removed.



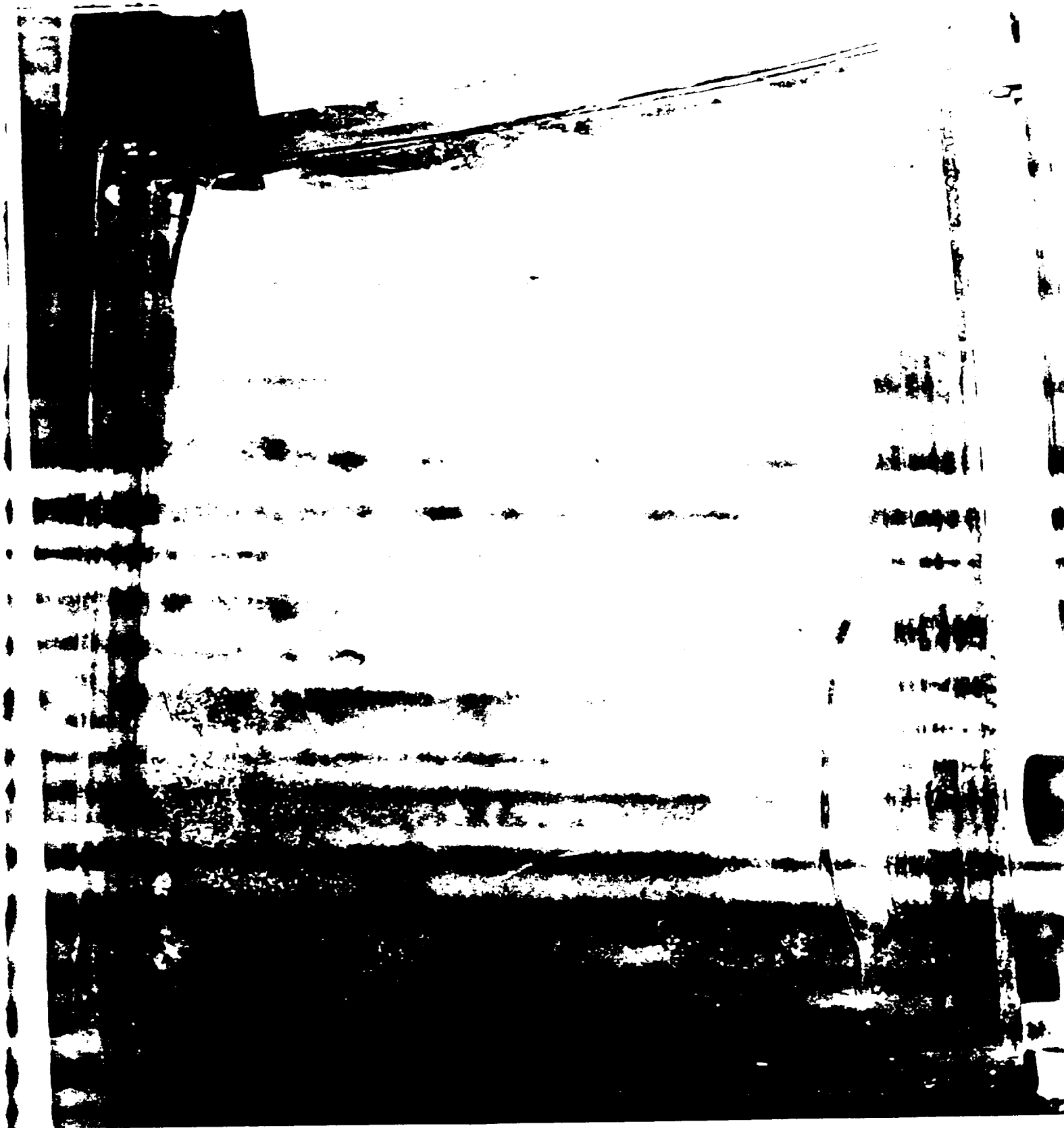
1114675

re



Photo 19 Removed Plant 9 Baghouse Bags
Detail.

1114676



1114677

Photo 20 Plant 9 Baghouse Access
Door Showing Gasket Seal, Allowing
Moist Air Inleakage.

Photo 21

Plant 9 Barhouse, Residue
Drum Enclosure Access Door With Gaping
Hole, Allowing Inleakage of Moist Air.

1114678

Photo 22 Hole in Inlet Duct to
Plant 9 Bayhouse.

1114679

andum

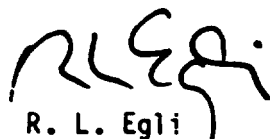
1986

nek)

EXPOSURE IN EXCESS OF QUARTERLY LIMITS AT THE FEED MATERIALS
CENTER

arber, Acting Director, Office of Nuclear Safety, EH-13, G-103/GTN

ce with DOE Order 5484.1, Chapter II, Section I.e(4), attached is
on of a radiation exposure in excess of quarterly limits which
the Feed Materials Production Center, Fernald, Ohio, operated by
Materials Company of Ohio (WMCO). A Type C Investigation is
med by the contractor.



R. L. Egli
Assistant Manager for Safety
and Environment

lyder, DP-84

1114680

SUMMARY

On January 10, 1986, the water-cooled lid was removed from remelt furnace number 5 in plant 5. A leak in the cooling water jacket on the lid underside was to be repaired by a welder. When an Industrial Hygiene Technician arrived at the work site to monitor for a Work Permit, it appeared that the repair was to be made on the relatively-clean outside surface of the lid. A work limit of three hours was granted.

After the Technician left, two riggers raised the lid on its edge so a welder could work on the underside where a radioactive residue accumulates. The welder then unsuccessfully attempted the repair for about 45 minutes, stopping work near the end of his shift. On the next shift, a new Work Permit was obtained and the lid underside was monitored. The permissible work time was determined to be only 2.25 minutes. Instead of continuing the repair, the lid was replaced.

On the next regularly scheduled workday, the difference in monitoring results was investigated by the Health Physics Department. The conclusion was reached that the welder received a dose of 10.7 rem to the right scalp and neck and a dose of 6.5 rem to the right side of the body (ref. 1). These doses exceed the DOE quarterly limit of 5 rems to the skin of the whole body. The method used to calculate the doses is attached as Exhibit 2 (ref. 4).

1114681

After the IH Technician left the furnace area, the riggers continued to raise one edge of the lid until the underside was facing the enclosure doorway. In this position, the underside collar extension of the lid jacket could be reached by the welder without entering the enclosure. At some point during the lid moving, a pipefitter disconnected the lid cooling water lines.

Standing at the entrance to the furnace enclosure, the welder attempted to repair the lid jacket. The leak had occurred in a weld seam on the collar and the seam was easily accessible to the welder. Exhibit 4 shows the general location of the weld; however, when the work was done, the lid was arranged on its edge for easy access to the weld. After 30-45 minutes of work, the welder concluded the seam crack could not be easily repaired at that location because the crack kept advancing as a new weld was made. About 3:45 p.m. the welder left the work area and went to the first floor to tell the Mechanical Supervisor of the difficulty. He then returned to the worksite to pick up his gear.

The decision to attempt the welding at the enclosure was based, in part, on the desire of the Mechanical Supervisor for a prompt repair and to avoid the difficult task of replacing the lid. Replacement is difficult because of the size and weight (51-inch diameter and an estimated 600 pounds) tight quarters in the furnace enclosure; the congested area just outside the enclosure; and the long distance from the enclosure to the elevator.

At about 4:45 p.m., the second shift Maintenance Supervisor called the second shift IH Technician and asked for a new Work Permit. This is the supervisor's normal practice when taking over a Work Permit job from the previous shift. The Technician arrived at the furnace enclosure and the

room. Low radiation levels were found and a recommended time limit of 25 hours was recorded on the Work Permit.

At about 9:00 p.m., the second shift IH Technician received a call to monitor the defective lid which had been transferred to the plant 5 furnace room. Based on information he received from a worker in the furnace room, the Technician believed that a pressure test was to be made on the cooling jacket. The Technician monitored the upper surface and edge and thinks he completed a Work Permit for the Maintenance Supervisor. However, a copy of that Work Permit could not be located and the Maintenance Supervisor says he did not request monitoring or a Work Permit for the defective lid.

While completing the monitoring on the defective lid, the Technician was called to the Maintenance Supervisor's office to complete the Work Permit for which he had monitored earlier (approximately 4:45 p.m.) at the furnace enclosure. Although the Supervisor asked for the permit to be completed, there was no work done under the permit because the lid had already been replaced.

While the Technician was recording data on the permit, the Supervisor showed him the first-shift permit which recommended a limit of three hours; they briefly discussed the difference in recommended times (3 hours versus 2.25 minutes). At 10:00 p.m., the Technician called his supervisor, at home, and reported the difference in monitoring results. An investigation by the Health Physics Department was begun on Monday, January 13, 1986, which was the next regularly-scheduled work day after the attempted lid repairs.

On January 17, 1986, the Health Physics Department was convinced that areas of the welder's skin received a beta radiation dose which exceed the quarterly limit set by DOE Order 5480.1. The DOE-FMPC office was formally informed of that conclusion by the WMCO Manager of Environment, Safety & Health, in a letter dated January 20, 1986, (ref. 1). The involved welder and his supervisor were also informed.

Personnel differences are evident in the entries on the Work Permit. One of the most important entries is the description of the job that is covered by the permit. In the first three permits covering the lid work, the job description was terse and vague. In the initial permit, for the work which led to the overexposure, the job description is "Patch furnace lid." There is no indication that the work was to be done on the lid underside where higher beta radiation levels exist. The second permit, requested for the same job by a different Maintenance Supervisor, gave the job description as "Monitor for entry." The same description ("Monitor for entry") was used on the permit that required monitoring of the replacement lid in the first floor furnace room, prior to its

transfer to the remelt furnace 5 on the second floor.

Personal differences are also evident in the manner that other data were recorded on the permits prepared for work on the defective lid or its replacement. While these differences may have no consequences during most operations, they became important during this investigation. Several different systems were used for denoting the hour when the General Information section was completed:

Permit 1	13:10
Permit 2	4:30 p
Permit 3	9:35
Permit 4	6:25

The Permit 1 time can be inferred to be 1:10 p.m. and the Permit 2 time is obviously meant to denote 4:30 p.m. There is no way to determine whether a.m. or p.m. was intended in Permits 3 and 4; of course, it can be deduced by learning what shift the writers were working on the dates noted on the permits.

There is no written procedure for removing furnace lids, replacing lids or for making welding repairs. The July 26, 1985 issue of the Maintenance Manual lists the titles of 224 Maintenance Standards. Objective of the standards is "to provide written information guidance, directions, and standardization of work techniques used at FMPC in the maintenance of plant facilities and equipment." According to page 7-1 of the Maintenance Manual, "maintenance supervisory personnel are responsible to insure that sufficient standards are developed, used and revised..."

IH&R Procedure No. 1.8, dated October 6, 1982, provides instructions for the radiation monitoring of enclosures for completing related sections of the Work Permit. The procedure was prepared when the industrial hygiene and health physics functions were both within the Industrial Hygiene & Radiation Department. As a result, the procedure contains instructions for radiation monitoring and for toxicity testing. In 1985, this single department was reorganized into two separate groups, the Industrial Hygiene Department and the Health Physics Department and there are plans to prepare separate Work Permit procedures within each organization. This procedure is currently being revised by Industrial Hygiene, Industrial Safety, and Health Physics.

ANALYSIS

It seems a basic premise that monitoring for a Work Permit requires that the monitor have a correct opinion of the work covered by the permit. Prior to the start of the welding repair, there were several circumstances which could have led to that correct opinion.

- (1) The Maintenance Supervisor's verbal request for a work permit.
- (2) The job description on the Work Permit.
- (3) Position of the furnace lid when the Industrial Hygiene Technician arrived at the enclosure.
- (4) Conversation between the riggers and the IH Technician.

Each of these important circumstances not only did not convey the correct opinion but actually helped to reinforce the incorrect opinion.

- (1) The Maintenance Supervisor and the IH Technician did not speak directly with each other. By radio, an intermediary relayed the message to the Technician that a Work Permit was needed at remelt furnace 5. From this message, the Technician learned only the general information that work was to be done in the furnace enclosure.
- (2) Section A of the Work Permit contains three blank lines for "Job Description," which is enough room for 20-30 handwritten words. This section is to be completed by the person who initiates the request for the Work Permit. In the permit for the furnace lid welding repair, the job description is given as "Patch furnace lid." A separate entry for "Equipment" identifies the location as "5 Remelt furnace." While these two entries are adequate to identify the item to be repaired, there is no differentiation between the top surface and the underside of the lid.

The lack of differentiation is important because of the higher radiation levels from the undersurface. During the remelting of uranium metal, the beta emitting daughters of uranium-238 act as impurities and rise to the top of the molten metal. Some of this remelt residue becomes airborne in the closed furnace and collects on the underside of the water-cooled stainless steel lid. Levels of beta radiation from residue on the underside usually exceed 1 rad per hour. The thickness of steel in the lid provides an effective shield so that levels on the upper surface are low. When a lid surface is monitored in the remelt furnace enclosure, most of the beta dose rate comes from settled

just on the lid and the general background radiation in the enclosure.

Terse and succinct descriptions are good if they are accurate. On January 11, 1986, a work Permit was completed for realignment of the replacement lid on the furnace. The job description is "Repair Lid Alinement (sic) Cyl." and the equipment identified is "#5 Remelt." Although the wording is brief, it clearly identifies the work location and the work to be done.

- (3) When the IH Technician arrived at the furnace enclosure, the lid was on the lid cleaner which is adjacent to the enclosure doors. An overhead line had been attached to the lid by the riggers and one edge had been raised slightly. This arrangement gave to the IH Technician the appearance that work was to be done on the lid surface or along the edge in the area which had been raised. The Technician monitored the surface and the lid edge and calculated a time limit based on the monitoring results. After the Technician left the area, the riggers continued raising the lid edge until the undersurface was accessible for the welder. If the Technician had arrived after the raising was completed, it would have been obvious that work was to be done on the underside. Because of other calls for his services, the Technician left soon after his monitoring was completed and the permit was filled out; he was not present while the riggers continued raising the lid or when the welder began the repair work.
- (4) The riggers were present when the IH Technician monitored the lid upper surface. The Technician recalls nothing being said by the riggers that would have led him to conclude that monitoring the upper surface was incorrect.

As part of the Work Permit procedure, the first shift Maintenance Supervisor had called the Fire & Safety Inspector because a section of the permit covers an approval for welding. The Inspector went to the Maintenance office, picked up the permit form and proceeded to the furnace enclosure. He inspected the work area, obtained a negative explosimeter reading and completed his part of the permit just as the Technician arrived. The Inspector and Technician spoke briefly about the work; however, the Inspector could not relay information about work on the underside because he did not know of that plan.

The main reason given for attempting the lid repair in the furnace enclosure was the desire to avoid the time and effort involved in moving the lids. The Committee learned that informal consideration had been given periodically to an overhead rail and hoist system for this task. However, the considerations never advanced to an actual project.

During this investigation, Production and Mechanical personnel expressed the opinion that the lid cleaners do not function as intended. They are unused and the opinion was given that performance was no better when the devices were new. The floor opening in which the cleaner is housed adds to the difficulty in working in the furnace enclosure as well as causing increased radiation exposure levels.

CONCLUSIONS

(1) Findings

The procedure for a Work Permit for the welding repair was initiated and if correctly implemented would have prevented the exposure in excess of the present standard.

The Technician who monitored for the first Work Permit did not have a correct opinion of the planned welding repair and, therefore, did not monitor the proper work area.

There were opportunities for correct information to be conveyed to the Technician but those opportunities were missed.

(2) Probable Causes

The Technician who monitored for the first Work Permit and the Maintenance Supervisor who requested the first permit did not speak with each other. The request for a permit was relayed by an intermediary via radio to the Technician and details of the work were not part of the message.

The job description on the Work Permit was ambiguous - it could have meant repair work was to be done on either lid surface (top or underside).

The position of the lid in the enclosure gave the impression that work was to be done on the top surface and the Technician had received no contrary information.

Workers at the furnace enclosure observed the monitoring of the lid surface and did not specifically inform the Technician that the underside was to be repaired.

(3) Judgment of Needs

A method is needed to insure that persons monitoring for Work Permit purposes have a correct opinion of the work to be performed.

A system is needed to lessen the difficulty of moving lids into and out of the remelt furnace enclosures.

A decision is needed regarding the usefulness and future status of the lid cleaners. This decision should lead to either renovation of

the cleaners if they are needed or eventual removal if the cleaners are ineffective and are not to be improved.

Replacement of furnace lids is a major task because of the physical handling required and the potential for beta exposure. A written procedure for this task is needed to ensure proper handling and to help ensure that beta exposures are kept as low as reasonably achievable.

H. O. Christiansen
H. O. Christiansen, Chairman

Paul P. Ball
P. D. Ball

M. W. Boback
M. W. Boback

REFERENCES

1. Letter, L. C. Bogar to J. A. Reafsnyder, "Radiation Exposure In Excess Of Quarterly Limits," dated January 20, 1986.
2. Department of Energy Order 5484.1, "Environmental Protection, Safety, And Health Protection Information Reporting Requirements."
3. Department of Energy Order 5484.2, "Unusual Occurrence Reporting System."
4. Letter, L. Scott Walker to H. D. Christiansen/S. L. Hinnefeld, "Remelt Lid Incident Exposure Calculations," dated February 5, 1986.

~~OFFICIAL USE ONLY~~



WMCO:EH(HP):86-001

Westinghouse
Materials Company
of Ohio

PO Box 398704
Cincinnati Ohio 45239

(513) 738 6200

January 20, 1986

J. A. Reafsnyder
Site Manager
U.S. Department of Energy
P. O. Box 39158
Cincinnati, Ohio 45239

RADIATION EXPOSURE IN EXCESS OF QUARTERLY LIMITS

Dear Mr. Reafsnyder:

The purpose of this letter is to provide written confirmation of my January 17 verbal report to you of a radiation exposure to an employee's skin in excess of the quarterly limit prescribed in DOE Order 5480.1, Chapter XI. Mr. [REDACTED], a welder, was the employee involved. The portions of Mr. [REDACTED] skin that were exposed in excess of the limit were his back right scalp and neck, which received 10.7 rem; and the right side of his body, which received 6.5 rem.

The exposure occurred on the afternoon (first shift) of January 10 during maintenance work on the underside of a remelt furnace lid to repair a hole in the water jacket. The furnace lid had been tilted onto its side in order to make its underside accessible. The welding was performed under a Radiation Work Permit (RWP) that reflected radiological conditions that existed when the underside of the furnace was oriented downward onto the furnace jacket. This was discovered when the exposure readings on the first shift RWP were compared to an RWP which was issued for the same job on second shift, and which reflected the radiological conditions that existed when the lid was tilted on its side.

Mr. [REDACTED] personnel dosimeter was read at about 8:00 AM on January 13, his next scheduled work day. It indicated a skin exposure of 258 mrem. However, subsequent investigation by the Environmental & Nuclear Safety Section revealed that the dosimeter's location (left lapel) was partially shielded from the radiation source (i.e., the underside of the furnace lid) by Mr. [REDACTED] body. Mr. [REDACTED] exposure was calculated from dose rate measurements that were made on the furnace lid in question during the week of January 13-17; from Mr. [REDACTED] description of his position when working on the lid; and from his recollection of the amount of time that he spent in that position.

1114691

~~OFFICIAL USE ONLY~~

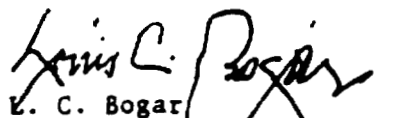
Two riggers and a pipefitter also worked in the vicinity of the furnace lid. Based on their descriptions of the work they performed, their personnel dosimeters are believed to accurately represent the exposures they received. All three dosimeters have been processed and all read less than 200 mrem skin dose.

I have directed that an Unusual Occurrence Report be prepared by Health Physics; and, in addition, I have appointed a Type C investigation panel for this incident. The panel is composed of:

H. D. Christiansen, Chairman	- Manager, Environmental & Nuclear Safety
M. W. Boback	- Director Special Projects
P. D. Ball	- General Supervisor, Plant 5

The Unusual Occurrence Report and the findings of the investigating panel will be prepared and forwarded in accordance with the requirements of DOE Orders 5484.1 and 5484.2.

Sincerely,


L. C. Bogar
Vice President & Manager
Environment, Safety
& Health

SLH/vvs

cc: B. Boswell
W. Britton
H. Christiansen
S. Hinnefeld

Central Files



From: L. Scott Walker

WMCO:EH(HP):86:0016

Date: February 5, 1986

Subject: REMELT LID INCIDENT EXPOSURE CALCULATIONS

To : H. D. Christiansen/S. L. Hinnefeld

The remelt lid incident exposure calculations were based on the following measurements:

Test Equipment	Location	Measured Value (Rems)	
		Skin	Whole Body
Test TLD Badges	Bottom lid lip circumference plane	13.0	0.130
EG&G Beta-Gamma Dose Rate Meter	3" interior to bottom lid lip circumference	14.3 Rem/hr.	
EG&G Beta-Gamma Dose Rate Meter	3" interior to bottom lid lip circumference with instrument covered with clothing	8.6 Rem/hr.	
EG&G Beta-Gamma Dose Rate Meter	3" interior to bottom lid lip circumference inside a welding hood	2.4 Rem/hr.	
EG&G Beta-Gamma Dose Rate Meter	3" interior to bottom lid lip circumference inside welding hood covered with safety glasses sideshield	0.6 Rem/hr.	
EG&G Beta-Gamma Dose Rate Meter	Uncropped Uranium Ingot	1.243 Rem/hr.	
EG&G Beta-Gamma Dose Rate Meter	Uncropped Uranium Ingot through back of leather palm glove	0.855 Rem/hr.	

The dose was then calculated assuming (as the welder testified) that 75% of the one hour it took to complete the job was spent welding. Thus as an example, the 8.6 rem/hr. exposure rate through clothing was multiplied by 75% yielding a dose to the right side of 6.45 rems or (when rounded to one significant decimal) 6.5 rems of exposure to the right side.

Supposedly, a factor had been calculated to take into account the beta shielding afforded by the back of the leather palm glove. After the lid was removed to decontamination it was learned that such a factor did not exist. The shielding factor was then developed by measuring the dose rate at the surface of an uncropped uranium ingot versus the dose rate through the back of a leather palm glove at the ingot surface. This shielding factor (f_s) was then applied to the extremity dose calculation:

$$f_s \times t \times \text{Dose rate} = \text{extremity dose}$$

where $f_s = 0.6888$ $t = 0.75 \text{ hr.}$ Dose Rate = 6 rem/hr.

$$0.689 \times 0.75 \text{ hr.} \times 6 \text{ rem/hr.} = 3.1 \text{ rem}$$

The whole body dose was calculated using the dose recorded by the test TLDs. The TLDs were positioned at the center of the remelt lid radiation field and remained in the field for one hour. The dose was calculated (assuming the torso of the body was at the plane of the remelt lid rim entrance) by multiplying the test TLD exposure (130 mrem/1 hr.) times the occupancy factor (75%) or 98 mrem whole body exposure.

L. Scott Walker

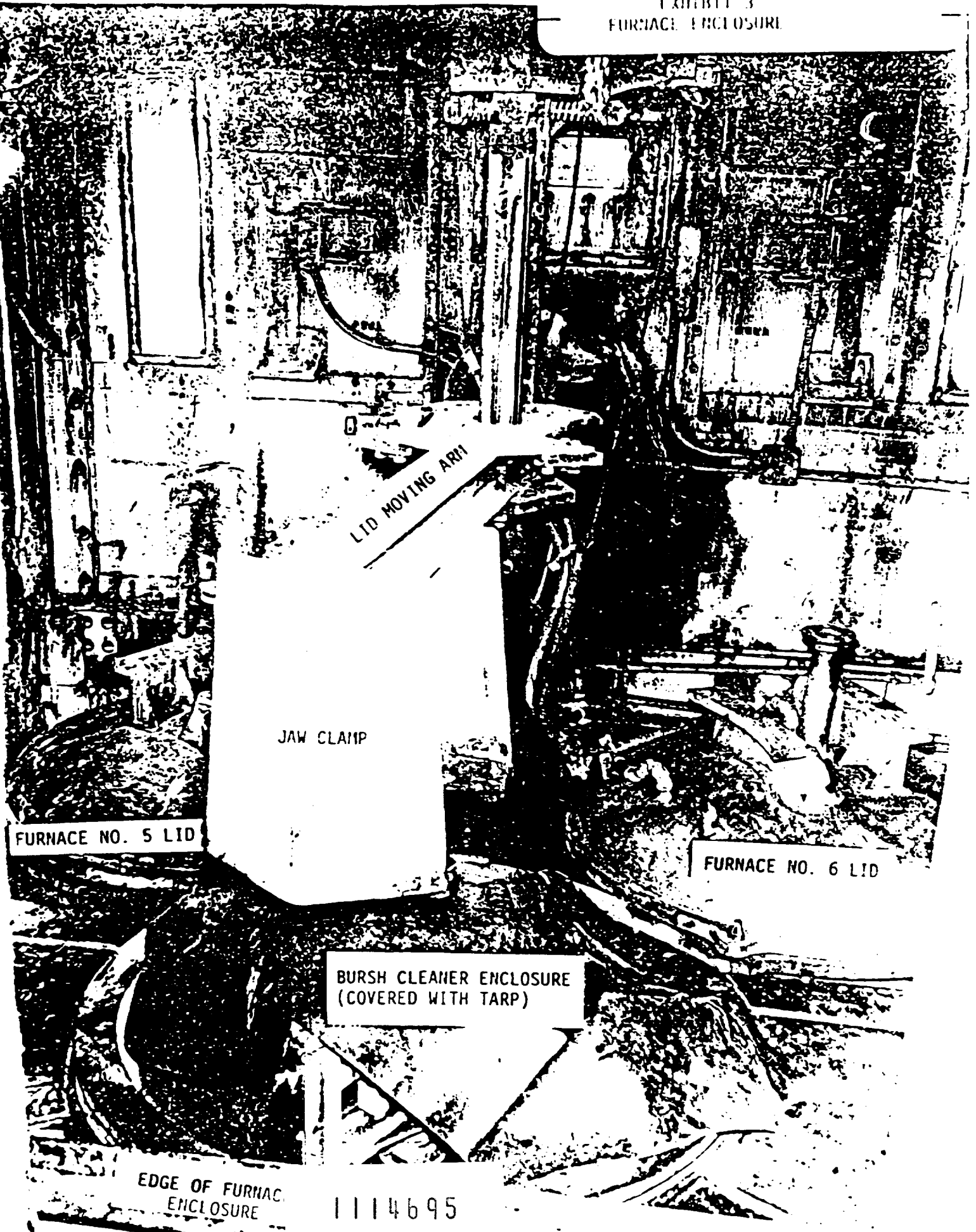
L. Scott Walker

LSW:veb

APPROVED:

S. L. Hinnefeld *2/6/86*
S. L. Hinnefeld Date

EXHIBIT 3
FURNACE ENCLOSURE



LID MOVING ARM

JAW CLAMP

FURNACE NO. 5 LID

FURNACE NO. 6 LID

BRUSH CLEANER ENCLOSURE
(COVERED WITH TARP)

EDGE OF FURNACE
ENCLOSURE

1114695

EXHIBIT 4
FURNACE LID

COLLAR EDGE ON WHICH
REPAIR WAS ATTEMPTED

1114696

NLO, INC.
HEALTH & SAFETY DIVISION
INFORMATION FORM

This form should be used to register a formal complaint as well as to respond to a complaint. It may also be used to make a suggestion, to report an observation, or to respond to either of these. Please indicate the purpose by checking the appropriate block below.

☒ Complaint

☐ Suggestion

☐ Observation

☐ Response

Safety

April 1, 1985

Bob Wiedner

From:

A production foreman named [redacted]
hooked an air line which was connected
an air line respirator that was being used
by me [redacted] while working
near the jaw-crusher. Mr. [redacted] failed
inform me that he was going to
connect my air line. This is but the
second known safety offense of Mr. [redacted]

to Bob Wiedner - April 4

Response to item 3

DISTRIBUTION OF COPIES
Addressee
Health & Safety (RECORD COPY)
Originator

Addressee shall respond within 15 days to the originator of a complaint, reporting action taken or planned.

1114697

NLO, Inc.

A SUBSIDIARY OF NL INDUSTRIES, INC.

CINCINNATI, OHIO 45237

April 16, 1995

SUBJECT SAFETY CONTROLS - AIR SUPPLIED RESPIRATORS
TO E. M. Nutter and J. Farr *Head of Maint./Dept. Super. → who are these ee?*
FROM R. B. Weidner *Production Div. Dir.*
REFERENCE

A safety complaint has been received concerning the disconnecting of the air supply while an employee was using an airline respirator in Plant 5. A recurrence of such an action could result in a serious injury to any personnel working in confined spaces or in tight quarters who are using air-supplied breathing equipment.

To eliminate the hazard described above, it is requested that your areas develop a policy requiring that prior to using any air-supplied respiratory protection, an employee attach an Information Tag to the fittings stating "DO NOT DISCONNECT - AIR-SUPPLIED RESPIRATOR IN USE" or other similar appropriate wording.

This should be accomplished immediately by supervisory directive until a formal policy can be written and issued.

ORIGINAL OF

R. B. Weidner

DEC

DEC/vvs

cc: D. E. Connell
R. W. Lippincott
D. A. Fleming - W. H. Mengel

U.S. DEPARTMENT OF ENERGY
OCCUPATIONAL SAFETY OR HEALTH COMPLAINT

This form is provided for the assistance of any DOE contractor employee or his representative who believes that a violation of DOE safety or health standards exists about which he desires to file a complaint. It is not intended to constitute the exclusive means by which a complaint may be registered with the contractor, the DOE, or the U.S. Department of Labor.

1. A. THE UNDERSIGNED BELIEVES THAT A VIOLATION AT THE PLACE OF EMPLOYMENT SHOWN IN ITEM 2, OF A DOE OCCUPATIONAL SAFETY OR HEALTH STANDARD EXISTS WHICH IS A JOB SAFETY OR HEALTH HAZARD.

(Check One)

☒ Employee

☐ Representative of employees

☐ Other
(Specify) _____

B. DOES THE HAZARD(S) IMMEDIATELY THREATEN DEATH OR SERIOUS PHYSICAL HARM?

☒ YES ☐ NO

2. CONTRACTOR'S NAME

N.L.C.

3. ADDRESS (Street, City, State, Zip Code)

Fernando Pina

4. TELEPHONE NO.

5. SPECIFY THE PARTICULAR BUILDING OR WORKSITE WHERE THE ALLEGED VIOLATION IS LOCATED, INCLUDING ADDRESS

Plant 5

6. KIND OF ACTIVITY *Working on conveyor belt*

7. NAME AND PHONE NUMBER OF CONTRACTOR'S AGENT(S) IN CHARGE

N.L.C.

8. DESCRIBE BRIEFLY THE HAZARD WHICH EXISTS INCLUDING THE APPROXIMATE NUMBER OF EMPLOYEES EXPOSED TO OR THREATENED BY SUCH HAZARD. (Continue on another sheet if necessary)

While working in an enclosure wearing an air line respirator the airline was disconnected by a NLO foreman. The air line was laid aside. This caused a lack of breathing air and also caused the respirator to be removed in a contaminated area.

9. LIST BY NUMBER AND/OR NAME THE PARTICULAR STANDARD(S) ISSUED BY THE DOE WHICH YOU BELIEVE HAS BEEN VIOLATED, IF KNOWN

All Safety Standards

10. A. TO YOUR KNOWLEDGE, HAS THIS VIOLATION BEEN THE SUBJECT OF ANY UNION/MANAGEMENT GRIEVANCE OR HAVE YOU (OR ANYONE YOU KNOW) OTHERWISE CALLED IT TO THE ATTENTION OF, OR DISCUSSED IT WITH, THE EMPLOYER OR ANY REPRESENTATIVE? (Check one)

☒ YES ☐ NO

If "YES" is checked above, please give the results, including any efforts by management to correct the violation.

A placard of installing tape saying "Do not disconnect this air line it is in use" was put into effect by the Company, and the foreman was talked to.

11. PLEASE CHECK ONE:

☐ I do not want my name revealed to the employer.

☒ My name may be revealed to the employer.

6-8-85

(Date)

(Typed or printed name)

IF YOU ARE A REPRESENTATIVE OF EMPLOYEES, GIVE THE NAME OF YOUR ORGANIZATION.

ADDRESS OF ORGANIZATION (Street, City, State, Zip Code)

TELEPHONE NO.

1114699

#85-12



Department of Energy

Oak Ridge Operations

P. O. Box E

Oak Ridge, Tennessee 37831

February 6, 1986

[REDACTED]

Dear [REDACTED]:

DOE OCCUPATIONAL HEALTH OR SAFETY COMPLAINT AT FMPC REGARDING THE DISCONNECTING OF AIRLINE RESPIRATOR HOSE WHILE IN USE AT PLANT 5

Your complaint dated June 8, 1985, regarding the above subject was received in this office on November 27, 1985. It was formally investigated on December 18 and 19, 1985, by a member of the ORO Environment, Safety, and Health Division. The DOE complaint form submitted by you to the DOE Site Manager's office was misplaced resulting in no action on your complaint for approximately five months. The enclosed letter to FMPC details the findings of our investigation and the actions that have been and will be taken.

If you disagree with the investigation results, you have the right to appeal. The appeal process is described in the enclosure.

Your interest and concern with the safety and health of employees at FMPC are appreciated. Should safety or health concerns arise again, hopefully, they can be resolved locally using the procedures and expertise available at your facility.

Sincerely,

David B. Howard, Director
Environment, Safety, and
Health Division

SE-334:Trivette

Enclosures:

1. Appeal Process
2. Ltr. Reafsnider to Boswell w/Enclosure

cc w/Enclosure:

R. L. Egli, SE-30
M. Bruce Boswell, WMC, Fernald

1114700

85-12

OAK RIDGE OPERATIONS

OCCUPATIONAL HEALTH OR SAFETY COMPLAINT APPEAL PROCESS

If you wish to appeal the results of your complaint investigation, you should submit a written statement expressing your views to:

Mr. R. L. Egli, Assistant Manager for
Safety and Environment
U. S. Department of Energy
Oak Ridge Operations, Room 3025
Federal Building
Post Office E
Oak Ridge, Tennessee 37831

The Environment, Safety, and Health Division of the Oak Ridge Operations may also submit a written position statement to Mr. Egli, with a copy to you. Mr. Egli, at his discretion, or at the request of you or the Environment, Safety, and Health Division, may hold an informal conference at which both parties may orally present their positions. After consideration of all views, Mr. Egli would determine the disposition of the complaint. You would be furnished a written copy of his determination.

1114701



Department of Energy
Oak Ridge Operations
P. O. Box E
Oak Ridge, Tennessee 37831

February 6, 1986

Mr. M. Bruce Boswell, President
Westinghouse Materials Company of Ohio
Post Office Box 398704
Cincinnati, Ohio 45239

Dear Mr. Boswell:

DOE OCCUPATIONAL HEALTH OR SAFETY COMPLAINT AT FMPC REGARDING THE DISCONNECTING
OF AIRLINE RESPIRATOR HOSE WHILE IN USE AT PLANT 5

A formal Occupational Health or Safety Complaint (Form EV-628) was received by ORO's Environment, Safety, and Health Division on November 27, 1985. Enclosed is a summary of the investigation.

One violation was noted as a result of the investigation regarding the above subject. This violation has been satisfied in that a policy has been developed and issued requiring that prior to using any air supplied respiratory protection, an employee attach an information tag to the fittings stating that the air supplied respirator is in use and it is not to be disconnected. Training has been given to the personnel to hang the airline respirator hose over walkways and paths used by motorized vehicles. However, a recommendation is made to request a urinalysis, or any other necessary medical examination, as soon as possible from an employee when an incident of this nature occurs and when an employee has the potential to be exposed to a hazardous chemical.

Please implement the recommendation noted in the summary and provide a report of your actions to my office within thirty (30) days of the date of this letter.

You may wish to post the violation and recommendation to inform your employees of actions taken by you on your behalf.

Cooperation extended by members of your staff is appreciated.

Sincerely,

James A. Reafsnyder
James A. Reafsnyder
FMPC Site Manager

SE-334:Trivette

Enclosures:

1. Ltr. to Complainant w/summary
2. DOE Form EV-628

cc w/Enclosures:
R. L. Egli, SE-30

1114702

SUMMARY

DOE OCCUPATIONAL HEALTH OR SAFETY COMPLAINT AT FMPC REGARDING THE DISCONNECTING OF AIRLINE RESPIRATOR HOSE WHILE IN USE AT PLANT 5

A. Basic Facts

A formal complaint dated June 8, 1985, was received in the Environment, Safety, and Health Division on November 27, 1985, regarding the disconnecting of an airline respirator hose while in use at Plant 5. The complaint was misplaced in the Feed Materials Production Center (FMPC) Site Manager's office. The complaint was found on November 27, 1985, and the investigation was initiated by Margaret Wilson, DOE, of the FMPC Site Manager's office. Alan Trivette visited the site on December 18 and 19, 1985, to assist in and complete the investigation.

B. Investigation Activities

An on-site formal investigation was conducted December 18 and 19, 1985, by Alan W. Trivette, Environment, Safety, and Health Division. During the course of the investigation, discussions were held with Weldon Adams, Assistant Manager; Bob Weidner, Industrial Hygiene and Safety Manager; Don Flemming, Industrial Hygiene Supervisor; Bob Lippencott, Fire and Safety Supervisor; Dan Connell, Safety Engineer; Mike Townsend, Production Area Supervisor; Ron Pennix, Maintenance Supervisor; Ray Hansen, DOE; Margaret Wilson, DOE; Don Ray, DOE Attorney; Keith Partridge, Production Supervisor; Doug Jennings, Attorney; Bob Schwab and Milke Playford, Union Representatives, and [REDACTED], Complainant.

A walk-around of the area in Plant 5 where the incident occurred was conducted by Alan Trivette and Don Flemming. The only personnel available that were knowledgeable of the incident were the two supervisors, Mike Townsend and Ron Pennix. A description of the incident that occurred on April 1, 1985, was given by the two supervisors to the DOE representative and the Industrial Hygiene Supervisor.

An investigation was conducted shortly after the incident by a safety engineer. The safety engineer was not available during the DOE investigation.

Separate fact-finding interviews were held with Keith Partridge and [REDACTED].

C. Findings

Inappropriate surveillance of the work area conditions and degree of employee exposure or stress not being maintained resulted in the airline respirator hose being disconnected from the air supply station by a supervisor while an employee was using the airline respirator in Plant 5. This caused a lack of breathing air to the employee using the respirator and the respirator was removed by the employee in a contaminated area.

Corrective action has been taken by the Fernald management to prevent this incident from reoccurring. A formal policy will be written and issued in the new Safety and Health Manual under the "Lockout and Tag" procedure, Section 8.3. In the interim, a policy has been developed and communicated to appropriate personnel in safety meetings requiring that prior to using any air supply respiratory protection, an employee attaches an information tag to the fittings stating "Do Not Disconnect - Air Supplied Respirator In Use."

The airline respirator hose was disconnected from the air supply station to allow passage of a forklift. Training has also been provided to appropriate personnel in safety meetings to hang the airline respirator hose over walkways and paths used by motorized vehicles.

A routine quarterly urine sample was collected for analysis from the complainant ten days after the incident. A concentration of uranium in the urine may be informative when an employee may have an exposure that is suspected to be high. It is good industrial hygiene practice to request a urinalysis or any other medical examination as soon as possible when an incident of this nature occurs and when an employee has the potential to be exposed to a hazardous chemical. The urine sample submitted by the complainant on April 10, 1985, was below the action level for uranium.

D. Conclusions

The airline respirator hose should not have been disconnected from the air supply station during its use by an employee. The actions taken by the Fernald Management were appropriate to prevent reoccurrence of this type of incident. To wait ten days for the submission of a urine sample after the employee's potential exposure is not good industrial hygiene or health physics practice.

E. Recommendation

Request a urinalysis or any other necessary medical examination as soon as possible from an employee when an incident of this nature occurs and when an employee has the potential to be exposed to a hazardous chemical.

F. Violation

29 CFR 1910.134 (b)(8): Appropriate surveillance of work area conditions and degree of employee exposure or stress was not maintained during the use of an airline respirator by an employee during work on a conveyor belt below the floor in Plant 5.

U.S. DEPARTMENT OF ENERGY
OCCUPATIONAL SAFETY OR HEALTH COMPLAINT

This form is provided for the assistance of any DOE contractor employee or his representative who believes that a violation of DOE safety or health standards exists about which he desires to file a complaint. It is not intended to constitute the exclusive means by which a complaint may be registered with the contractor, the DOE, or the U.S. Department of Labor.

1. A. THE UNDERSIGNED BELIEVES THAT A VIOLATION AT THE PLACE OF EMPLOYMENT SHOWN IN ITEM 2. OF A DOE OCCUPATIONAL SAFETY OR HEALTH STANDARD EXISTS WHICH IS A JOB SAFETY OR HEALTH HAZARD.

(Check One)

☐

Employee

☒

Representative of employees

☐

Other
(Specify) _____

- B. DOES THE HAZARD(S) IMMEDIATELY THREATEN DEATH OR SERIOUS PHYSICAL HARM?

☐

YES

☒

NO

2. CONTRACTOR'S NAME

NATIONAL LEAD CO. OF OHIO

3. ADDRESS (Street, City, State, Zip Code)

N.I.O.; P.O. Box 30158, Cincinnati
Ohio 45233

4. TELEPHONE NO.

513-738-1151

5. SPECIFY THE PARTICULAR BUILDING OR WORKSITE WHERE THE ALLEGED VIOLATION IS LOCATED, INCLUDING ADDRESS.

Security Police post # 10, Main employee entrance (turnstile booth)

6. KIND OF ACTIVITY

Unsanitary, unhygienic eating place

7. NAME AND PHONE NUMBER OF CONTRACTOR'S AGENT(S) IN CHARGE

Larry Devir 513-738-1151

8. DESCRIBE BRIEFLY THE HAZARD WHICH EXISTS INCLUDING THE APPROXIMATE NUMBER OF EMPLOYEES EXPOSED TO OR THREATENED BY SUCH HAZARD. (Continue on another sheet if necessary)

23 employees exposed and threatened.
Also see attachments.

9. LIST BY NUMBER AND/OR NAME THE PARTICULAR STANDARD(S) ISSUED BY THE DOE WHICH YOU BELIEVE HAS BEEN VIOLATED, IF KNOWN.

Unknown

10. A. TO YOUR KNOWLEDGE, HAS THIS VIOLATION BEEN THE SUBJECT OF ANY UNION/MANAGEMENT GRIEVANCE OR HAVE YOU (OR ANYONE YOU KNOW) OTHERWISE CALLED IT TO THE ATTENTION OF, OR DISCUSSED IT WITH, THE EMPLOYER OR ANY REPRESENTATIVE? (Check one)

☒

YES

☐

NO

- B. IF "YES" IS CHECKED ABOVE, PLEASE GIVE THE RESULTS, INCLUDING ANY EFFORTS BY MANAGEMENT TO CORRECT THE VIOLATION.

See photocopies attached

11. PLEASE CHECK ONE:

☐

I do not want my name revealed to the employer.

☒

My name may be revealed to the employer.


(Signature)

(Date)


(Typed or printed name)

IF YOU ARE A REPRESENTATIVE OF EMPLOYEES, GIVE THE NAME OF YOUR ORGANIZATION.

NIO Security Police

ADDRESS OF ORGANIZATION (Street, City, State, Zip Code)

Same as Above

1114705

83-6
TELEPHONE NO.

William H. Travis
U.S D.O.E
O.K.E Ridge Operations
Office, P.O Box 2.
OKE Ridge, Tennessee 37830

July 12, 1983

Reply To:

Security police at post #10 must physically check the I.D badges of all employees entering N.L.O. They must take the badge in hand and compare it to the person entering, according to a recent D.O.E. order. Since security police are ordered to eat in post #10, when assigned that post, we feel, that it is an unsanitary and unhygienic eating location, as there are no facilities to wash hands after handling the badges. The security police either have to quit eating, or eat with contaminated hands, or not eat at all.

It is a known fact that the badges are not clean, and maybe contaminated with radiation, chemicals and most probable of all, with germs. With the recent outbreaks of hepatitis in this area, there is even more reason to discontinue this practice.

An official written complaint was made to N.L.O., concerning this situation, and the reply was that the amount of radiation a person could consume in this manner, was in no way harmful. But if even this small amount could be avoided, would it not be a good idea to avoid it? Also, in the reply they neglected to mention anything about the germs and the filth that would be consumed after handling the badges and eating with the same unwashed hands.

I would also like to mention that security officer, [REDACTED], who filed the original complaint with N.L.O., was later called in, to discuss with Lt. Niemeyer, his complaint, and the reply received from N.L.O. After a lengthy discussion about the hazards of eating at post #10, Lt. Niemeyer sided with the company's reply that there was no danger in eating at post #10, and handling badges at the same time. However, when asked by security officer [REDACTED] what he, Lt. Niemeyer, would personally do in such a case, Lt. Niemeyer replied that after he handled the badges, he would wash his hands, before continuing to eat.

Respectfully yours,

("COMPLAINANT'S NAME DELETED")

1114706

#1105
JUL 18 1983

October 3, 1983

[REDACTED]
[REDACTED]
[REDACTED]
Dear [REDACTED]:

DOE OCCUPATIONAL SAFETY OR HEALTH COMPLAINT AT NLO REGARDING UNSANITARY CONDITION AT POST #10 WHILE SECURITY GUARDS CHECK EMPLOYEE BADGES AND EAT LUNCH

Your complaint of July 12, 1983, regarding the above subject was investigated by a member of my staff. Enclosed is a summary of our investigation. As discussed with you on September 6, 1983, by Alan Trivette, since the situation described in your complaint does not involve a violation of DOE safety or health standards, a formal onsite inspection was not conducted. By copy of this letter, management at your facility is being formally advised of our evaluation.

If you disagree with our investigation results, you have the right to appeal. An appeal would be initiated by submitting a written statement of your views to the Oak Ridge Operations Technical Advisor to the Manager at the following address:

Mr. Charles A. Keller
Technical Advisor to
the Manager
Room 3025, Federal Building
U.S. Department of Energy
Oak Ridge Operations
Post Office Box E
Oak Ridge, Tennessee 37831

We may also submit an opposing written statement of position to Mr. Keller. If so, a copy will be sent to you. Mr. Keller, at his discretion, or at your request, or at our request, may hold an informal conference in which both parties may orally present their positions. After consideration of all views, he would determine the disposition of the complaint. His determination would be final and not subject to further review. You would be furnished a written copy of the final determination.

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

1114707

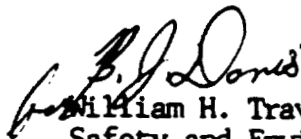
Complainant

2

October 3, 1983

Your interest and concern with the safety and health of the employees at NLO are appreciated.

Sincerely,



William H. Travis, Director
Safety and Environmental
Control Division

SE-334:AWT

Enclosure:
Summary

cc w/encl.:
R. M. Spenceley, NLO
C. A. Keller, M-3

1114708

SUMMARY

DOE OCCUPATIONAL SAFETY OR HEALTH COMPLAINT AT NLO REGARDING UNSANITARY CONDITION AT POST NO. 10 WHILE SECURITY GUARDS CHECK EMPLOYEE BADGES AND EAT LUNCH.

1. Basic Facts

On July 18, 1983, an Occupational Safety or Health Complaint (Form 628 attached) dated July 12, 1983, was received by William H. Travis, Director, Safety and Environmental Control Division. The complaint alleged unsanitary condition at Post No. 10 because there are no facilities immediately available for security guards to wash their hands after physically checking employee badges.

2. Investigation Activities

Since it was judged that a physical inspection was not warranted, information was requested in order to evaluate the allegation. Mr. Alan Trivette, Safety and Environmental Control Division, ORO, had telephone conversations with Mr. Mike Boback, Director of Health and Safety; Mr. Bob Weidner, Chief, Industrial Hygiene & Radiation; and [REDACTED], complainant.

The discussions covered the rotation of the guards at Post No. 10, time frame allowed for lunch, badge surveys, and an employee suggestion.

A written suggestion from an NLO employee, dated June 2, 1983, had been made regarding the same subject as the complaint. A response from management, dated June 10, 1983, was made explaining any contamination received as a result of the security guards physically checking the employees' badges while eating at Post No. 10 would be so minimal as to be negligible.

The guard is allowed to eat his lunch at Post No. 10 during the two-hour duty at this post. There is no hand sink or running water in Post No. 10

for the guards to use. The guard is allowed to visit the restroom prior to the duty at Post 10 or to call for a guard relief if a restroom break is needed during this shift. If a guard relief is not available, the turnstile is temporarily closed during the time required to visit the restroom. Restrooms are within easy access to Post No. 10.

The industrial hygiene staff discussed the disease transmission potential via handling employees' badges with Dr. R. B. Rardin, Medical Department Physician. It is his opinion there should be no health problem with the guards handling the badges.

All employee and visitor badges are read by the Health Physics Department for radiation contamination at the end of the month. No security guards' badges have had high readings to require cleaning.

3. Conclusion

The investigation conducted revealed no violation of safety and health standards. The written suggestion on the same subject received prompt and adequate attention by the appropriate staff, and a response was provided in a timely manner.

4. Recommendations

None.

5. Violations

None.

Attachment:
As stated

This form should be used to register a formal complaint as well as to respond to a complaint. It may also be used to make a suggestion, report an observation, or to respond to either of these. Please indicate the purpose by checking the appropriate block below.

☒ Complaint

☒ Suggestion

☒ Observation

☐ Response

Subject: UNSANITARY EATING LOCATION AND CONDITION

Date: 6/2/87

To: R. LIPPINCOTT AND M. BOBACK

From: [REDACTED]

Message: UNSANITARY
LOCATION FOR SECURITY POLICE TO EAT, WHEN WE A
ASSIGNED TO POST TO THE PROBLEM IS EMPLOYEES ENTERING THE PROJECT
MUST HAVE THEIR RAD- PHYSICALLY CHECKED BY SECURITY WHO IF EATING
AT THE TIME WOULD CONTAMINATE THEIR HANDS WITH RADIATION OR
ANY UNKNOWN SUBSTANCE THAT MAYBE ON THE RAD- CHEMICALS, GERMS
IT IS MY OBSERVATION THAT THERE IS NO WAY THAT FULL ATTENTION CAN
BE GIVEN TO THE ENTERING & EXITING EMPLOYEES WHILE THE GUARDS ARE
ASSIGNED TO HAVE LUNCH IN THE TURNSTILE, WHILE POSTED AT POST #1.
SUGGESTION: RELIEVE THE GUARD AT POST #1 DURING HIS LUNCH TIME
TO EAT IN THE DESCRIBED LUNCH ROOM.

NLC SECURITY POLICE

NO.	DISTRIBUTION OF COPIES
1	Addressee
2	Health & Safety (RECORD COPY)
3	Originator

Addressee shall respond within 15 days to the originator of a complaint, reporting action taken or planned.

NLO, INC.
HEALTH & SAFETY DIVISION
INFORMATION FORM

This form should be used to register a formal complaint as well as to respond to a complaint. It may also be used to make a suggestion, to report an observation, or to respond to either of these. Please indicate the purpose by checking the appropriate block below.

☐ Complaint

☐ Suggestion

☐ Observation

☒ Response

Subject: UNSANITARY EATING LOCATION AND CONDITION

Date: 6/10/83

To: [REDACTED]

From: R. B. Weidner

Message: Your complaint has been given to me for a reply. It is our opinion, based on
past experiences, that no problems should result from the Security Guards physically
checking the employees' badges while eating at post #10. The amount of contamination,
if any, would be so minimal as to be negligible.

The other problems associated with this operation (e.g., "... no way that full
attention can be given to the entering and exiting employees ..." is not a Health
and Safety matter and should be handled through your supervisor.

NO	DISTRIBUTION OF COPIES
1	Addressee
2	Health & Safety (RECORD COPY)
3	Originator

Addressee shall respond within 15 days to the originator of a complaint reporting action taken or planned

OCCUPATIONAL SAFETY OR HEALTH COMPLAINT

This form is provided for the assistance of any ERDA contractor employee or his representative who believes that a violation of an ERDA safety or health standard exists about which he desires to file a complaint. It is not intended to constitute the exclusive means by which a complaint may be registered with the contractor, the ERDA, or the U.S. Department of Labor.

1. A. THE UNDERSIGNED BELIEVES THAT A VIOLATION AT THE PLACE OF EMPLOYMENT SHOWN IN ITEM 2. OF AN ERDA OCCUPATIONAL SAFETY OR HEALTH STANDARD EXISTS WHICH IS A JOB SAFETY OR HEALTH HAZARD

(Check One)



Employee(s)



Representative of employees



Other (Specify) _____

B. DOES THE HAZARD(S) IMMEDIATELY THREATEN DEATH OR SERIOUS PHYSICAL HARM?



YES



NO

2. CONTRACTOR'S NAME

NLO, Inc. (Nat'l Lead Co. of Ohio)

3. ADDRESS (Street, City, State, Zip Code)

P. O. Box 39158, Cincinnati, OH 45239

4. TELEPHONE NO.

513-738-1151

5. SPECIFY THE PARTICULAR BUILDING OR WORKSITE WHERE THE ALLEGED VIOLATION IS LOCATED, INCLUDING ADDRESS.

Plant 5

6. KIND OF ACTIVITY

Jolter operation

7. NAME AND PHONE NUMBER OF CONTRACTOR'S AGENT(S) IN CHARGE

(same as above)

8. DESCRIBE BRIEFLY THE HAZARD WHICH EXISTS INCLUDING THE APPROXIMATE NUMBER OF EMPLOYEES EXPOSED TO OR THREATENED BY SUCH HAZARD. (Continue on another sheet if necessary)

Jolters lining pots with magnesium fluoride dispenses mag. fluoride dust constantly into the air which is breathed by the employees.

9. LIST BY NUMBER AND/OR NAME THE PARTICULAR STANDARD(S) ISSUED BY THE ERDA WHICH YOU BELIEVE HAS BEEN VIOLATED, IF KNOWN.

10. A. TO YOUR KNOWLEDGE, HAS THIS VIOLATION BEEN THE SUBJECT OF ANY UNION-MANAGEMENT GRIEVANCE OR HAVE YOU (OR ANYONE YOU KNOW) OTHERWISE CALLED IT TO THE ATTENTION OF, OR DISCUSSED IT WITH, THE EMPLOYER OR ANY REPRESENTATIVE? (Check one)



YES



NO

B. IF "YES" IS CHECKED ABOVE, PLEASE GIVE THE REASON, INCLUDING ANY EFFORTS BY MANAGEMENT TO CORRECT THE VIOLATION.

The fact is, the situation still exists.

PLEASE CHECK ONE



I do not want my name revealed to the employer.



My name may be revealed to the employer.

11/1/80

(Date)

(Typed or printed name)

IF YOU ARE A REPRESENTATIVE OF EMPLOYEES, GIVE THE NAME OF YOUR ORGANIZATION.

ADDRESS OF ORGANIZATION (Street, City, State, Zip Code)

TELEPHONE NO.

Log #18

1413

1114713

December 24, 1980

NLO, Inc.
ATTN: Mr. Samuel F. Audia
Manager
Post Office Box 39158
Cincinnati, Ohio 45239

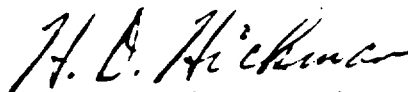
Gentlemen:

DOE OCCUPATIONAL SAFETY AND HEALTH COMPLAINT AT NLO, INC., PLANT 5,
REGARDING EXPOSURE TO MAGNESIUM FLUORIDE

A formal occupational safety and health complaint was received by
ORO's Safety and Environmental Control Division on November 7, 1980.
Enclosed for your information is a summary of their investigation.
There were no DOE standards violations observed nor any recommenda-
tions resulting from the investigation.

Since the complainant requested to remain anonymous and no address
was provided, we would appreciate you posting this letter in the
work area for a period of five days.

Sincerely,


H. D. Hickman, Director
Manufacturing Division

MS-334:KES

Enclosure:
Summary

cc w/encl.:
C. A. Keller, MS-30
J. W. Swafford, PE-10
W. H. Travis, MS-33

1114714

**SUMMARY OF OCCUPATIONAL SAFETY AND HEALTH COMPLAINT AT NLO, INC.,
REGARDING EXPOSURE TO MAGNESIUM FLUORIDE IN PLANT 5**

1. Basic Facts

On November 7, 1980, an occupational safety and health complaint dated November 1, 1980, was received by W. H. Travis. The complainant requested to remain anonymous. The complaint (Attachment 1) alleged excessive magnesium fluoride dust being constantly generated at the jolter operation in Plant 5. It was noted on the complaint that the situation had been called to the employer's attention, but the alleged excessive air concentrations still existed.

2. Investigation Activities

An onsite investigation was conducted on November 25, 1980, by Kenneth E. Shank and John R. Martin, Safety and Environmental Control Division, ORO. The investigation team met with Mr. R. C. Heatherton, Director of Health and Safety, who coordinated the needed response from the employer. A tour of the jolter area was conducted by the investigation team, along with Mr. W. J. Adams, General Superintendent; Mr. L. E. Green, Health Physicist; and Mr. V. Gessendorf, Union Safety Representative. Interviews were conducted with the foreman for the jolter area and the jolter operator. No health complaints were voiced to the investigation team. It was noted that a former jolter operator had a skin complaint about a year ago, but this was later discerned to be nonwork related. Excessive magnesium fluoride air concentrations were not apparent during the tour. Air sampling and jolter ventilation measurements were requested by the investigation team to be performed that day. A review of air sampling, urinalysis, and in-vivo data was conducted. No evidence of overexposure was indicated in the data. The jolter ventilation measurements also indicated adequate air flow.

3. Conclusions

There were no violations of DOE standards observed nor evidence to support the allegations of adverse health effects. However, continuing adequate breathing zone samples and ventilation measurements need to be performed to assure worker protection.

4. Action Required

There are no DOE standards violations requiring correction nor are any recommendations being made.

Attachment:
Form ERDA-628

1114715

June 12, 1976

Dr. Thomas H. Mancuso
THE MACHINIST
909 Machinist Building
Washington, District of Columbia 20036

Dear Doctor Mancuso:

My name is [REDACTED]. I am [REDACTED] years of age. I live in Cincinnati, Ohio and have been a member of Machinist local 1901 for twenty years. I have been employed by THE NATIONAL LEAD COMPANY OF OHIO at Fernald, Ohio for twenty-two and one-half years mostly as a Machine Tool Operator. The company, upon completion in the early part of 1952, has been a Uranium Feed Material Plant for the Federal government and the Atomic Energy Commission when the A.E.C. was in existence.

I am writing to you, Sir, at the urging of the Machinist Disability Claims representative who has filed my claim with the Ohio State Compensation Board on the grounds of Radiation illness, #24 in the Ohio Compensation Law. I am, at present, medically retired on Social Security, and with almost no hope of ever being gainfully employed again. Also, I would like to say I am writing to you not necessarily to gain space in THE MACHINIST but for any assistance or helping hand that you could offer. The Claims Representative has heard you speak on several occasions and told me you were extremely interested in the effects of radiation and the physical damage it can cause individuals who are employed with radioactive materials and are exposed to its effects on their daily jobs.

In March Of 1952, I became employed in the Machining Department for The National Lead Company, machining solid uranium metal and continued at this for twenty years. I operated turret lathes, Acme screw machines, centerless-grinders, boring machines and many other jobs in the actual turning, cutting, grinding, boring of normal and enriched uranium metal. The machine area was equipped with a vacuum system, consisting of metal tubes placed over all the machines to carry off contaminated smoke and fumes which was by no means one hundred percent effective. Uranium

111471b

Page 11
June 12, 1976

Dr. Thomas H. Mancuso
Washington, D. C. 20036

ignites into flame when machined and even with a coolant system I consumed a lot of the smoke that escaped outside the hood every working day for many years. I came into contact with uranium in many ways. There was a constant blue haze in the machining area when the machines were running. As an operator, I had to constantly cope with burning uranium. The company furnished all of our work clothing such as underwear, coveralls, socks, shoes, etc., to be worn in the contaminated areas. Whenever a worker left a contaminated area he was required to take a shower.

About seven years ago I noticed burning while passing water. At first I thought it was a strain or an acid condition, but upon examination by my Urologists they found I had a Bladder tumor which was removed by Cystoscope surgery (was found to be malignant). I went to the hospital every six months and yearly until it was finally decided upon to remove my bladder and prostate gland. The surgery was performed in the spring of 1974. In the Spring of this year, I underwent another operation of five and one-half hours duration to reconstruct kidney tube as one of my kidneys was hardly functioning.

My Doctors, who are Urologists of note, have told me that in their opinion, my illness, which has left me an invalid, was the result of my working with Uranium over a long period of time.

My Workmans Industrial Claim is in the state capital at Columbus, Ohio. I am awaiting for my hearing to take place to see if they will accept my claim as I feel personally that the Uranium caused all of my illness because I was well physically when I started and after a time I started to progressively feel worse. If my case was accepted it would consequently help others in the future.

I have noticed certain negative attitudes when speaking to others about radiation even some of my former fellow workers and some Doctors who don't want to commit themselves completely. Even the Federal Government

1114717

Dr. Thomas H. Mancuso
Washington, D. C. 20036

tries to, as they say, "Pass the Buck". Of course, they do not like
dissent amongst the people of the country because the Oil Companies
and Utility Companies want to build and convert to Atomic Power Plants.

I am in need of unbiased and professional support. This is the reason
for my personal letter to you.

Doctor Mancuso, I hope you can oblige me in anyway possible.

I remain,

Gratefully yours,

(NAME DELETED)

(NAME AND HOME ADDRESS DELETED)

1114718



**INTERNATIONAL ASSOCIATION of MACHINISTS
and AEROSPACE WORKERS**

MACHINISTS BUILDING, 1300 CONNECTICUT AVENUE, WASHINGTON, D. C. 20036

Office of the

Area Code 202
785-2525

MEDICAL CONSULTANT

Thomas F. Mancuso, M.D.
Graduate School of Public Health
University of Pittsburgh,
Pittsburgh, Pa. 15261

July 7, 1976

(INSIDE ADDRESS DELETED)

Dear [REDACTED]

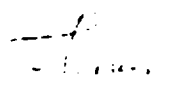
This is in response to your letter advising me that you had been employed as a machinist for 22 years, machining uranium. You now have bladder tumor and also kidney damage.

As I told you on the phone, it was my belief that uranium could cause kidney damage, and this is stated in the enclosed medical report about uranium.

So there is no question at all about that fact, and the fact that you were exposed to 22 years to uranium fumes.

Now as I suggested on the phone, you should make a determined effort to find other workers who left and became sick, who also developed kidney damage. Now the damage could take on many different forms, some may have tumors, or nephritis or nephrosis, or have highly elevated blood pressure. So in your inquiry with the union find out what kinds of sicknesses the workers at this plant had that were doing similar type of work as you. Send me that information.

Sincerely,


Thomas F. Mancuso, M.D.
Research Professor
Department of Industrial
Environmental Health Sciences

Enclosure

TFM/fam

1976 - The Year for Progress

1114719

14-5 Uranium mining and milling.

The problem of radiation of radon and radioactivity in the uranium mining industry has been known for many years. Since the 18th century it has been known that miners in the pitchblende mines of Saxony and Bohemia have suffered a high incidence of fatal respiratory disease. It was not until after 1930 that the possible connection was suspected between the high radioactivity of the atmosphere in the mines and the development of lung cancers in the miners after long occupational exposure and an average latent period of 17 years (30).

It is uncertain whether the high incidence of lung cancer in the miners is due to inspired radon itself or to radon decay products which adhere to dust particles and are inhaled as such. Although the exact etiological agent is not clearly defined, the existence of a radiologic health hazard in the mines is unquestioned. The uranium mining and milling industries are relatively recent developments in the United States, but they are expanding and the concentration of radon in the unventilated mines of the Colorado Plateau is higher than the median concentration of radon reported in the mines of Bohemia and Saxony (32). Furthermore, it is known that American uranium miners are excreting the radon decay product, polonium (33).

14-6 Uranium. The biological effects of uranium are better understood than those of any other internal emitter. This is due largely to the extensive studies carried out under the Manhattan Project during and after World War II (34,35). Uranium is of biological importance because it is a powerful chemical nephrotoxin, and not because of its radioactivity.

Fortunately, only trace amounts of uranium are absorbed from the gastrointestinal tract and skin. Uranium in the blood tends to convert to the hexavalent ion, which is complexed with protein and bicarbonate in nearly equal amounts (36). The latter complex is diffusible. Hexavalent uranium leaves the blood stream rapidly, 40 percent of an injected dose being cleared in about 20 hours (37). After leaving the blood, the major sites of retention are bone and kidney. Rats have been shown to deposit 6 to 20 percent of an intravenous dose in the skeleton, 20 percent in the kidney, and to excrete 50 to 75 percent in the urine during the first 24 hours (38). Similar data have been reported for human beings (37). Within one to two months nearly all of the uranium held in soft tissues is excreted in the urine, leaving only the fixed bone deposits.

Because of the low level of radioactivity of the natural mixture of uranium isotopes, a significant radiation dose far exceeds the nephrotoxic dose. Therefore, uranium deposits in bone do not constitute a radiological hazard (39).

The ingra is a chemical one and is independent of the concentration of radioactivity of the uranium isotope used (40). In contrast to the highly appearing chemical lesions due to the alpha particles, the lesions of the kidney, the chemical effects of uranium on the kidney are acute and of a reversible nature. Most of the urinary excretion occurs in the first 24 hours, during which time the diffusible uranium bicarbonate complex enters the glomerular filtrate. In the proximal convoluted tubule the bicarbonate complex breaks down, freeing the uranyl ion (41), which, by blocking carbohydrate metabolism, injures the epithelial cells. Autonephrograms of human kidneys show uranium concentrated in the cortex on the luminal surfaces of the proximal convoluted tubule and in tubular casts (42). There is no chronic form of uranium poisoning.

14-7 Polonium. The first detailed study of the metabolism of polonium was carried out during the years 1924 to 1938 by Fawcett and his associates (43). They found that in rats and rabbits polonium is excreted through the kidneys, and that the retained material is concentrated in the cells of the reticulo-endothelial system, the highest concentrations occurring in the lymphoid tissues, kidney, liver, bone marrow, and lungs. Casarett (44) in 1948 and Fink and his group in 1950 (45) described the acute effects of intravenously administered polonium in rats. Finkel et al (46) injected polonium intravenously into mice and found an LD₅₀ and distribution and excretion patterns similar to those in the rat.

Polonium forms colloidal aggregates at a physiological pH. Autoradiographic studies suggest that intravenously injected polonium chloride occurs in two systems: in colloidal aggregates and as iontoprope, singly dispersed atoms or molecules. Colloidal particles are removed from the blood in about two hours by phagocytosis in the reticulo-endothelial system. Nonparticulate polonium concentrates in the epithelium of the proximal and convoluted tubules of the kidney. Polonium is not fixed in these tissues in the sense that radium and strontium are fixed in bone. There is a continued relatively high excretion rate, only about 20 percent of injected polonium being retained in tissues after 120 days (corrected for radon decay) (47). After intravenous injection highest concentrations appear in the spleen, lymph nodes, kidneys, and gonads, with less in the liver and bone marrow.

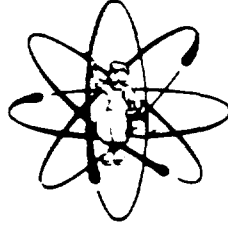
The pathological effects of the alpha particle emission of intravenously administered polonium in rats were studied in detail by Casarett (48). At doses of 10 and 20 $\mu\text{Ci/kg}$ after 425 and 160 days, respectively, he found:

- (1) Slowly progressive arteriosclerotic nephropathy leading to azotemia and hypertension. (The changes in tubular epithelium and glomeruli were secondary to ischemia.)

NATIONAL LEAD COMPANY OF OHIO

A SUBSIDIARY OF NL INDUSTRIES, INC.

P. O. BOX 39158



CINCINNATI, OHIO 45239

PHONE: AREA CODE: 513-738-1151

MAR 28 1977

Mr. H. Doran Fletcher, Director
Uranium Enrichment Operations Division
Oak Ridge Operations
U. S. Energy Research & Development Administration
P. O. Box E
Oak Ridge, Tennessee 37830

Dear Mr. Fletcher:

[REDACTED] - WORKMEN'S COMPENSATION CLAIM NO. OD 167677

By letter dated January 16, 1976, we advised you that our former employee, **[REDACTED]**, had filed a Workmen's Compensation claim alleging that he suffered an occupational disease (radiation sickness) as a result of exposure to uranium in his employment as a machine tool operator at the FMPC. With ERDA approval, **[REDACTED]** allegation and his medical history were referred to local medical specialists who provided written opinions discounting any relationship between **[REDACTED]** cancer of the bladder and his employment at FMPC. These opinions were made a part of the Bureau of Workmen's Compensation's (BWC's) file.

After many months of review and processing by the BWC, this claim has finally been set for a hearing at 10:30 AM on April 11, 1977 in Cincinnati, Ohio. This past week we again reviewed the BWC's file. In addition to opinions by the Bureau's medical and legal sections to the effect that the evidence on file fails to support any causal relationship between employment and the disease, there were letters from **[REDACTED]** to Dr. Thomas H. Mancuso, IAM Medical Consultant, dated June 12, 1976, and Dr. Mancuso's response dated July 7, 1976. Copies of these letters are enclosed for your information. You will note that Dr. Mancuso, who is a contributor to an ERDA contract for epidemiological studies of AEC contractor employees, tends to be supportive of **[REDACTED]** allegation. These two letters, although they are dated this past summer, are recent additions to the file since they were not

357

Mr. H. Doran Fletcher

Page 2

[REDACTED] - Workmen's Compensation Claim No. OD 167677

a part thereof when it was checked by us last month. We surmise that they were inserted by Mr. Robert E. Hauser, IAM Union Representative, who is representing the claimant in this matter.

We will keep you advised of developments.

Sincerely yours,

Original Sign. of E.

S. F. AUDIA

Manager

S. F. Audia

Manager

WJG/rb

Enclosure

cc: H. D. Fletcher

C. W. Hill

/W. A. Johnson

W. J. Grannon

R. C. Heatherton

G. C. Smith

1114722

IN THE COURT OF COMMON PLEAS
HAMILTON COUNTY, OHIO

CERT. MAIL

WPS
@ Dr. Moore
444-7987
@ John Daly - 7879

DIANE T. HICKS, Individually,
and as Administratrix of the
Estate of LARRY WARDELL HICKS
3939 Vine Vista Place
Cincinnati, OH 45217

Plaintiff,

vs.

NLO, Inc., an Ohio Corporation
c/o Statutory Agent
815 Superior Avenue N.E.
Cleveland, OH 44114

and

HANFORD ENVIRONMENTAL
HEALTH FOUNDATION
Post Office Box 100
Richland, Washington 99352

Defendants.

CASE NO: A8506436

SECURITY FOR COSTS IN THE SUM OF \$ 100
DEPOSITED BY S. CHESLEY

COMPLAINT AND
JURY DEMAND

Clerks Fees 74-626-
Paid by S. CHESLEY

Now comes the Plaintiff, Diane T. Hicks, individually,
and as Administratrix of the Estate of Larry Wardell Hicks,
and for her complaint against the Defendants, states as
follows:

1. The Plaintiff, Diane T. Hicks, is now and was
at all relevant times hereto, a resident of Hamilton County,
State of Ohio, and is the widow of Larry Wardell Hicks.
Mr. Hicks also leaves surviving his two minor children,
Ajani L. Hicks and Lawrence Q. Hicks.

2. Defendant, NLO, Inc. ("NLO") is now, and was
at all times relevant hereto, a corporation duly organized

and existing under the laws of the State of Ohio, having its principal place of business in the City of Fernald, Hamilton County, State of Ohio.

3. Defendant, Hanford Environmental Health Foundation, at all times relevant hereto, maintained the Uranium Registry which was funded by the Department of Energy.

4. The decedent, Larry Wardell Hicks, was at all times relevant hereto employed by the Defendant NLO. The decedent began employment with NLO on April 16, 1973 as a laborer. During his tenure, he received various promotions. His last position before his untimely death was as an inspector.

5. Approximately five days prior to his death, the decedent was contaminated by exposure to uranium oxide and/or uranium dioxide ("black oxide") while in the course of his employment at NLO.

6. At the time of his death, decedent, Larry Wardell Hicks, was 33 years old, he was in excellent health, and he had had no prior history of heart disease. On May 20, 1985, Mr. Hicks woke up feeling weak and had difficulty in walking. He was extremely fatigued and he felt that his heart was beating irregularly. Mr. Hicks immediately went to his physician's office, where he was examined and then admitted to the Cardiac Care Unit at Bethesda Hospital. Immediately after taking his medical history

in the hospital, Mr. Hicks went into ventricular fibrillation, which is a disorganized and irregular heart beat. All attempts to save Mr. Hicks' life were to no avail and on May 20, 1985, he was pronounced dead. An autopsy later revealed that he died of acute interstitial myocorditis.

FIRST CAUSE OF ACTION

7. Plaintiff repeats and realleges in this paragraph each of the allegations set forth in paragraphs 1 through 6 as if set forth verbatim.

8. Defendant NLO knew or should have known of the fact that contamination by exposure to black oxide would pose a severe health hazard. Defendant NLO also knew or should have known that its employees in fact became contaminated when exposed to uranium oxide and/or uranium dioxide.

9. Despite this knowledge, Defendant, NLO, intentionally, maliciously, willfully and wantonly failed to correct the hazards of exposure to uranium oxides or failed to warn the decedent of the dangers and conditions that resulted from such exposure.

10. Plaintiff has requested pertinent medical records from Defendant NLO. Despite all assurances that these records would be produced, Defendant, NLO, has not done so. This lawsuit will provide the means for obtaining all of the pertinent records.

11. As a direct and proximate result of NLO's intentional, malicious, willful and wanton conduct, the decedent was contaminated by the "black oxide", which resulted in his death.

12. As a direct and proximate result of the aforementioned conduct of the Defendant, NLO, the Plaintiff was caused to suffer loss of support, services, society, comfort, care, medical and funeral expenses, all to which the Plaintiff has been injured in the amount of \$3,000,000.00 compensatory damages.

SECOND CAUSE OF ACTION

13. Plaintiff repeats and realleges in this paragraph each of the allegations set forth in paragraphs 1 through 12 as if set forth verbatim.

14. Beginning in 1956, NLO undertook a program of obtaining tissue samples primarily from the bodies of deceased former employees. NLO also worked in conjunction with Uranium Registry, which is maintained by Defendant Hanford Environmental Health Foundation and funded by the Department of Energy.

15. The purpose of the program was to surreptitiously obtain samples of body tissue from deceased NLO employees in order to perform certain examinations of the tissues.

16. In order to maintain this clandestine and ghoulish operation, the Defendants attempted to engage the cooperation of various physicians in the community. On information

and belief the Defendants never obtained the required written consents of the individuals involved.

17. Thus, there existed some form of an agreement between Defendant NLO and the Uranium Registry, as run by Defendant Hanford Environmental Health Foundation, to obtain tissue samples without the knowledge of the decedents' families, and give them either to the Uranium Registry and/or to NLO for their studies, which agreement continues to this date.

18. Defendants and the Department of Energy, by and through its agent, Hanford Environmental Health Foundation, planned and conspired to obtain organs and tissue samples from the decedent without the consent of the Plaintiff as required by O.R.C. § 2108.50.

19. In accordance with this plan and conspiracy, the Defendants did in fact obtain or through its co-conspirator, the Uranium Registry, obtained such organs and tissue samples from the body of the decedent, and such actions were willful, wanton and malicious.

20. As a direct and proximate result of the aforementioned actions, Plaintiff has been caused to suffer mental anguish and suffering, all to which Plaintiff has been injured in the amount of \$3,000,000.00 compensatory damages

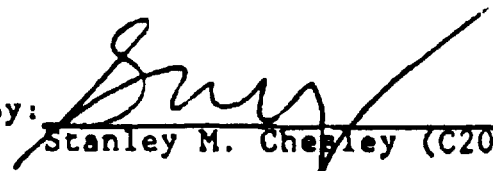
THIRD CAUSE OF ACTION

21. Plaintiff repeats and realleges in this paragraph each of the allegations set forth in paragraphs 1 through 20 as if set forth verbatim.

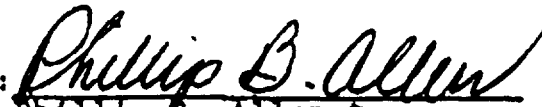
22. The foregoing acts and omissions of the Defendants were willful, wanton and reckless, and caused, directly and proximately, the injuries to Plaintiff as aforementioned, all to which Plaintiff as been damaged in the amount of \$5,000,000.00 punitive damages.

WHEREFORE, Plaintiff, individually, and as Administratrix of the Estate of Larry Wardell Hicks, demands judgment against the Defendant, NLO, in the amount of \$3,000,000.00 compensatory damages, and against the Defendant, Hanford Environmental Health Foundation in the amount of \$3,000,000.00 compensatory damages, and against both Defendants the amount of \$5,000,000.00 punitive damages. Plaintiff also demands all costs, interests, attorneys fees and all other relief to which they may be entitled.

WAITE, SCHNEIDER, BAYLESS
& CHESLEY CO., L.P.A.

By: 

Stanley M. Chesley (C203)

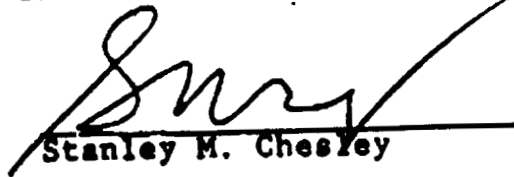
By: 

Phillip B. Allen
1513 Central Trust Tower
Cincinnati, OH 45202
(513) 621-0267

Trial Counsel for Plaintiff

JURY DEMAND

With the filing of this complaint, Plaintiff herein demands a trial by jury on all issues.


Stanley M. Chesley

CLASSIFICATION FORM ref: local rule 11(B)

A - 9 **A8506436** PLAINTIFF: _____SUANT TO SUPERINTENDENCE RULE 4, THIS COMPLAINT WAS ORIGINALLY FILED AND
MISSED UNDER CASE NO. A - BY JUDGE _____

PLEASE INDICATE CLASSIFICATION INTO WHICH THIS CASE FALLS

) APPROPRIATION - 1000-8

) DOMESTIC RELATIONS - 2000

Indicate which classification:

- | | |
|-------------------------------------|-----------------------------------|
| () Alimony Only-2500-51 | () Diss. w/ Minor Child.-2300-37 |
| () Annulment-2400-52 | () Divorce-2000-31 |
| () Dissolution of Marriage-2200-30 | () Divorce w/Minor Child-2100-38 |

) PERSONAL INJURY-3000-2

Indicate if applicable:

- | | |
|---------------------------------|------------------------------|
| () Medical Malpractice-3300-32 | () Vehicle Accident-3100-33 |
|---------------------------------|------------------------------|

) WORKER'S COMPENSATION APPEAL-4000-27

) ALL OTHER CIVIL-9000-34

Indicate if applicable:

- | | |
|----------------------------------|----------------------------------|
| () Accounting-5000-12 | () Foreclosure-5160-3 |
| () Appeal Civil Service-5010-41 | () Foreclosure, Taxes-5170-48 |
| () Appeal Liquor-5020-42 | () Habeas Corpus-5180-11 |
| () Appeal Miscellaneous-5030-5 | () Injunction-5190-9 |
| () Appeal Motor Vehicle-5040-43 | () Legal Malpractice-5500-55 |
| () Appeal Taxes-5050-44 | () Mandamus-5200-19 |
| () Appeal Unemployment-5060-45 | () On Account-5220-49 |
| () Appeal Zoning-5070-46 | () Partition-5230-4 |
| () Breach of Contract-5080-29 | () Quiet Title-5240-25 |
| () Cancel Land Contract-5090-22 | () Replevin-5250-13 |
| () Change of Venue-7001-56 | () Sale of Real Estate-5260-16 |
| () Class Action-5100-54 | () Specific Performance-5270-6 |
| () Convey Declared Void-5110-23 | () Support-5280-10 |
| () Declaratory Judgment-5130-15 | () Temp. Restrain Order-5290-50 |
| () Delinquent Tax-5170-47 | () Testimony-6000-21 |
| () Dissolve Partnership-5150-14 | () U. R. E. S. A.-6100-50 |
| | () Wrongful Death-6200-53 |

NOTIFICATION FORM ref: local rule 11(B)

E NO. A - CAPTION: _____

) DOMESTIC RELATIONS DIVISION () GENERAL CIVIL DIVISION

a) Attorney: _____

Address: _____

Street

City

State

Zip

stituted for: _____

orney for: _____

() Plaintiff () Defendant

() Check this box if above is a change of address.

e Trial Attorney _____

(Please print)

Atty Code

HAMILTON COUNTY, OHIO

DIANE T. HICKS

Plaintiff

— vs —

NLO, INC.

Defendant

Use below number on
all future pleadings

No. A 85-06436
SUMMONS

NLO, INC.
AN OHIO CORPORATION
X STATUTORY AGENT
915 SUPERIOR AVENUE N.E.
CLEVELAND, OH 44114

(D-0001)

*You are notified
that you have been named Defendant (s) in a complaint filed by*

DIANE T. HICKS, INDIVIDUALLY
3939 VINE VISTA PLACE
CINCINNATI, OH 45217

Plaintiff(s)

In the Hamilton County, Court of Common Pleas, Hamilton County Court House, Cincinnati, Ohio 45202. You are hereby summoned and required to serve upon the plaintiff's attorney, or upon the plaintiff, if he has no attorney of record, a copy of an answer to the complaint within twenty-eight (28) days after service of this summons on you, exclusive of the day of service. Your answer must be filed with the Court within three (3) days after the service of a copy of the answer on the plaintiff's attorney.

If you fail to appear and defend, judgment by default will be rendered against you for the relief demanded in the attached complaint.

ROBERT D. JENNINGS

Clerk, Court of Common Pleas
Hamilton County, Ohio

Name and Address of attorney

STANLEY MORRIS CHESLEY
131A CENTRAL TRUST TOWER
CINCINNATI, OH 45202

By Stephen F. Kerbluff Deputy

Date August 8, 1985

1114731

HAMILTON COUNTY, OHIO

DIANE T. HICKS

Plaintiff

- vs -

N.I.O. INC.

Defendant

HANFORD ENVIRONMENTAL
HEALTH FOUNDATION
P.O. BOX 100
RICHLAND, WA 99352

Use below number on
all future pleadings

No. A 85-06436
SUMMONS

(D-0002)

You are notified
that you have been named Defendant (s) in a complaint filed by

DIANE T. HICKS, INDIVIDUALLY
3939 VINE VISTA PLACE
CINCINNATI, OH 45217

Plaintiff(s)

In the Hamilton County, Court of Common Pleas, Hamilton County Court House, Cincinnati, Ohio 45202. You are
hereby summoned and required to serve upon the plaintiff's attorney, or upon the plaintiff, if he has no attorney
of record, a copy of an answer to the complaint within twenty-eight (28) days after service of this summons on you,
exclusive of the day of service. Your answer must be filed with the Court within three (3) days after the service of
a copy of the answer on the plaintiff's attorney.

If you fail to appear and defend, judgment by default will be rendered against you for the relief de-
manded in the attached complaint.

ROBERT D. JENNINGS

Clerk, Court of Common Pleas
Hamilton County, Ohio

Name and Address of attorney

STANLEY MORRIS CHESLEY
131A CENTRAL TRUST TOWER,
CINCINNATI, OH 45202

By Stephen F. Kerbhoff Deputy

Date August 8, 1985

1114732