KNR 11-3 11/24

November 14, 1973

HIGH URANIUM FOR URINES - PLANTS 2 & 3

S. F. Audia

R. M. Spenceley

Letter, Heatherton to Spenceley, dated 11/1/73: "Refinery Urinalysis Report for September, 1973"

Reference report indicates that thirteen chemical operators from Plants 2 & 3 exceeded the allowable limit for uranium in urine in the month of September, 1973. Three of the thirteen were subject to call back procedures. A review of work records indicate that two operations predominate as sources of this contamination. These operations are: (1) dumping of concentrates and (2) denitration area pot deck routines.

The dumping of concentrates requires the use of a respirator. We find that all operators are using the required protection during the dumping operation. However, we also find that at least one operator (Sutton) acknowledges that he wears no respirator when handling and loading empty drums for transfer to the drum washer. Use of a respirator has been made mandatory for this operation. The respirator of this same operator was examined and found to be in good condition with filters in place. Again he acknowledges that he makes no check when he gets a clean respirator to see that filters are in place. The need for such a check has been passed on to all operators.

Exposures resulting from pot deck operations are a little more difficult to pin down. We suspect that clean up operations are the cause in this area. We will insist that operators wear respirators when cleaning up loose UO_3. That portion which may be attributed to packaging operations should be greatly reduced. First, we are now packaging into hoppers rather than drums. Second, additional ventilation has been ordered for this area.

In order to reduce delay between exposure and our follow up, M. Boback has agreed to call to us, immediately, any urine results above standards. This will permit us to more accurately determine the cause for exposure and to move the exposed operator to another operation.

Original Signed By
R. M. SPENCELEY

R. M. Spenceley

RMS/jm

cc: S. F. Audia (1x)

[redacted]

2132052

CENTRAL FILES

February 2, 1954

Dust Exposures at Packaging Station

A. Stewart, Plant 4

R. C. Heatherton

The following is a tabulation of air dust samples taken at the Packaging Station on three different dates.

Adjusting weight from green salt in six-gallon can. Funnel hood installed about January 14 in use.....	5400 d/m/M^3
Same operation as above. No hood used. Operator extremely careful.....	1600 d/m/M^3
Same operation as above. No hood used. Operator using normal care.....	21000 d/m/M^3

From the above data it was apparent that the use of the funnel-shaped canopy hood has resulted in some improvement in the normal operation. However, the average concentration in using the hood is still about 70 times the MAC. Still greater improvement was realized without using the hood but with using some care.

On the basis of the above results it is seen that the funnel type hood is unsatisfactory for the desirable control. The installation of this hood could actually result in higher concentration if the operators are led to believe that it is satisfactory and do not use necessary care. It is our recommendation that this problem be submitted to Engineering for design of suitable dust control at this station. It is our belief that suitable control will be maintained only by completely enclosing the entire operation.

It has also been noted that personnel are entering the Packaging Station enclosure for the purpose of cleaning up green salt spil without the use of respiratory protection. The use of respirato is recommended for this work.

Yours truly,

ORIGINAL SIGNED BY

R. C. HEATHERTON

R. C. Heatherton

090783 ec

[redacted]

OFFICIAL USE ONLY

F-2-1-1

January 19, 1959

ADDITIONAL JUSTIFICATION FOR CP-58-65

P. G. DeFazio

C. R. Chapman

1. Letter, G. L. Karl to J. H. Noyes, subject, "CP-58-65 - Additional Ventilation and Dust Collector for Packaging Stations - Plant 4", dated January 7, 1959. C-2-1-1

2. Report by Survey Section of Health and Safety Division, National Lead Company of Ohio, subject, "Exposure Study of Plant 4 Personnel to Airborne Radioactive Dust - 1958", dated April 18, 1958. F-1-1-1

3. Letter, P. G. DeFazio to C. R. Chapman, subject, "Additional Justification for CP-58-65, dated January 9, 1959.

We supply here the additional justification which you have requested for the proposal from both the Health & Safety and the economic viewpoints.

The airborne dust contamination for the operation of packaging of green salt is 12.44 times the maximum allowable concentration (Reference 2). The term MAC is defined as 70 alpha disintegrations/minute/cubic meter of air. For the general area around the green salt packaging station the airborne dust contamination is 1.80 MAC. Additional ventilation is required to improve this condition.

At present, material collected in Dust Collectors G4-2 and G4-11 is collected and packaged together and transferred to Plant 8 for recovery of the uranium value. G4-2 dust collector services the West and East packaging stations (G4-559 and 590), the Paducah hopper packaging station (G4-659), the Reject dust hopper (F4-102), and the Reject packaging station (G4-755). G4-11 dust collector services the House Vacuum System in Plant 4. The system proposed in CP-58-65 will recycle the material collected from packaging stations G4-559, G4-590, and G4-659, thus saving the cost of reprocessing this material through Plant 1, Plant 8, Plant 2 & 5, and the orange salt to green salt conversion in Plant 4. The estimated savings that would have been realized in the six-month period July through December, 1958 is $5700.

Original Signed By
C. R. CHAPMAN
Supt. of Production Engineering

C. R. Chapman

JPG/mgm

cc: M. E. Nelson
J. A. Quigley - R. Starkey
W. J. Strattman - R. M. Spenceley
Central Files

72-1-1-1

March 20, 1961

"RODDING OUT" UO_3 HOPPERS, PLANT 4

K. M. Rose

A. D. Morlam

On Thursday, March 16, 1961, on second shift, air dust samples were taken on the operation of "rodding out" UO_3 hoppers. In the past it has not been necessary to perform this operation on a routine basis. For the last two weeks, however, almost 75% of the hoppers have needed "rodding". Following are the results of the samples:

Type	Sample Description	Results X MAC*
BZ	Operator standing on juice hopper and "rodding out" hopper. Respirator worn.	19
BZ	Same as above	15
BZ	Same as above	57

*MAC (Maximum Allowable Concentration)
Type Sample: BZ - Breathing Zone

ORIGINAL SIGNED BY

A. D. Morlam

ADM/bw

PE 160b

Excerpt from H&S Monthly Report for March, 1963 - IH&R Dept.

Air Hygiene Studies

Dumping Station - 619 Level - Plant 4:
An air dust evaluation of the UO_3 and UF_4 dumping station on the 619 level of Plant 4 showed breathing zone air dust levels as high as 200 MAC. The chief causes for this level were improper handling of the drums while dumping and the ventilation to the drumming station had been deliberately cut off and a Hoffman Hi-Vac line used instead. This has been discussed with Plant 4 supervision. An airline respirator outlet has been installed, and it has been agreed that this station will be operated properly in the future.

Noyes sent this to Chapman with a note "Please explain this action."

on 5/3, following all the explanations, Mr. Noyes wrote: "For me to understand, without any other explanation, is very difficult. This meant (past tense) complete and utter disregard of the dust problem.

July 7, 1967

AIRDUST EVALUATION OF PULLING A PLANT 4 REACTOR SCREW

K. N. Ross

D. G. Jones and R. E. Keim

When reactor screws break they must be replaced. Since the reactor is full of uranium oxide or UF_4 in a powdered form, this is an unusually dusty operation.

This particular evaluation is of pulling the Cocoa main screw of the Number 3 reactor. Since this screw was broken into several pieces in operation, the uranium oxide in the reactor could not be run out to the next reactor. This is one of the reasons that this evaluation must be considered as a "maximum air dust level" evaluation. If the screw had not been so badly broken, it could probably have been pulled in less time and with somewhat less dusting.

It was also necessary in this particular operation to remove both the front and rear reactor cover plates to remove pieces of the screw from both ends. Air dust levels were higher while working at the rear of the reactor screw possibly because of the small amount of working area and drafts from nearby windows blowing the dust about.

The following tables show air dust levels during various phases of the operation.

No. of Samples	Type	Description	α d/m/M³ High	α d/m/M³ Low	NCG*
2	GA	Removing rear motor drive unit	900	490	7.0
2	GA	Vacuuming open end of talcum reactor	5690	1720	37.0
4	GA	Shoveling oxide into drum	25600	890	96.0
2	GA	Small sections of screw being removed	740	500	6.2
7	BZ	Raking loose oxide into catch pan, vacuuming talc, & shoveling oxide into drums	171,770	10390	454.0
2	BZ	Pulling parts of screw from the reactor	23330	17800	206.0

Type Sample	Location or Operation	High	Low	Average NCG
GA	12' N.W. of reactor. No work being done.	47	41	0.4
GA	12' N.W. of reactor. Casket being attached. Millwright standing in half-filled pan.	620	310	5.0
GA	12' N.W. of reactor. Screw being winched out of reactor.	105	24	0.6
GA	12' from reactor. Cocoa being raked from reactor into pan then shoveled into 55-gal drums.	570	26	2.2
BZ	Millwright attaching steel cable to end of screw and bolting casket up to reactor, standing in pan of material.	22600	8130	154.0
BZ	Chemical operator raking Cocoa from reactor into pan on platform.	1180	240	7.0
BZ	Millwright prying at screw with crowbar working through inspection port of casket.	2550	2520	25.0
BZ	Chemical operator raking Cocoa into slant hoppers.	1030	850	9.0
BZ	Raking Cocoa into pan.	2700	1900	23.0
BZ	Shoveling Cocoa from pan into drums on floor.	400	230	3.0

GA - General Area
BZ - Breathing Zone

*NCG - National Lead Company of Ohio Concentration Guide - 100 alpha disintegrations per minute per cubic meter of air.

As can be seen from the above data, air dust levels are well above the NCG. Respiratory protection is necessary when performing this operation. On the basis of the air dust levels, air-supplied respiratory protection would be required if it would not create a safety hazard from the trailing hoses.

It is also recommended that reactor screws be removed and repaired before they become as badly broken up as this one was. This should help to lower the air dust exposure by lowering both the concentration of dust and the amount of time necessary to change the screw.

ORIGINAL SIGNED BY

D. G. Jones

ORIGINAL SIGNED BY

R. E. Keim

jlw

NLO-2S-LOTZ

NATIONAL LEAD COMPANY
OF OHIO
P. O. BOX 158
MT. HEALTHY STATION
CINCINNATI 31, OHIO

2257542

June 24, 1953

SUBJECT: Air Dust Results

TO: D. Nelson

FROM: R. C. Heatherton

REFERENCE:

Results of air dust samples collected on June 19 in the "B" area are as follows.

Three (3) breathing zone samples of the graphite crusher operator feeding graphite to the crusher through a port on the ground floor range from 428 to 1111 d/m/M^3. The average value of 817 d/m/M^3 are about 12 times the present maximum allowable concentration. Three (3) breathing zone samples of a helper throwing pieces of graphite to the platform range from 8966 to 56,455 d/m/M^3. The average value was about 3100 or 44 MAC.

These are typical of the results that can be obtained when operations are performed in a manner other than the standard procedure where ventilation has been provided. We understand that the crusher which was not operating has now been placed in operation. We therefore can expect that in the future the operation will be performed according to the standard procedure. If it is necessary to deviate from this we would like to be notified and to know what precautions are being taken to prevent exposure of personnel.

Yours truly,

R. C. Heatherton

RCH:bg

cc: J. A. Quigley, M.D.

F2-1-1-1

CENTRAL FILES

NATIONAL LEAD COMPANY
OF OHIO
P. O. BOX 188, MT. HEALTHY STATION
CINCINNATI 31, OHIO

November 20, 1956

2236/19

SUBJECT AIR HYGIENE AT WEST BREAKOUT STATION, PLANT 5

TO J. W. Mahaffey

FROM A. J. Stefanec

REFERENCE

Shown in the following table are the results of air dust samples collected at the west derby breakout on 11/14/56 and 11/16/56, day shift only. These results indicate only radioactive dust concentrations since fluoride analyses of these samples are not yet complete.

Operation or Location	Concentration-α d/m/M3 High	Low	Average	X MAC
BZ (1) Breakout helper breaking top liners of a row of furnace pots with a pick hammer.	--	--	1563	22.3
BZ (3) Breakout operator jolting out derby and reaming empty furnace pot on side reamer only.	776	208	466	6.7
BZ (3) Removing furnace pot from breakout and lowering to main floor on turnover unit.	663	17	340	4.9
BZ (2) Breakout operator. (This is a combination of the above two operations.)	360	252	306	4.4
BZ (3) Derby cleaning helper rough cleaning derby with an air hammer.	412	126	243	3.5
BZ (2) Derby cleaning helper moving derby to circular grate and finish cleaning with a chipping hammer.	126	29	78	1.1
GA (1) North side of breakout.	--	--	264	3.8
GA (1) By weigh scale on west side of breakout.	--	--	341	4.9

0377354

[redacted]

Operation or Location	Concentration-α d/m/M³ High	Low	Average	X MAC
GA (1) By recording desk about 8' west of breakout enclosure.	---	---	183	2.6
GA (2) Main floor area during breakout operations.	646	225	435	6.2

NOTE: O. Boehler, "A" Area shift foreman, was present during all of the above sampling periods and certified that operations were being performed according to S.O.P.

The sources of visible dusting during this survey period were: 1) breaking top liners of unlidded furnace pots, 2) leakage of material from edges of crusher plate, 3) leakage of material from floor of breakout around the jolter downcomer, 4) dusting from furnace pots as they are inverted on turnover unit and lowered to main floor, and 5) escape of dust through reamer armports. The dusting through the reamer armports was only occasional.

Downdraft ventilation on the cleaning grates appeared good. However, very little air was moved through the reamers, probably due to the frequent plugging of the screen in the vent duct that is tied into the reamer discharge tube. This screen had to be cleaned twice during the sampling period.

A survey of the east breakout is now underway. Results of that survey will be forwarded in the very near future.

A. J. Stefanec

AJS:bg

cc: S. F. Audia
R. C. Heatherton

Central File

August 8, 1960

DERBY FIRES AND ASSOCIATED AIR DUST LEVELS - PLANT 5

J. A. Quigley, M.D.

R. H. Stanley

Following is a compilation of air dust data collected in connection with the recent derby fires in Plant 5. The dates shown indicate when the samples were taken.

Type	Sample Description	No. of Samples	Concentration - c/m/ft³ High	Low	Average	% MAC*
GA	Background - West side of derby storage area. No fires. (8/2/60)	5	263	48	149	2.1
GA	Same as above, except one derby on fire. (8/2/60)	(2)	60,000	4,127	32,063	458.0
GA	Same as above, except two derbies on fire. (8/2/60)	(2)	16,500	308	8,404	120.0
GA	Same as above, except skid of derbies on fire. (8/2/60)	4	35,400	300	17,525	250.0
GA	Same as above, except two or three derbies on fire. (8/3/60)	3	54,000	4,200	30,060	429.0
GA	Same as above, except skid of burning derbies 20' east of pumps. Smoke going north. (8/3/60)	2	334	277	281	4.0
GA	Background - Derby spray trough, 2nd floor. Smoke and fume still visible from previous fires. (8/2/60)	4	1,700	205	726	10.4

Time	Sample Description	No. of Samples	Concentration - c/m/ft³ High	Low	Average	% MAC*
0A	Same as above, except skid of derbies in trough being sprayed. (8/3/60)	2	4,200	3,700	3,950	56.4

*MAC (Maximum Allowable Concentration) - 70 c/m/ft³

At 1115 on August 4, 1960, three samplers were started on the second level of the breakout area in Plant 5. These samplers ran continuously until 1540 on the same day. For the first hour the sampling heads were changed at irregular intervals. All samples taken after 1220 were of 20-minute duration. At 1220 another set of samplers was set up on the first level and began sampling at the rate of one sample every 20 minutes.

The following is a compilation of the results of the air dust samples taken and about the conditions during the time each was taken. The samplers were set up at the north, east, and west sides of the areas to give a representative sampling of air in the breakout and derby storage areas.

Start Time	Length of Sample (Min)	Conditions During Sampling	Level	No. of Samples	% MAC
1115	3	Fire in derby booth and between breakouts.	2nd	2	87.0
1130	10	Fires under control. Some smoke still visible.	2nd	3	7.0
1135	15	Fires extinguished. No smoke visible. Operations have stopped except for cleanup.	2nd	3	1.2
1150	25	No fires; no production. Spraying cold derbies in trough and cleaning lids in west breakout.	2nd	2	1.9
1205	20	Same as 1150 - moving and restacking derbies and pallets.	2nd	3	3.0
1220	20	Same as 1150 - production operations are being resumed.	2nd	3	1.5

DERBY FIRES AND ASSOCIATED AIR DUST LEVELS - PLANT 5
J. A. Quigley, M.D.
August 8, 1960

Start Time	Length of Samples (Min)	Conditions During Sampling	Level	No. of Samples	% HAC
1240	20	Production is fully resumed. No fires.	1st	3	1.0
			2nd	3	1.1
1300	20	Same as 1240 - The derbies in the 1st level storage area were moved out during the afternoon and the area was washed clean during this period.	1st	3	1.2
			2nd	3	3.2
1320	20		1st	3	2.9
			2nd	3	4.1
1340	20		1st	3	2.6
			2nd	3	5.3
1400	20	Derby fired on breakout during 1400 samples.	1st	3	2.3
			2nd	3	23.3
1420	20	One derby on fire in quench tank, 2nd level.	1st	3	3.4
			2nd	3	13.5
1440	20	Same as above.	1st	3	3.0
			2nd	3	9.6
1500	20	Same as above.	1st	3	2.6
			2nd	3	7.3
1520	20	Three derbies on fire in quench trough, 2nd level. One derby fired in breakout and moved to tank. Other derbies fired in storage area and moved to tank.	1st	3	3.8
			2nd	3	40.0

Original Signed By
R. H. STARKEY

R. H. Starkey

RHS:bg

cc: C. K. Chapman
F. L. Cuthbert
J. K. Noyes

Central File

OFFICIAL USE ONLY

NATIONAL LEAD COMPANY
OF OHIO

December 7, 1960

SUBJECT: CLEANING UNDER BURNOUT OXIDE CONVEYORS - PLANT 5

TO: R. H. Starkey

FROM: F. J. Klein

An air dust evaluation was made on 10/29/60 of the dropping of inspection plates under the west burnout conveyor and the cleaning out of the uranium oxide accumulation underneath the conveyor in Plant 5.

Five air sampling pumps were set up in the general area behind bottom remelt furnaces where the operations took place, one at the west separation booth area, one in front of #25 remelt furnace and one at the west breakout canning station. The pumps ran for approximately 7 hours which included the major part of the cleaning operation.

The air sampling results and description are as follows:

1. Samples taken while canvas tarpaulins were being hung to help confine the dust prior to dropping the inspection plates. This was done from 06:28 A.M. to 07:35 A.M. The air sample results averaged 2025 α d/m/M³ or 29 X MAC for the whole area during this hour. The canvas was contaminated with uranium oxide as it is used regularly for this monthly job.

2. Samples taken after canvas tarpaulins were hung and no further operations from 07:35 A.M. to 08:35 A.M. (shift change during this period and new shift crew getting organized). The air sample results averaged 69 α d/m/M³ or 1 X MAC for the whole area during this hour.

3. The actual clean-out operation started between 08:35 A.M. and 09:05 A.M. It was nearly completed at 3:00 P.M. and air sampling was discontinued. The remainder of the work consisted of taking down the canvas tarpaulin, routine vacuum cleaning and water flushing the bottom remelt area. During the 5 hours of actual clean-out the entire west bottom remelt area averaged 359 X MAC.

The individual air dust sample results and their respective air sample pump locations are on the attached table.

Breathing zone sample results were:

	α - d/m/M³			
	High	Low	Average	X MAC
Operator cleaning under burnout conveyor.	3,100,000	500,000	1,300,000	18,000

Up to about one year ago, the operator had to position himself under the inspection plate to remove it for access under the oxide conveyor. This caused much of the oxide to come down upon him. Breathing zone sample results of this operation were found to be:

α - d/m/M³			
High	Low	Average	X MAC
9,300,000	4,600,000	6,800,000	97,000

At the present time the inspection plates are held in place by metal poles propped up against them before removing the bolts. A rope is then tied to the poles holding up the inspection plates. The operator can then pull the rope which allows the inspection plates and oxide fall without anyone below. This way the operators are out of the area where contamination is greatest. After the dust has subsided behind the canvas enclosure, cleaning under the burnout conveyor begins.

Frank J. Klein

F. J. Klein

FJK:mjs

Time Started	West Separation Booth Area	Behind #28 Remelt Furnace	In Front of #25 Remelt Furnace	SAMPLE PUMP LOCATION AND RESULTS (α - d/m/M³) Pump Behind #23 Remelt Furnace	Pump Behind #21 Remelt Furnace	Pump Behind #17 Remelt Furnace	Elec. Switch Area for West Remelts	West Breakout Canning Station	Avg. α d/m/M³	X UW
(30 min. Samples)										
0635	369	9000	63	4120	5946	1462	1549	830	2916	42
0705	64	532	45	2647	1726	1363	2386	288	1131	16
0735	26	330	17	29	25	47	201	51	91	1.3
0805	15	31	15	60	70	53	100	36	48	0.7
Contaminated canvas tarps hung from 6:25 A.M. until 7:35 A.M.										
Operations Started										
0835	42	92	51	420	412	312	256	122	213	3.0
0905	335	665	272	80000	1878	304	2238	Pump Burned Out	12200	174
0935	140102	600000	4586	200000	100000	40000	90000	20000	149300	2130
0950	3463	16000	2000	70000	30000	70000	170000	20000	47700	682
1007	390	2000	859	20000	9000	20000	50000	7800	13000	191
1037	413	13000	810	10000	5000	8000	30000	2814	8800	126
Break for lunch										
1219	200	1249	230	1184	5000	4000	4000	898	2100	30
1249	61	300	79	875	1000	1000	686	134	516	7.3
1319	359	3068	492	4000	5000	4000	4000	330	2700	39
1349	1576	20000	1547	60000	40000	30000	40000	417	24200	346
1419	4000	50000	1337	30000	20000	10000	10000	600	15700	224
Total	150961	706374	12163	476479	217290	187616	401180	53115		
Average α d/m/M³ per 5 Hr. Period (During actual cleanout operations)										
	13729	64215	1105	43316	19571	17056	36470	5312		
MAC	197	917	16	618	280	244	521	76		

Average MAC for entire area = 859 MAC

March 15, 1955

AIR CONTAMINATION, MILL AREA, PLANT 6

2119655

G. Harr

R. C. Heatherton

The following is a tabulation of air dust samples collected in the period from 2-18-55 to 2-24-55.

Operation or Location	Type of Sample	Concentration Range	Concentration Average
Medart #0 Operator	Breathing Zone	2.1-4.5	3 x MAC
Medart #2 Operator	Breathing Zone	12-59	34 MAC
Rod Kick-off Operator	Breathing Zone	10-30	20 MAC
Medart Runout	Breathing Zone	10-30	20 MAC
Medart Area	General Air	2.5-13	8.8 MAC
Saw Operator, Filing ends of rods	Breathing Zone	5-20	16 MAC
Saw Operator, Sawing rods only	Breathing Zone	5-6.5	6 MAC
Saw Area	General Air	1.5-7.5	4 MAC
Gag Shear Operator	Breathing Zone	.8-1.5	1 MAC
Crop Shear Area	General Air	.7-2.5	1.7 MAC

Note: Present acceptable level, 70 alpha disintegrations per minute.

Following is a tabulation of urinary samples collected in the period from 3-1-55 to 3-9-55.

Location	No. of Samples	Range	No. ofer MAC
Saw Operators	11	.032-.139	7
Medart Operators	3	.04-.074	2
Stampers	2	.065-.079	2

Note: The present acceptable urinary maximum allowable concentration is .050 milligrams/liter.

PE301a

The following conclusions can be drawn from the above data:

1. It will be necessary to provide local exhaust ventilation in order to control the air contamination at the straighteners and saws. This should include ventilation for the run-on and run-off tables for the Medarts.

2. In addition to planned ventilation for the saws, it will be necessary to ventilate the filing operation if this is to be continued as an operating procedure. It is our understanding that with the changes in the Acme-Gridley, the filing operation will no longer be required

3. While the air contamination level in the vicinity of the shears and the mill area is above MAC, it will not be necessary to ventilate the shears for these reasons:
    a. A large part of the contamination in this area originates at the Medart. Controlling the contamination at the Medart will result in a reduction of the air contamination in the rest of the mill area.
    b. Personnel in the mill area are not required to spend a large portion of their time in the immediate vicinity of the shears, where the concentrations will be higher than that measured in the general air.

We feel that adequate ventilation provided for at the straighteners and saws, and by following good operating practices, personnel exposures can be limited to less than the maximum allowable exposure and that it will not be necessary to provide ventilation for any of the other equipment in this area under the present system of operation. There is one operation in the area -- that of stamping the rods -- where it is still questionable whether local exhaust ventilation should be provided. However, we do not feel that such a system should be incorporated with that of the Medarts and saws. We feel that if any ventilation at all is required at this point, that it can be very simply provided for on a job order, for a system of its own.

R. C. Heatherton

RCH:mk

cc: J. A. Quigley, M. D.
C. Bussert
A. Yocco
M. S. Nelson
C. Konkle

F-2-1-1

NATIONAL LEAD COMPANY
OF OHIO
P. O. BOX 158. MT. HEALTHY STATION
CINCINNATI 31. OHIO

April 15, 1954

SUBJECT AIR DUST SURVEY - PLANT 6 MACHINING AREA

TO A. J. Stefanec

2124423

FROM C. E. Schumann

REFERENCE

Was dust checked (urinanalysis)?
1-28-53 nothing between
9-30-54

During the week of April 12, 1954, an effort was made to determine the levels of airborne radioactive dust over a continuous eight-hour period of machining operations. Air dust sampling was started at 8:15 a.m. in each of the three machining areas (Acme-Gridleys, Turret Lathes and Centerless Grinders) and continued until 4:15 p.m. Each of the operations was sampled on different days.

Concurrent with the air dust sampling, operating conditions and other incidents were also observed. An attempt is now made to correlate these observations with the air dust results and to further determine the cause of excessive dust exposures in these areas as indicated by current urine analyses.

Weather conditions on each of these three days were similar. All outside doors were open with roof fans and other ventilation running continuously. Normal production was maintained in all areas.

Submitted herewith are the results of this survey along with comments and recommendations. Figures shown are alpha d/m/M3.

C. E. Schumann

CES/mb

Attachments

ACME-SHEDLEYS

	(1) Where #2 AG Oper. Stands	(2) In Aisle 3' E. of #2 AG Oper.	(3) On Sheffield Gauge, W. End of #2 AG	(4) North Side of #2 AG Behind #1 AG Oper.
8:15 am to 9:15 am	95	50	63	25

#5 started 8:32 am - #3 started 8:35 am - #2 at [illegible] am
Small 1 min. fire in #2 - 3 min. fire in #4 at [illegible] am
Another fire in #4 at 9:00 am - #1 started at 9:05 am.

9:15 am to 10:15 am	5	119	16	9½

Fire in #2 at 9:25 am - out in 1½ min. - all 6 machines operating by 9:15 am - smoke constantly d[illegible] #4 - #3 & #4 down at 10:00 am for repair of ventilatio

10:15 am to 11:15 am	76	44	5	15

#3 & #4 down till 10:45 am - small 30 sec. [illegible] in #2 - fire in #4 at 10:47 am - #3 still sm[illegible] with ventilation on.

11:15 am to 12:15 pm	22	11	11	17

Lunch period - no operations

12:15 pm to 1:15 pm	79	53	9	84

All 6 machines operating - smoke still drifting from #4 - small fire in #2, quickly extinguished.

1:15 pm to 2:15 pm	65	23	72	73

#3 not running - glowing turnings slid down slug slide and burned out on floor by operator.

2:15 pm to 3:15 pm	53	27	43	69

Fire in #2 turnings tray, extinguished in 1 min. - small fire in #4.

3:15 pm to 4:15 pm	26	11	24	31

#2 running only 10 min. - other machines operating 20 min. - small fire in #6.

Approximate amount of time operator in location No. 1 - 210 minutes
Approximate amount of time operator in location No. 2 - 20 minutes
Approximate amount of time operator in location No. 3 - 30 minutes
Approximate amount of time operator in location No. 4 - 65 minutes
Approximate amount of time operator in other locations - 95 minutes

Total Time 420 minutes

Assuming cafeteria and change time as zero (0) the following is a weighted average exposure of #2 AG operator on 4-12-54 (based on 510 min. shift).

40 d/m/M3

Conditions noted in the Acme-Gridley Area:

1. Push brooms are being used to clean floors around machines and basket loading area.
2. Slide doors, particularly on the north side of the machines, are not kept entirely closed. The door on the operator's side is usually kept closed but still leaves an opening of approximately 3-1/2 sq. ft.
3. Turnings are allowed to build up quite high before being raked down. Turnings seem to pile up much faster on the side opposite the operator which forces the operator to walk around the machine to rake them down.
4. Coolant supply and angle of quenching is not sufficient to eliminate sparking and burning.
5. Small fires in machines receive very little attention. Most times are allowed to burn themselves out.
6. Smoke and coolant mist is often visible above machines; an indication of inadequate ventilation.
7. Ventilation efficiency is very low. 7" ducts into machines are evacuating 203 CFM. Main exhaust duct through roof (9") shows 1115 CFM.
8. Floor around A-G is littered with turnings and coolant.
9. Operators frequently stick their head inside machine before smoke and mist has settled.
10. Set-up operators work with head inside machine.

Approximate amount of time #3 operator at position No. 2 - 300 minutes
Approximate amount of time #3 operator at other locations - 120 minutes
(Other locations meaning storage & general lathe area)
Approximate amount of time #7 operator at position No. 3 - 310 minutes
Approximate amount of time #7 operator at other locations - 110 minutes

Assuming cafeteria and change period exposures as zero (0) the following are weighted average exposures of #3 and #7 lathe operators (based on 510 min. shift).

#3 operator - 113 d/m/M3

#7 operator - 57 d/m/M3

Conditions noted in the Turret Lathe Area:

1. Turnings are allowed to build up unnecessarily.
2. Small fires (turnings) are constantly occurring.
3. Visible smoke from burning turnings floats over machines.
4. Coolant supply and angle of quenching is not sufficient to keep turnings from burning.
5. Floor covered with coolant.
6. Operator gets head close to turnings quite often.
7. Push brooms are being used to clean floors around machines.

2131708

CENTRAL FILES

August 12, 1958

DUST LEVELS ENCOUNTERED AT SLUDGE REACTOR, EAST PAD - PLANT 6

C. E. Bussert

J. F. Wing

During the air dust survey period of June and July, 1958, it was found that the radioactive airborne dust levels encountered during the sludge reactor operation have increased from .44 MAC in 1957 to 18.94 MAC in 1958. When collecting the samples of this operation, it was noted that steam was rising into the area of the operator's face. The top of the tank is open, thereby making this condition possible.

It has been learned that the new sludge furnace is expected to be in operation sometime in the near future. If so, it is understood that this will eliminate the use of the sludge reactor.

Until the sludge furnace is in routine operation, the possibilities of installing a ventilated cover over the opening of the reactor should be investigated. It is believed that this cover will tend to reduce these dust levels.

Original Signed By
J. F. Wing

J. F. Wing

RNH:bg

cc: R. H. Starkey
J. W. McKelvey
R. N. Halcomb

Central File

090294

[redacted]

F-1-2

November 11, 1953

Occupational Histories Relating to Urinary Excretion Levels

J. W. Durkin, M.D.

2132070

R. C. Heatherton

Your letter of November 5

In addition to the work history of the following are the work histories of the three men employed in Plant 6 mentioned in the letter.

Name	No.	Approx. Starting Date	Job Description
			Machine Tool Operator - Centerless Grinders
			Machine Tool Operator - Acme-Gridleys
			Machine Tool Operator - Turret Lathes, Centerless Grinders, Acme-Gridleys

Air surveys made in the machining section of Plant 6 in December 1952 and March 1953, showed the following average concentrations for breathing zone samples for the operations in question.

December 1952	MAC	March 1953	MAC
Acme-Gridley Opr.	153	Acme-Gridley Opr.	39
Contour Grinder Opr.	2415	Contour Grinder Opr.	91
Rough Grinder Opr.	6468	Rough Grinder Opr.	154
Lathe Operator	336	Lathe Operator	79

We have no reason to expect that there will be any change in the concentration since the March survey. We are not schedled to do any further checking at this time in the machining section unless it is believed absolutely necessary.

Yours truly,

RCH:bg

R. C. Heatherton

cc: J. A. Quigley

NA53

Plant 6

OPERATION	X MAC	STATUS
Medart straightener operation	.1	Revision of hooding on the straightener permitting it to be kept closed, addition of extra oil and ventilation of the rod transfer point dropped level from 6.6 x MAC. Will be dropped from list.
Shoving rods down rollers to scales	.1	Dropped from 3.8 x MAC largely because of additions of extra oil and mechanization of rod handling. Will be dropped from list.
Loading rods into tote pans	---	No longer being manually performed as operation has been automated. Will be dropped from list.
Stamping rods	13.0	New spray quenching tests conducted by the Technical Division indicated that an appreciable reduction of air dust levels will result if approval to water quench the rods is received from the reactor sites.
Drumming crop ends	4.3	Nothing in progress to improve.
Coating warm crucibles (Under Salt Melting Bldg.)	3.1	Nothing in progress to improve.
Dumping can of residue from grated table into drum (Under Salt Melting Bldg.)	608.0	Nothing in progress to improve.
Breaking out "pigot" onto grated table (Under Salt Melting Building)	3.1	Nothing in progress to improve.
Stirring molten metal with graphite stick (Under Salt Melting Building)	5.5	Nothing in progress to improve.
Putting salt into furnace (Under Salt Melting Bldg.)	16.0	Nothing in progress to improve.
PLANT 8		
Removing and lidding drum from Rotex	6.0	New or reconditioned drums would reduce still further.
Feeding box furnace	4.9	Dropped from 88 x MAC largely by more operator care. CP-59-57 should improve still more.
Removing and lidding drum from muffle furnace	2.8	Dropped from 88 x MAC as a result of installation of new drumming station. Will be dropped from list.
Removing and lidding drum from UAP furnace	22.0	Dropped from 43 x MAC largely by more operator care. Engineering Project 8-78 (UAP Furnace Off-Gas Revision) is awaiting decision on installation of new dust collection facilities before further work is done on it.
Drumming UAP cake	18.0	

for Dust files

October 30, 1961

AIR DUST SURVEY - UNDER SALT MELTING BUILDING

J. A. Quigley, M.D.

R. H. Starkey

Attached is a copy of the air dust survey conducted in the Under Salt Melting Building during the month of October.

In all instances the air dust levels were extremely high, up to 150 x MAC for the routine operation of breaking out a pigot. This operation is now performed on the floor with no ventilation whatsoever.

In my opinion, the operations in this building propose the most serious potential personnel exposures of any we have ever had at the PNPC. We have, I am sure, had individual operations with higher air dust levels; however, in my opinion we have never had such a collection of air dust levels in any one building.

Included in the attached report are recommendations which I feel are absolutely necessary if operations in this building are to be continued. These same recommendations are included in a report "Survey of Ventilation Requirements - Under Salt Melting Process - Plant 6 (P-20000-22)" L. W. Kessler to G. J. Morgan dated October 24, 1961. The Fume and Dust Control Committee reviewed this report and in general agree with Mr. Kessler. Some of the air volumes are undoubtedly a little low, but these can be corrected in the final design.

I would recommend that serious consideration be given to shutting down the operations in this building until such a time as the recommendations, as included in both our report and Mr. Kessler's have been put into effect.

Original Signed By
R. H. STARKEY

R. H. Starkey

RHS/mjs

[redacted]

October 26, 1954

PLANT 7 URINE SAMPLING PROGRAM.

J. A. Quigley, M. D.

R. C. Heatherton

In line with our discussion on Friday, I am briefly summarizing the information which we have obtained from the sampling program in Plant 7. For your information we have been obtaining weekly urine samples from all personnel in Plant 7. Anyone showing over a .050 mg/l in a sample is required to return to Medical for additional sampling on a daily basis until the excretion level is below .050 mg/l. In addition, a request is made to remove the man from exposure to soluble uranium, until the level is down.

The above program was initiated in June. From that time to the present just about everyone who has been employed in Plant 7 for any length of time has exceeded the MAC on one or more occasions. There have been several individuals who have gone from 2 to 4 times the MAC. The following have been selected as possibly most significant.

- This man has shown the highest level of any person on a single sample. On 8/7 the concentration was .621 mg/l. On two other occasions in August he exceeded .050.

- This man has been over .050 on 13 occasions. On one occasion, 8/25, he was over .1 mg/l.

- Over .050 mg/l 11 times. On 8/25 and 10/7 he was over .2 mg/l.

- Over .050 8 times. He was over .1 on 9/23 and over .2 on 8/16 and 8/21.

This man has been over .050 on 12 occasions. On 8/6 and 9/2 he was over .1 mg/l. On 7/24 his concentration was .364 mg/l. On 9/29 he was over .2 mg/l. This man was removed from Samples taken since that time fluctuate below and above .050. He is presently employed as a maintenance man in Plant 5.

In addition to the above, the following people have shown high urinary uranium excretion as indicated:

[redacted]

Production Personnel:

Name	Number	Over .1 mg/l	Over .2 mg/l
		10/13	
		7/16	
		9/16	7/21
		10/13	8/26
			10/11
		7/29	
		8/25	
			7/28
		6/30	
			8/25
		8/23, 10/7	
		9/14	
		9/14, 10/14	
		6/24	
		7/29	
		8/28	8/5
		7/28	

17

Maintenance Personnel:

		8/17	
		9/13	
		8/26	
			8/17
		8/28	
		8/28	
		8/25	
			8/23
		8/25	
		10/18	
		8/23	
		9/13	10/19
			9/14
		7/29	

14

ORIGINAL SIGNED BY
R. C. HEATHERTON

R. C. Heatherton

RCH/mb

April 24, 1964

PROJECT LABOR POOL OPERATIONS

J. A. Quigley, M.D.

M. L. Starkey

We have now evaluated the more routine Project Labor Pool operations as it was agreed that we should in our meeting with J. L. Carvitti and S. F. Audia on February 13, 1964. Some of the PLP operations aren't too bad from an industrial hygiene standpoint; however, others are extremely bad, and still others are far from satisfactory. All of the PLP activities are routinely observed and when a specific operation looks to be unsatisfactory, air dust samples are taken. For example, we don't sample operations such as sorting lids and rings or blending organics. The duplicate copy of the work records that I receive daily have helped considerably in our follow-up on the PLP activities. A complete summary of the air dust sample results are included in Appendix I.

As you recall, the operation of screening and redrumming UF_4 in Plant 7 precipitated our 2/13/64 meeting at which time we had no air dust samples on the operation. Samples were taken and as we surmised, they are extremely high (up to 1100 MCG). There is no question that this operation should never again be performed until suitable facilities are provided. As you recall, considerable discussion concerning clean-up, and lack of facilities for doing so, took place at our 2/13/64 meeting. This time, a portable vacuum was available in Plant 7 but not used. Air dust levels of 39 MCG resulted from the "sweeping and shoveling" operation which was substituted for the vacuum cleaner. Respirators were worn during these operations; however, there was never a dust respirator built efficient enough to adequately protect workers in such atmospheres.

The cement mixer located in Plant 3 is now being operated on a two-shift basis. Air dust levels of 87 MCG were measured while MgF_2 was being dumped on the tray for loading into the mixer. All general air levels taken throughout the Denitration Area while the mixer is operating are above MCG. The mixer is located just inside the east door and the wind blows the contamination throughout the entire area. A report was written to J. Carvitti on March 31, 1964 outlining suggested revisions to the operating equipment and procedures which would result in lower air dust levels. Joe contacted me and told me that it wouldn't be possible to revise the operating procedure and he didn't feel he would be able to get money for other equipment for the operation. To

February 28, 1966

AIRDUST EVALUATION OF THORIUM REVERTER - PLANT 8

R. H. Starkey

K. K. Ross

Airdust samples taken in the Plant 8 Thorium Reverter Area and shown in the following table indicate the concentration of Thorium is too high in all areas. The causes of these high airdust levels are, 1) ineffective ventilation on both the drumming and dumping stations, 2) leaks in dumping system and in the reverter, 3) poor procedure in handling the feed and the product, and 4) lack of general cleanliness in the area.

	$\frac{\text{ad/m/M}^3}{2033}$	$\frac{\text{Th ug/M}^3}{1469}$	$\frac{\text{Th X NCG}}{81}$
BZ Dumping ThF_4 into reverter dumping station			
BZ Scooping recycle ThO_2 into reverter dumping station	3387	2037	113
BZ Changing drums at reverter drumming station	1440	450	25
GA Th Reverter drum dumping station area	188	46	2.5
GA Th Reverter drumming station area	135	119	6.6
GA Thorium reverter level	124	39	2.2

NCG = 18 ug Th/M^3

To improve these airdust levels it is recommended:

1. The face velocity of the reverter dumping station be kept at at least 200 ft./min. Equipment for measuring this is available and is being used.

2. The leaks in the dumping station and reverter feeding system must be caulked and sealed. The inspection doors to this system should be gasketed and kept closed. The reverter screw seals should be inspected frequently

and replaced as necessary. If a good vacuum is maintained in this system, these leaks will be internal and cause no industrial hygiene problems.

3. The drums of ThF_4 must be placed inside the dumping station before they are delidded. They should not be removed from this station until they are relidded and cleaned. The same procedure applies to the drumming station. All ThO_2 including residue from the cyclone should be packaged in drums that can be dumped in the dumping station. This will make it unnecessary to hand scoop any material.

4. The entire reverter area should be cleaned at least once/day. All spills should be vacuumed immediately.

5. Changing drums from the cyclone drumming station requires an air supplied respirator on the operator. Dust in this operation is quite visible.

The ventilation for the entire process is supplied by one quick draft eductor through one scrubber. As the scrubber becomes plugged blast gates on ventilation lines are gradually closed to maintain static pressure on the process off-gas line. This deprives the dumping station of its needed ventilation. The exhaust line from the drumming station is too long to provide sufficient ventilation, with the door open, at any time.

Leaks from the dumping station to the floor continue to build up piles of material on the floor and sides of the dumping system. Leaks in the seals of the screw feeders and in the seals of the reverter screw are often visible when the scrubber is plugged, reducing the static pressure on the off-gas line.

Drums are delidded and relidded outside the dumping station. Recycle ThO_2 is scooped from a drum outside the ventilated enclosure and dumped into the drumming station. The filled drums of ThO_2 are not cleaned or lidded before they are removed from the drumming station. ThO_2 deposits are visible on all these levels in the reverter area.

These deposits are not cleaned up on a routine basis and are rarely cleaned up except at the specific request of the IH&R Department. Allowing dusty material to accumulate on floors and other surfaces is a large source of airdust.

ORIGINAL SIGNED BY

K. N. Ross

gj

W. K. Boone

NATIONAL LEAD COMPANY
OF OHIO
P. O. BOX 158, MT. HEALTHY STATION
CINCINNATI 31, OHIO

April 9, 1957

SUBJECT FUMES AT DIURANATE FURNACE, PLANT 8

TO A. J. Stefanec

FROM R. L. Ruhe

REFERENCE

On Saturday, April 6, at approximately 8:30 p.m., the nurse on duty received a call from one of the Plant 8 operators. He stated that the fumes at the new diuranate furnace were so heavy that he had trouble breathing. Phosphate cake was being roasted at the time the call was received.

I monitored the air on the second floor, top level for airborne uranium contamination and obtained the following results:

No. of Samples	Concentration-α d/m/M3 High	Low	Average	% MAC
5	47,316	29,411	38,121	944

I was called back about one and one-half hours later by C. Pursifull, shift foreman, who said that the scrubber system had now been unplugged and wanted the area remonitored. This time the results were:

No. of Samples	Concentration-α d/m/M3 High	Low	Average	% MAC
4	2,112	404	1,083	15

On the first trip the smoke and/or fume was very dense. On the second trip there was very little visible air contamination; the small amounts which were visible were probably a carry-over from the original fuming.

I understand this is a common occurrence and suggest that Plant 8 supervision be notified of the excessive amounts of airborne radioactivity which occur during these periods.

ORIGINAL SIGNED BY

R. L. Ruhe

RLR:bg

[redacted]

00267

NATIONAL LEAD COMPANY
OF OHIO

P. O. BOX 158
MT. HEALTHY STATION
CINCINNATI 31, OHIO

3739

2124904

March 25, 1958

SURVEY DATA REQUESTED ON WILLIAMS HAMMER MILL, PLANT 8

J. F. Wing

R. M. Holcomb

The following are the individual sample results that you requested on the area outside the Williams Hammer Mill. Samples were taken on May 26 and 27, 1957. The results are given in d/m/M³. The MAC for airborne radioactive material is 70 d/m/M³.

Operation or Location	Type Sample	d/m/M³	% MAC
1) Changing drums at outside mill.	BZ	19,137 4,801 1,842	122.9
2) Shoveling salt onto conveyor at outside mill	BZ	19,885 14,864 6,381	194.0
3) Outside Williams Mill.	GA	5,861 4,836 1,191 480	44.3
4) Breaking salt at outside mill.	BZ	2,698 2,409 1,358	20.8

Dust-Fee respirators were worn by the operating personnel during these operations.

ORIGINAL SIGNED BY

R. M. Holcomb

RMHrbg

PE 3186

000465

[illegible] ONLY

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OF OHIO
P. O. BOX 158, MT. HEALTHY STATION
CINCINNATI 31, OHIO

March 1, 1960

SUBJECT ANNUAL I.H. & R. SURVEY - PLANT 8

TO C. R. Chapman

FROM H. M. Beers

REFERENCE

The 1959 Industrial Hygiene and Radiation survey states that the air dust problem in Plant 8 is worse than it ever has been. 89.5% of the personnel employed in Plant 8 are currently exceeding the desired exposure limits (MAC).

In reviewing the statistics of this report it is obvious that the reasons for these high exposure levels fall into four categories.

1. Insufficient ventilation facilities
2. Poor housekeeping standards
3. Insufficient high level cleaning and equipment maintenance
4. Faulty drums

During the past year it was obvious that the ventilation facilities were inadequate. Since 1955 the recovery rate of uranium has increased 297%. Except for minor alterations the ventilation facilities have remained status quo. Consequently, numerous engineering projects are currently on the agenda.

PROJECT NO.	C.P. NO.	PROJECT TITLE
8-78		UAP furnace off-gas revision
8-69		Rotary kiln off-gas revision
8-66	CP-59-57	Additional dust collector capacity
8-73	CP-59-87	Improvement of drumming stations
8-56	CP-59-12	Primary calciner off-gas revisions

These five items will definitely improve the dust problems since they are directly related to the higher exposure levels as indicated in the 1959 survey.

UAP Furnace	- 13.99 MAC
Furnace Room	- 10.92
Rotary Kiln	- 6.01
Oxidation Furnace	- 5.66

These additional facilities will, however, only be as effective as our housekeeping standards. Consequently, in order to immediately improve our housekeeping standards we have divided the plant into eight areas,

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[redacted]

one area per line supervisor. The area supervisor will inspect and grade each area weekly as a means of developing a more competitive housekeeping spirit. The 1959 I.H. & R. survey indicated that signs have been installed on most canning and dumping stations stating that respiratory protection must be worn while performing these operations. This is very good, however, more signs are needed. (A job order was issued 2/10/60 to install 48 additional signs). The annual I.H. & R. survey also stated that signs are worthless without enforcement. Therefore, at the forthcoming foreman's meeting 3/4/60 all line supervisors will be instructed to issue reprimands to any individuals who fail to heed to the warning signs.

Another reason for the high dust levels in Plant 8 is that almost every square inch of horizontal surface of high elevation or remote areas is a source of airborne dust. Since most of these areas, rafters, ledges, etc are covered with a layer of contaminated dust it is undoubtedly one of the principle sources for the high general air dust levels. This high level contamination is due to equipment leaks. Mr. Martin indicated at our meeting last week that this is primarily a maintenance problem. Therefore, Messrs. Martin, Nieminen and I will get together this week 3/1/60 to resolve these problems. Numerous job orders of this nature have been issued as far back as October and still are pending. As soon as all jobs pertaining to improvements in dust problems are completed a high level cleaning and painting program will be inaugurated.

The final dust problem is related to the condition of the drums used at the Plant 8 packaging stations. A prototype packaging station was installed at the rotex station in Plant 8. Initial survey of this unit indicated an exposure level of 1.03 MAC. This survey was conducted under ideal conditions using new drums. However, in the last six (6) months we have not seen any new or good drums. Consequently, the 1959 survey indicated an exposure level of 89.10 MAC for the rotexing operation. This operation is, therefore, the main reason for the general air level of 4.91 MAC in the dry area of the Recovery Plant. Arrangements were, therefore, made with the Transportation Department on 2/29/60 to supply us with good drums and lids. All product will be packaged in good drums so that the exposure level at the rotex station should be down to the desired level. Since good drums are a prerequisite for this operation the drumming facilities for Plant 1 are a must and a drum re-roller should be considered a crash item. I think the drumming facilities for Plant 1 have been on the agenda for about one year. The idea letter was approved by the AEC on 9/10/59 and the Engineering Division is still studying design criteria for this item.

Thus more rigid adherence to the SOP's, high level cleaning and painting and immediate equipment repair will improve the operations. Further im-

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NATIONAL LEAD COMPANY OF OHIO

CINCINNATI, OHIO 45239

October 5, 1967

SUBJECT EXPOSURE STUDY OF PLANT 8 PERSONNEL TO AIRBORNE RADIOACTIVE DUST

TO S. F. Audia

FROM H. M. Beers

REFERENCE Report issued by I H & R, dated July 1967, Same Subject

The Reference Report reflects an increase in (DWE) from 0.9 NCG in 1965 to 2.2 NCG in 1966. This report also indicates that 64% of the personnel exceeded the NCG in 1966 as compared to 21% in 1965. Thus in either comparison approximately a three fold increase.

Reviewing the specific assignments and/or specific operations the report indicates the major problems are related to only a few items.

1. ASSIGNMENTS

	X NCG 1965	X NCG 1966
1.1. Rotary Kiln and NPR Operator	0.9	7.1
1.2. Roving Operators	0.9	4.3

2. OPERATIONS

2.1. Charging Leach Tank	7.4	24.0
2.2. Changing drums at the Rotex oversize station	1.4	76.0
2.3. Changing drums at the Rotex packaging station	5.3	29.0
2.4. Charging Box Furnace	3.5	10.0
2.5. Changing drums at Rotary Kiln packaging station	6.1	9.2
2.6. Charging Rotary Kiln feed tray	1.6	41.0

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The Reference Report defines the problems as:

(1) Poor operator's material handling procedures

(2) Leaks in equipment

(3) Poor housekeeping

(4) Inadequate ventilation

(1) We do not find fault with any of these comments. Most of the handling problems are manual rather than automatic and it is very difficult to maintain constant feed rates by this technique. For instance. We have established schedules at all our charging stations in drums per shift or drums per hour. This should be satisfactory but it is obvious that the incremental rates per ¼, ½, and/or 1 hours are not maintained. This is part of the problem and the main reason why we are planning to feed the new UAP furnace via a Moyno pump.

(2) Equipment is leaking and is patched with yellow tape due to shortage of sheetmetal craftsmen.

(3) Housekeeping standards are improving.

(4) Ventilation is inadequate in some areas and Engineering Requests have been issued to improve ventilation at the Box Furnace, and Rotex unit (new dust collector).

Comments of Recommendations are as follows:

(1) Expedite Revisions to UAP furnace. According to the Engineering Division this project should be completed some time during February 1968.

(2) Job Order Requests on duct work are and have been issued but shortage of craftsmen doesn't accomplish the job.

(3) An Engineering Request will be issued today for a complete ventilation survey of all Plant 8 equipment.

(4) Job Order Request issued today to repair drum dumpers so all doors can be completely closed.

(5) I think we do inspect our equipment routinely and we do issue JOR's but manpower is a problem. We seem to have more jobs than craftsmen.

COPY

NATIONAL LEAD COMPANY OF OHIO
HEALTH & SAFETY DIVISION

INCIDENT OBSERVATION REPORT

ROUTE TO	

To E. D. Leininger

From M. M. Lawrence

Location Plant 8

Subject G43-27 Dust Collector

Date 10/24/67

While checking stack samplers in Plant 8 this morning, I noticed a large amount of dust coming out the stack of G43-27 dust collector. The stack filter was loaded with material.

I immediately informed Al Kreuzmann of this condition, and he shut the collector down. We found two bags with holes in them right away, but it was hard to tell how many more holes there were because the bag house was so full of material. The material loss must be very large.

When the collector was shut down, clouds of dust came from the Calciner Drumming Stations (primary and secondary) and from the bucket elevator and the Calciner system in general. Most of the people in the area put respirators on.

NLO-H&S-1878 (1/16/62)

CENTRAL FILES

NATIONAL LEAD COMPANY
OF OHIO
P. O. BOX 158, MT. HEALTHY STATION
CINCINNATI 31, OHIO

F2.1:1.1

July 21, 1953

SUBJECT Chip Furnace

TO The Files

2124465

FROM R. C. Heatherton

REFERENCE

Attached is a summary of results of all dust samples collected during the operation of the Chip Furnace during the period from 3/7/53 to 5/7/53.

Contamination surveys made in the area during this period showed alpha radiation measurements in the vicinity of the furnace and the collector between 5000 and 20,000 d/m/100cm^2. Contamination readings inside the Thorium Building around the Hoffman vacuum cleaner measured 4000 to 15,000 d/m/100cm^2.

RCH/plp

		Week of	No. of Samples	α d/m/M3 High	Low	Avg.	X MAC
BZ	Cleanout pit	3-7 to 3-14	8	75589	9100	26815	383
Z	Dump dust collector to furnace	2-20 to 2-27	5	4339	2018	8120	50
BZ	Beating bags	2-1 to 2-7	5	6000	38	1581	22
BZ	Repairing inside furnace	4-12 to 4-18	21	81470	43	7922	113
BZ	" " "	4-25 to 4-30	5	1804	57	504	7.2
BZ	" " "	5-1 to 5-7	7	55083	15	8250	117
BZ	Repairing inside T.H.	3-1 to 3-7	11	23167	17	2578	37
BZ	" " "	4-7 to 4-14	28	18629	126	2439	35
BZ	" " "	4-14 to 4-21	12	7876	120	1620	23
P	While repairing inside fur.	4-1 to 4-7	3	12787	268	7020	100
P	" " " "	4-23 to 4-30	12	5546	49	13-1	18
P	" " " "	5-1 to 5-7	11	92984	79	24853	355
P	" " " "	5-20 to 5-27	2	841	214	528	7.5
P	Rabble shaft opening	2-7 to 2-13	9	47	6	22	0.3
P	" " "	2-18 to 2-25	21	12653	3	2532	36
P	" " "	4-14 to 4-20	6	1467	13	495	7.1
P	Over front of furnace	2-1 to 2-7	5	28	0	15	0.2
P	" " " "	3-8 to 3-15	5	54167	2784	25676	366
P	" " " "	4-12 to 4-18	3	1683	29	5656	9.3
P	" " " "	4-23 to 4-30	8	2704	21	684	9.5
P	" " " "	5-1 to 5-7	8	190	22	61	0.9
P	" " " "	5-13 to 5-20	3	441	17	210	3.0
	Empty sludge to fur.tray	5-6 to 5-13	3	286	51	134	1.9
	" " " " "	4-22 to 4-28	5	508	66	316	4.5
BZ	Feeding turnings	2-21 to 2-28	13	544	23	103	1.4
BZ	" "	3-6 to 3-12	18	5527	.6	503	7.1
BZ	" "	3-13 to 3-19	10	605	17	118	1.7
BZ	" "	3-20 to 3-26	4	348	33	117	1.7
BZ	" "	3-26 to 3-31	5	1167	16	308	4.4
BZ	" "	4-1 to 4-7	10	982	2	142	2
BZ	" "	4-8 to 4-14	20	482	3	113	1.6
BZ	" "	4-14 to 4-20	19	761	13	150	2.1
BZ	" "	4-20 to 4-27	17	1195	5	175	2.5
BZ	" "	4-28 to 4-30	14	1287	11	252	3.5
BZ	" "	5-1 to 5-7	48	2716	0	144	2.1
BZ	" "	5-8 to 5-14	12	2171	18	281	4
BZ	" "	5-14 to 5-21	20	409	8	105	1.5
BZ	Feeding turnings & sludge	3-23 to 3-30	3	1057	31	682	9.7
BZ	" " " "	4-8 to 4-14	8	16795	32	2220	31
BZ	" " " "	4-21 to 4-27	8	4853	49	750	10.7
BZ	" " " "	4-27 to 4-30	13	646	6	240	3.4
BZ	" " " "	5-1 to 5-7	14	5276	0	474	6.7

DECEMBER. 1955

COMPARABLE WEIGHTED EXPOSURE OF PLANT 9 PERSONNEL

TABLE I

Job Description	No of Employees	Daily Weighted Exposures Multiples of MAC: May 17 to Oct. 31	Daily Weighted Exposures Multiples of MAC: Nov. 4 to Nov. 23
WET AREA			
Wet Area Operator - up	3	34.8	6.54
Wet Area Operator - down	3	215.1	2.74
Wet Area helpers	3	46.9	6.21
Sump operators and helpers	6	7.3	3.34
REDUCTION AREA			
Reduction charging operator	3	4.11	2.67
Reduction charging helpers	3	233.71	3.49
Jolter operators	3	4.10	2.36
Reduction furnace helper	3	4.11	2.67
Breakout operator	3	14.9	12.26
Derby cleaning operator	3	6.21	5.41
Dezincing operator and helpers	6	10.60	6.67
ARC FURNACE			
Primary welder	6	25.06	89.44
Secondary welders	3	8.83	27.49
Secondary welder helpers	3	685.64	122.11
Primary arc furnace operators and helpers	6	473.03	23.26
Secondary arc furnace operators and helpers	6	75.71	43.74
MACHINING			
Derby saw operator	3	12.87	4.91
Ingot saw operator	6	17.67	5.63
Engine lathe operator	10	20.60	10.09
Centerless grinder oper. & helper	6	10.46	(Operations
Turret lathe operator #1	3	8.21	(not performed
Turret lathe operator #2	3	25.41	(during this
			(period.
MISCELLANEOUS			
Residue operator	3	9.66	5.23
Chip processing operator	3	4.39	---
Slug stamper	3	4.23	(Operations
Quality Control operator	3	4.91	(not performed
Final Inspection	1	4.91	(during this
			(period.
Fork Lift Operator	4	9.66	5.31
Shift Foreman	3	34.46	6.13
Area Foreman	1	9.44	5.17
Clerks	4	1.36	1.14
Superintendent	1	1.59	1.25

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12-1-1

CENTRAL FILES

NATIONAL LEAD COMPANY
OF OHIO
Cincinnati 39, Ohio

October 5, 1960

SUBJECT AIR DUST EVALUATION OF REMOVING MORTAR AND BRICKS FROM REMELT FURNACE COIL, PLANT 9

TO E. N. Rosu

FROM R. N. Halcomb

On Friday, September 23, 1960, an air dust evaluation of the operation of removing mortar and bricks from a remelt furnace coil was conducted. The operation was performed on the east pad, south of the maintenance shop. The coil was attached to the furnace bottom. The stone mason removed the mortar and bricks with a hammer and chisel. All droppings were shoveled out of the bottom of the tank by a laborer. Heavy concentrations of dust were visible at all times during the operation.

Listed below are the results of the air dust samples collected:

Type	Sample Description	Concentration-α d/m/M³ High	Low	Average	X MAC*
BZ	Breaking brick and mortar with hammer and chisel, and picking loose brick from inside coil and tossing into drum. Respirator worn.	59,549	8,510	24,932	356
BZ	Laborer shoveling brick and mortar residue from bottom of tank. Visible U308. Respirator worn.	90,842	50,601	67,039	958

*MAC (Maximum Allowable Concentration) - 70 α d/m/M³.

As indicated by the above results, a ventilated enclosure should be used for this type of operation in the future. It is understood that this work is done approximately twice each week. Plant 9 supervision should explore the possibilities of procuring an enclosure for this operation similar to the one located in the "B" Area of Plant 5. An air line respirator should be used in the interim period between now and such time as a ventilated enclosure is available and an air dust re-evaluation shows dust levels to be less than the MAC. Also, the operation should be isolated as much as possible from other jobs and personnel.

R. N. Halcomb

RNH:bg

[redacted]

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2132049

NATIONAL LEAD COMPANY
OF OHIO
P. O. BOX 158, MT. HEALTHY STATION
CINCINNATI 31, OHIO

February 5, 1954

SUBJECT Summary of Air Dust Samples taken of Rough Grinder Operator

TO R. C. Heatherton

FROM A. J. Stefanec

REFERENCE

Machine #	Date	No. of Samples	High	Low	Ave.	Remarks
1	1/3/52	4	3039	1225	1861	E-Metal
1	1/2/53	4	14053	1978	6471	
1	1/23/53	3	39	27	34	
4	3/11/53	4	65	24	48	
12	3/12/53	4	42	12	30	
12	3/25/53	3	720	672	698	Baffle on
12	3/27/53	5	92	45	68	Baffle Removed t determine effect
12	3/27/53	1	116			Baffle Replaced only one sample
11	4/22/53	2	295	47		
11	5/27/53	3	363	46	153	Lard oil being tried as coolant
11	2/4/54	5	22143	11066	17814	Taken to determine high urine result of Young and Heindreich

Yours truly,

A. J. Stefanec

AJS/mb

090780

[redacted]

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CENTRAL FILES

72-1-1-1

September 27, 1960

AIR DUST EVALUATION OF BULLARD LATHE - DEVELOPMENT MACHINE SHOP

E. H. Rose

R. H. Hildreth

On September 8, 1960 an air dust evaluation of the Bullard lathe was conducted. At the time of the evaluation a hollow, cylindrical, uranium uranium billet was being machined. A three-inch vacuum line furnished the only ventilation to the machine. Listed in the table below are the results of the air dust samples obtained.

Type	Sample Description	Concentration - d/m/ml Max	Min	Average	% MAC*
BZ	Control point located 2' east of machine. Operator usually located here, but not during this operation as items were too large.	4035	750	1580	22.0
BZ	Operator sitting on stool 9" east of machine.	155	29	76	1.1
F	Pump 20" away from operation.	7686	525	4099	59.0

Type Samples: BZ - Breathing Zone
F - Pressure

*MAC (Maximum Allowable Concentration) - 70 c d/m/m^3

It was noted during the evaluation that fiery chips and turnings were causing heavy smoke to drift into the atmosphere. This observation together with the sample results shows the existing ventilation arrangement to be inadequate, and should therefore be redesigned.

A dust-type respirator should be worn when performing this operation until an adequate ventilation design is installed.

ORIGINAL SIGNED BY

R. H. Hildreth

RHHirg

[redacted]

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OF OHIO

P. O. BOX 158
MT. HEALTHY STATION
CINCINNATI 31, OHIO

March 17, 1953

SUBJECT Ventilation of Spectroscopic Sources in Laboratory

TO 2257534

FROM S. L. Cox

REFERENCE F. Blase

On March 11, five air dust process samples were taken at the spectroscopic sources in the Laboratory Building to determine the amount of contamination being made airborne at these locations.

Results of the samples varied from 25029 d/m/M^3 to 71370 d/m/M^3, and averaged 51068 d/m/M^3 or 729 times the maximum allowable concentration.

It is our understanding that a request to engineer the appropriate ventilation has been made to your department by George Stuckenbrocker and we would appreciate your expediting this job for health reasons.

Yours truly,

E. F. Blase

EFB:bg

cc: R. C. Heatherton

[redacted]

R. Wiley

NLC-2F-LOTZ

NATIONAL LEAD COMPANY
OF OHIO

P. O. BOX 158
MT. HEALTHY STATION
CINCINNATI 31, OHIO

May 22, 1953

SUBJECT Air Dust Results - Rooms 130 and 131, Laboratory Bldg. 2257537

TO R. C. Heatherton

FROM E. F. Blase

REFERENCE

On May 1, 1953 and May 4, 1953, a number of air dust samples were collected in Rooms 130 and 131 of the Laboratory Building. In these rooms samples of metal are polished by grinding and buffing for use of the Metallurgical Department.

A summary of results is as below:

Room	Description	No. of Samples	d/m/M3 High	Low	Avg.	X MAC
130	BZ #1 wheel rough polish 3 samples #36 paper	2	8095	3793	5944	85
130	BZ #1 wheel polish #80 paper	6	756	31	187	
130	BZ #1 wheel #180 paper	2	492	12	312	
130	BZ #1 wheel #240 paper	2	14	6	10	
130	BZ #1 wheel #400 paper	3	63	13	34	
130	BZ Burring	2	2246	1994	2120	
130	BZ Cut-off wheel	4	546	126	363	
130	P Cut-off wheel	2	847	620	733	10
130	GA While grinding only	1			7	
130	GA Burring, cut-off, and grinder operating	1			218	
131	BZ Using 6 micron polisher	2	27	26	26	
131	GA Using 6M polisher	4	30	3	21	

An average of thirty (30) specimens per day are polished in these two rooms. The papers normally used are Nos. 24, 36, 60, 120, 180, 240, 400, and 600, the coarser grades having the lower number. As can be seen from the data the coarser papers produce the greater contamination. It was also noted that a fresh piece of paper produced greater contamination than one that was used.

The daily weighted average for a technical man doing this job is 3.3 MAC. See Job Exposure Evaluation Sheet #1.

The surface contamination found in these rooms after polishing is as below.

3409259

3506

NATIONAL LEAD COMPANY
OF OHIO

P. O. BOX 158
MT. HEALTHY STATION
CINCINNATI 31, OHIO

FC-1-1-1

2124471

July 6, 1953

SUBJECT: Air Dust Concentrations - Sample Preparation Room

TO: J. Robinson

FROM: R. C. Heatherton

REFERENCE

CENTRAL FILES

On July 1, 1953, E. Blase collected a total of thirty (30) air dust samples in the sample preparation room. These consisted of general air and breathing zone samples while screening the bomb liner and emptying the ball mill as well as process samples of three possible sources of dust. The results of all thirty samples were above the maximum allowable concentration of 70 d/m/M3 for airborne alpha emitters. A rough approximation of the exposure to people in the room is 20 times the maximum allowable concentration while performing screening or ball mill operations. In addition it has definitely been determined that the use of a vacuum cleaner exhausting into the room, the operation of the grinding machine and removing ore from the grinder are all definite sources of air contamination considerably above the maximum allowable concentration.

We understand that Mr. Cox has already begun the drawings for the ventilation in the room. However, until such time as adequate ventilation is installed we recommend the following.

1. The area rules with respect to the wearing of protective clothing in the room are to be followed at all times. In addition to protective clothing, dust-proof gloves must be worn for handling radioactive materials where hand contamination is possible.

2. Extreme care must be used in handling in order to reduce air contamination and to keep contamination of the table tops, etc. to a minimum.

3. Wherever possible wet cleaning should be used to remove contamination from surfaces rather than the vacuum cleaner which exhausts into the room. It is suggested, for example, that the floors be mopped and that the bench tops be cleaned with a wet sponge.

065976

[redacted]

NATIONAL LEAD COMPANY
OF OHIO
P. O. BOX 158. MT. HEALTHY STATION
CINCINNATI 31. OHIO

October 22, 1953

3707

SUBJECT Dumping of Q-11 Into The Temporary Hopper

TO J. J. Costa

2124456

FROM E. V. Barry

REFERENCE

Air dust samples taken during the dumping of Q-11 into the temporary hopper indicate the following dust concentrations in the breathing zones of the operating personnel.

1396 α d/m/m^3	4150 α d/m/m^3
602 α d/m/m^3	1125 α d/m/m^3
2573 α d/m/m^3	373 α d/m/m^3

Average - 1703 α d/m/m3

The average dust concentration is 24 times greater than the maximum allowable concentration.

The original design proposed an 8 inch ventilation duct at the rear of the hopper. The size in actually 5 inches.

If the hopper is to again be put into operation we recommend the following changes.

1. An 8 inch diameter ventilation duct.
2. The duct as it enters the hopper should be coned so as to streamline the air flow.
3. The duct be relocated from the midpoint of the back face to a distance about 3/4 down the back face.

The above recommendations will, in our estimation, improve the dust situation. We do not, however, guarantee it.

Yours truly,

Eugene V. Barry

E. V. Barry

EVB:bg

cc: R. C. Heatherton

F/W0002703

NATIONAL LEAD COMPANY OF OHIO
Cincinnati, Ohio 45239

January 28, 1980

SUBJECT: MEETING TO DISCUSS PIT AREA DUST CONTROL

TO: R. C. Heatherton

FROM: M. W. Boback

On January 17, 1980, a meeting was held in the Health & Safety Conference Room for the purpose of discussing means to control dust from residue dumping in the pit area. Present were E. M. Nutter, A. R. Diehl, E. A. Huey, E. Skintik, C. E. Block, and M. W. Boback.

Present dumping methods frequently cause dust to drift across and beyond the pit disposal area. Even when the wind is calm, a significant amount of dust usually occurs when dry powders are emptied from drums or dumpsters. Drums may contain depleted uranium (UF_4, U_3O_8, or a mixture of residues) and the dumpsters contain magnesium fluoride. At pit 4, material is dumped at the concrete pad and bulldozed into the pit. At pit 6, some direct dumping into the cavity may be possible.

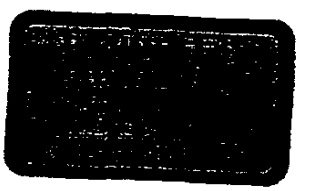
No single method of dumping that was discussed would solve the dust problem. Following are several major points brought out in the discussions:

(1) Plastic bag drum liners are being used in the drumming of some materials in Plants 5 and 6. The liners are closed with tape. To date, no lined drums have been dumped.

(2) Liners are not being used for hot material or residues which contain sharp fragments.

(3) An average of three dumpsters of magnesium fluoride from Building 55 are dumped each week. Each dumpster contains 7500 lbs. of MgF_2.

(4) Using a bag liner inside the dumpsters is not feasible. Positioning the bag before filling would be difficult. Dumping without tearing the liner may be impossible.



(5) Various uses of water for dust suppression were considered. Empty dumpsters would have to be dried before reuse because of the hard cake formed when MgF_2 becomes wet.

6) Drawings of the Middlesex dumping enclosure were reviewed at the meeting. This device is intended to help control losses when contaminated soil is dumped from a front-end loader into a truck bed. Various modifications were discussed but no satisfactory alterations were suggested.

(7) Fine materials, excluding uranium metal, are now being dumped into pit 6. Coarse materials will be added when a suitable protective layer is formed over the pit rubber liner.

(8) Uranium metal and materials which could damage the pit 6 liner continue to be dumped into pit 4.

A. R. Diehl agreed to identify drums now at Plant 1, awaiting disposal approval, in which liners were used. C. E. Block will schedule the dumping and notify the meeting attendees. The dumping will be observed to determine if the use of liners provides adequate dust control when the drums are emptied.

E. A. Huey noted there was an active engineering project for pit area dust control. The job originated with C. E. Block's request for engineering services. E. Skintik now has been assigned that project.

No plans were made for another formal meeting of this group. A report will be made of the test dumping of bagged material from drums.

M. W. Bernard
M. W. Bernard

MWB/vvs

cc: W. J. Adams
S. P. Audia
C. E. Block
A. R. Diehl
B. Hessinger
W. Hill
E. Huey
E. M. Nuss
C. A. Ostwan
E. Skintik
W. Wright

2129110

NATIONAL LEAD COMPANY
OF OHIO

P. O. BOX 158, MT. HEALTHY STATION
CINCINNATI 31, OHIO

October 2, 1958

SUBJECT RADIOACTIVELY CONTAMINATED INDUSTRIAL VEHICLES

TO R. H. Starkey BS

FROM W. A. Smith

REFERENCE

32-1-1
C. C12-16

CENTRAL FILES

32-1-2

Reference is made to your letter of September 25, 1958, addressed to G. J. Nowlin, subject as above. Motor vehicles including tow trucks, passenger cars and trucks, trailers, industrial trucks, cranes and miscellaneous other material handling equipment have been moved about the site without regard for process areas since the beginning of this plant. In this instance it seems inappropriate for you to remark that this has just come to your attention.

It seems only reasonable that vehicles in question become mildly contaminated and there have been instances where contaminated material has been spread about the site; a recent case being the spreading of contamination between Plant 8 and the K-65 Area. If your memory serves you, the Transportation Department called this situation to your attention and, in fact, was responsible for first, discontinuing the operation; secondly, cleaning up the resultant contamination and thirdly, instituting corrective measures which markedly reduced the spread of contamination.

In another instance, again in the Plant 8 area, we sent two fork trucks to the decontamination area to be thoroughly steam cleaned.

The Transportation Department is as mindful as you are regarding the general desire not to contaminate the outside areas or otherwise spread contamination and, I believe, takes reasonable precaution against this. We contemplate no other action than to continue this program.

082529

[redacted]

2

If the movement of industrial vehicles which are important to this site does in fact spread contamination, then it seems to me that you could much better devote your time in the industrial areas where the contamination exists since I believe it is common practice not to allow contaminants to remain on the working surfaces of the various plants.

Generalizations such as are contained in your letter of September 25 are inappropriate. If you have specific examples or situations to report, I will be more than happy and keenly interested in helping you resolve our problems. Supervision in the Procurement Division does not need nor deserve the type of criticism which is contained in your letter and you will be well advised to discontinue writing the sort of tripe therein contained.

J. A. Smith

W. A. Smith

WAS/re

cc: J. A. Quigley
G. J. Nowlin
Central Files

2131839

SEP 2 5 1961

Mr. C. L. Karl, Area Manager
U. S. Atomic Energy Commission
P. O. Box 158
Cincinnati 39, Ohio

SUBJECT: REVIEW OF VEHICLE CONTAMINATION SURVEY RESULTS

Dear Mr. Karl:

In compliance with a verbal request from Mr. E. L. Siebol of your office to review the results of vehicle contamination surveys with respect to the vehicles possibly being released to a Government pool the following is offered:

A review of the results of past surveys for vehicle contamination indicate that, without decontamination, 62% of the vehicles exceed the limits specified in AEC Manual Chapter 5170-1A0. Although this pertains to "Utilization and Disposal of Excess and Surplus Property" the principle involved is the same, viz., the release of radioactively contaminated vehicles for public (or semi-public) use.

In addition, 100% of the vehicles would, as normally encountered, exceed the alpha radiation contamination limits of 500 disintegrations per minute per 100 square centimeters as specified in George's ICC Tariff No. 13, #73.395. Approximately 40% of the vehicles would exceed the beta-gamma limit of 10 milliroentgens per 24 hours. This section also indicates that each vehicle "shall be thoroughly cleaned in such a manner that a resurvey of the interior surface shows the contamination to be below these levels." Although the percentage values are subject to change from day-to-day, they do indicate the general vehicle contamination picture. The phrase "as normally encountered" was used to imply that in the routine daily use of these vehicles it is quite likely that they will become contaminated. This is not surprising since, as you know, they are used daily throughout the Production Area, in many cases to transport uranium feed materials and/or radioactive scrap residues.

090543

[redacted]

Such a transfer of NLO-operated vehicles to a central Government pool would mean that each vehicle would require monitoring (and very likely decontamination to varying degrees) each day prior to each vehicle being returned to the pool. We feel that such a proposal is not practical from a health and safety viewpoint.

Sincerely yours,

/s/ C L Chapman

for J. K. Noyes
Plant Manager

JFK/mjs

cc: C. L. Karl - 1x
J. A. Quigley, M.D. - 1x
W. [illegible] Smith
R. H. Sturkey

Central File

090544

J. LONDON

AS RESULT OF THIS HAVE RE-ASSIGNED BACK TO 2ND SHIFT WITH RESTRICTIONS ON WORKING IN PLT 2,3-8 ONLY.

4/14/69

April 11, 1969

INDUSTRIAL HYGIENE EVALUATION OF INDUSTRIAL TRUCK OPERATOR JOB ASSIGNMENTS

J. A. Quigley, M.D.

R. H. Starkey

As you requested, I have evaluated all areas in which industrial truck operators are assigned. Based on the restriction which stated that the individual "should not work in areas where the airborne dust or fume levels are excessive," I feel that the following areas are safe for an individual to work. Where accidental releases of radioactive dust and/or acid gases are possible, these are also listed.

Plant 1 - all areas.	Occasional NO_2 exposures possible from Refinery.
Plant 4 - all areas.	Occasional HF leak possible.
Plant 5 - all areas.	
Plant 6 - all areas.	Occasional uranium fires and NO_2 releases.
Plant 9 - all areas.	Potential acid gas releases from Zirnlo Area.
Pilot Plant - all areas.	Potential acid gas releases. HF, HNO_3, NO_2.

A complete list of ITO job assignments furnished by J. H. Harrison are included in the attachment.

The only areas that I feel that a person with such a restriction should not be assigned are Plants 2, 3 and 8. The Project Labor Pool also, occasionally, becomes involved in some rather dusty short-term operations; therefore, I'd also recommend against this assignment.

If there is some concern with an individual's working in areas where an occasional fire and/or gas release may occur, then I'd suggest that he be supplied with adequate respiratory protection while working in these areas. Also, for gas releases, he could be instructed to immediately leave an affected area when a release occurs. Fires in these areas might cause a more complicated problem, however, as it is quite common that an industrial truck operator's assistance is required for extinguishing a fire.

[redacted]

Exposures to airborne material from fires can be quite satisfactorily controlled by the use of dust respirators which are equipped with ultra-filters.

Original Signed
R. H. STARKEY

R. H. Starkey

RHS:lrr

Attachment

cc: J. A. Quigley, M.D. (3)

2132117

CENTRAL FILES

November 25, 1952

Transfer of K-65 from Deteriorated to Solid Drums

W. Strattman

R. C. Heatherton

On Tuesday, November 25, I made an inspection of the subject operation on the Storage Pad. There were indications that people working on this operation are subject to very high radiation exposure and in all probability, exposure to radioactive dust in excess of the maximum allowable concentration. At the time of my inspection there were a total of six (6) operators.

a) Two (2) were handling drums with fork lifts.
b) Two (2) were removing lever locks and covers from old drums and placing the collar and new drum in position.
c) Two (2) were removing the old drums and placing covers and lever locks on new drums.

None of these operators were working behind shields, although shields were provided for Operators B, above.

Radiation exposures as measured with a pocket dosimeter on Monday indicate that the fork lift operators were receiving approximately 20 mr/hr. Other operators were receiving about 10 mr/hr when working behind shields. However, it is expected that their exposure is at least doubled when they are working as they were today. At this time we have no dosimeter data to confirm this, although we are accumulating more information.

Previously we have permitted exposures equal to or in excess of the maximum permissible dose in case of emergencies. However, the practice of considering each job as an emergency and permitting exposures at this level should not be continued. The maximum permissible exposure of 300 mr/wk is just what the term implies, the maximum permissible exposure. It is not an exposure which we would recommend be permitted on a continuous basis. It will be the policy in this plant to limit radiation exposure to a minimum. Where emergency requires that a person receive a certain amount of exposure the total during the emergency should be limited to no more than 150 mr if possible. This is on the assumption that a person may normally receive 150 mr in his other duties.

090927

[redacted]

NLO, INC.
HEALTH & SAFETY DIVISION
MESSAGE FORM

Subject: Cleaning Subcontract Laundry Area

To: M W Boback MWB 4/22/81

From: WH Mengel

Date: 4/22/81

ROUTE TO	DATE	INITIAL

Four subcontractor workers are now cleaning the ventilation duct outlets throughout the Service Building. A measurement with the pancake B/G meter showed up to 15,000 counts/minute in the chunks of dust removed. Workers were not wearing respirators or NLO clothing so I issued air-purifying respirators with purple radionuclide cartridges and coveralls and hats to put over their street clothing. I also showed them how to install bags in their vacuum cleaners so as to minimize exposure when emptying dust, to facilitate emptying, and to reduce the chance of later dust release. Two air samples were collected on the worker, Henry Lightner, judged to have the highest dust exposure (dust was visible in the local work area.)

These things were communicated to Gale Watson who was filling in for Ed Koenen, the foreman responsible for this subcontract. These added work requirements should be communicated to Ed Koenen when he returns this afternoon, since this job will continue all week.

Street Clothes

There is a possibility that the subcontract workers street clothes which were worn before they were given coveralls, may be contaminated. Also, the workers should probably be made to change completely into NLO clothing on all succeeding days. Later, a survey of street clothing showed that only bkd background levels of contamination and were safe to be taken home without cleaning. Worker was told clothing was not contaminated.

[illegible] it was found that street clothes [illegible] up to 5 mr/hr [illegible] <0.2 mr/hr [illegible]

Worker was told clothing was not contaminated

NLO-H&S-1874 (REV. 1/16/81)

[redacted]

BEST COPY AVAILABLE

July 31, 1981

HEALTH & SAFETY DIVISION MONTHLY REPORT - JULY 1981

R. M. Spenceley

R. C. Heatherton

1) Considerable work was done in thepast month preparing drafts of procedures for the Medical Department Manual. Most of the procedures have been reviewed in draft form and corrections have been made. Formal typing of the procedures is to follow. Preparation of the manual is on schedule for the targeted date of August 15 for draft completion and September 15 for final issue.

2) Health & Safety's Quality Assurance Manual was issued in July.

3) The Health & Safety Division Safety Meeting was held on July 16. The primary topic was the employee's rights and responsibilities under the Occupational Safety and Health Program. The meeting was attended by most of the Health & Safety Division employees and some of the Production employees in the Health and Safety Building.

4) There have been several meetings with two millwrights for the purpose of providing them with better understanding and acceptance of procedures for radiation control. Originally four meetings were planned for about one hour each, but each of the three meetings which has been held lasted for about two hours. Mr. Boback feels that these meetings have been helpful in providing better understanding and acceptance. The union Safety Representative has also been included in the last two meetings. The fourth and final meeting has been scheduled for early in August when the film badge procedures will be discussed in considerable detail.

5) Several persons have been included in a special urine sampling program during the week of July 27. This program was initiated because of work going on in Plant 4 with the subcontractor Master Painting preparing to paint. The airborne dust levels have been relatively high during the cleaning process. On July 28, eleven Master Painting employees, two Westinghouse employees who were here to work on the elevator, and six NLO chemical operators from Plant 4 submitted urine samples prior to leaving the plant. Eight of the Master Painting employees and six NLO employees returned on the start of the workday on July 29 to leave another sample.

[redacted]

HEALTH & SAFETY DIVISION MONTHLY REPORT - JULY 1981
R. M. Spenceley
July 31, 1981

Six of the Master Painting employees and three NLO employees showed urinary radiation concentrations above our checkpoint of .040 mg/liter on the 28th. Four of the Master Painting employees and two NLO employees were still excreting urihe above the .040 mg/liter level on July 29. These persons were asked to report again on July 31 at the start of the workday.

The uranium concentrations which were found should be no cause for concern, however, they do indicate an airborne uranium concentration level above our NLO concentration guide. They also indicate a need for greater care on the part of subcontractors in performing their work and for using respiratory protective equipment properly when indicated. On July 30 I met with the Master Painting employees showing higher concentration and the Engineering representative to explain to them the purpose of the urine sampling and the reason for requesting additional samples. It is expected that all employees will be down below the .040 mg/liter level with the samples submitted on July 31.

Highlight items for the month of July for H&S Departments are given in the attached reports. Accomplishments are included in these reports.

Original Signed by
R. C. HEATHERTON
Dir. of Health & Safety

R. C. Heatherton

RCH/jjc

Attachments

NLO, Inc.

A SUBSIDIARY OF NL INDUSTRIES, INC.

P. O. BOX 39158 CINCINNATI, OHIO 45239

PHONE: AREA CODE: 513-738-6200

NO Plutonium Accounts

MAY 1 1985

Mr. J. A. Reafsnyder
Site Manager
U. S. Department of Energy
P. O. Box 39158
Cincinnati, Ohio 45239

Dear Mr. Reafsnyder:

JOINT TASK FORCE ON RECYCLE MATERIAL PROCESSING

8 1 ERS

REFERENCE: 1) J. A. Reafsnyder to R. M. Spenceley, Same Subject, dated April 18, 1985.
2) B. Gessiness to W. J. Adams, "Plutonium Content of NLO Feed Materials (Revision 1)", dated April 10, 1985.

Several divisions of NLO, Inc. have reviewed the questions raised in Reference Letter 1. It should be stated from the outset that NLO, Inc. has not attempted over the years to maintain plutonium accountability. Analyses for plutonium were made only on special occasion when specific receipts of recycle material warranted such analyses for transuranic elements. During the past few weeks we have initiated plutonium analyses on a routine basis in our laboratories in order to characterize our present inventories and to check incoming offsite receipts of questionable materials.

Reference Letter 2 was prepared several weeks ago to answer specific questions which you raised at that time in behalf of Senator Glenn's Office. Much of that information is included in the current report.

Our answers to your specific questions are provided in the attachments.

Sincerely yours,
Original
R. M. SPENCELEY
R. M. Spenceley
Manager

BG:kmb
Attachments

cc: R. H. Cross, ORO
R. C. Kispert - B. Gessiness (2X)
E. M. Nutter - D. C. Bonfer
R. B. Weidner - S. L. Hinnefeld
Central Files

PLUTONIUM CONTENT OF NLO FEED MATERIALS

SUMMARY OF RECYCLE FEEDS OF MATERIALS RECEIVED ABOVE THREE ppb PLUTONIUM

Year	Material Type	Total Uranium kg	Total Plutonium grams	Total Plutonium ppb
1966	UNH	103,469	0.698	6.746
1967	UO_3	263,545	1.044	3.961
	UHH	130,823	0.880	6.727
1968	UHH	147,210	0.992	6.739
1969	UHH	119,148	0.804	6.748
1970	UO_3	1,249,642	4.953	3.964
	UHH	52,354	0.352	6.723
1971	UHH	66,399	0.448	6.747
1972	UHH	1,000	0.006	6.000
1974	UNH	14,965	0.100	6.682
1975	UNH	12,290	0.082	6.672
1975-76	Pad. Scrap	290,742	2.610	8.977
1976	UNH	6,935	0.046	6.633
1978	UNH	12,279	0.082	6.678
1979	UO_3	395,482	2.160	5.462
1980	UNH	29,751	0.200	6.722
	ASH	22,529	25.290	1122.553
1981	UO_3	399,301	2.180	5.460
1982	UO_3	622,746	3.619	5.811
1983	UO_3	420,660	2.166	5.149

From: S. L. Hinnefeld

WMCO:OSH(ODI):88-359

Date: September 19, 1988

Subject: POOS HISTORY AND RISK ASSESSMENT

To : G. F. Beecher
L. C. Bogar
M. B. Boswell
S. L. Bradley
W. H. Britton
H. D. Christiansen
J. A. Grumski
J. M. Martin
A. C. Reynolds
S. A. Scheer
A. M. Schwartzman
P. C. Weddle
W. A. Weinreich

The recent round of publicity concerning potential exposure to plutonium at the FMPC has caused considerable employee reaction and there appears to be a general lack of information about this issue. Consequently, I have prepared the attached summary to provide some insight into the background and significance of the current situation. Please feel free to disseminate this summary as you see fit.

S. L. Hinnefeld

S. L. Hinnefeld, Manager
OS&H Dosimetry & Instrumentation

Attachment

SLH/blr/dmj

c: R. W. Keys (w/ attachment)

Central Files (w/ attachment)

PODS History and Risk Assessment

I. INTRODUCTION

Recently, bioassay samples from several FMPC employees were reported by an outside laboratory to contain small amounts of plutonium. These results have caused significant reaction among employees, and there appears to be a general lack of information about plutonium. The purpose of this document is to briefly describe how plutonium became an issue at FMPC; discuss the current situation; and assess the significance of the positive bioassay results.

II. DESCRIPTION OF PODS HISTORY

In 1985 a DOE Task Force evaluated the processing of "recycle uranium" at several DOE facilities. Recycle uranium was defined as uranium that had been recovered from irradiated production reactor fuel. It was known to contain traces of transuranic (TRU) and fission product impurities. TRU impurities were usually limited to Neptunium-237 and Plutonium-238 and -239, and the radioactivity of the TRU impurities was generally less that 0.1% of the total radioactivity of the recycle uranium.

One of the findings of from the Task Force on Recycle Uranium was that many of the chemical and physical processes performed at DOE facilities tend to separate impurities from the uranium product. The mechanism for this is illustrated by the following generalized reaction:

Uranium feed + Reagent-- Uranium product + Byproduct

The uranium feed would contain the trace of TRU impurity that was typical of recycle uranium. A portion of the TRU impurities would end up in the uranium product and a portion in the byproducts. The vast majority of the uranium goes to the uranium product, but a small amount does end up in the byproduct. The end result is that the ratio of TRU to U is slightly lower in the product than it was in the feed, but that ratio is much higher in the byproduct than it was in the feed.

II. DESCRIPTION OF POOS HISTORY (continued)

Essentially all recycle uranium is enriched in the U-235 isotope, and it is economically advantageous to reprocess reaction byproducts (often called "residues") in order to recover the enriched uranium. Consequently byproducts containing relatively high TRU to U ratios were sometimes returned to product streams. In 1980, 89,000 lbs of material identified as "Feed Plant Ash and Other Paducah Scrap" was shipped from the Paducah Gaseous Diffusion Plant to the FMPC. This material contained 22.5 metric tons of uranium, and the TRU to U ration was about 200 times higher than what was typical for recycle uranium. The plutonium and neptunium in this shipment is the cause of the out-of-specification materials at the FMPC today.

A second finding of the Task Force on Recycle Uranium was that most DOE facilities did not have specifications for acceptable levels of TRU and fission product impurities in recycle uranium. Consequently, affected facilities were directed to develop such a specification. The specification adopted by the FMPC was that the total alpha activity from TRU elements in recycle uranium shall not exceed 0.1% of the alpha activity from the uranium. This equates roughly to 10 parts of plutonium per billion parts of uranium on a mass basis, if plutonium is the only TRU element present. This specification was adopted in late 1985, and was based on the facts that 1) the 10 ppb value had been used in the past by some DOE facilities for certain products; and 2) at that level, the potential health risk associated with exposure to the TRU elements was negligible compared to that associated with exposure to the uranium that was present.

III. DISCUSSION OF CURRENT SITUATION

When the specification for acceptable levels of TRU elements was adopted in late 1985, it was recognized that certain materials already at the FMPC did not meet the specification. In 1986 special procedures were developed for processing these materials, which were subsequently dubbed "POOS", for plutonium-out-of-specification. The most significant POOS material was approximately 160 metric tons of uranium as UO_3. The TRU level in this material was approximately four times the specification. The plans for processing this material called for it to be blended with within-specification UO_3 while being converted to UF_4 in Plant 4. The goal was to dilute the TRU content so that the product UF_4 would meet the TRU specification.

III. DISCUSSION OF CURRENT SITUATION (continued)

The campaign to process the POOS UO_3 to UF_4 ran for only a few days before a spill of POOS material from a hopper shut down operations. Subsequent POOS operations have involved running out the POOS material that remained in the reactor banks at the time the operation was shut down, and recovering material from various pieces of process equipment.

One aspect of the procedure for running POOS materials was the collection of urine samples to be analyzed at an outside laboratory for plutonium. A "POOS urine sample" was to be collected before an employee started working with POOS materials, at six-month intervals during POOS operations, and at completion of POOS operations. In the April 1988 time frame samples were collected from individuals who had worked in POOS areas since July of 1987. In one batch of 11 samples that were sent in a single shipment to an outside analytical laboratory, 8 samples were reported to contain plutonium. These results were received at FMPC in early August, the involved employees were informed of the results, and additional bioassay samples were collected.

IV. SIGNIFICANCE OF PLUTONIUM EXPOSURE

The risk associated with exposure to plutonium stems from the resulting radiation exposure. The most common plutonium isotope, Pu-239, is a pure alpha emitter. It does not emit gamma rays, and unlike uranium, it does not have short half-lived decay products that emit beta particles. Consequently, it poses no external radiation threat. Exposure to plutonium is significant only if it is inhaled.

The impact of inhaling a radioactive material depends on 1) it's physical half-life; 2) the type and energy of the radiation it emits; and 3) where it resides in the body; and 4) how long it resides in the body.

The uranium and plutonium isotopes of interest all have physical half-lives that are much longer than a person's lifespan, and all emit alpha particles having energies within about 30% of each other. The reason that plutonium is considered more hazardous than uranium, then, is that the behavior of these two elements inside the body is radically different. Whereas a fraction of the uranium that is absorbed into the bloodstream deposits relatively briefly in bone and kidneys (biological half-lives of a few days for the vast majority of the deposited material);

IV. SIGNIFICANCE OF PLUTONIUM EXPOSURE (continued)

a larger fraction of plutonium that is absorbed into the bloodstream deposits in bone and liver for much longer periods (biological half lives of 50 and 20 years, respectively). Therefore inhaling a given activity of plutonium will result in a significantly higher radiation exposure than will inhalation of the same activity of uranium.

The International Commission on Radiological Protection (ICRP) has defined 2 quantities to describe the risk associated with intakes of radioactive material. These quantities are "effective dose equivalent" and "committed effective dose equivalent." Effective dose equivalent determinations take into account the organs that receive radiation exposure as a result of an intake of radioactive material, the quantity of radiation exposure received by each organ, and the risk of health effects associated with radiation exposure of those organs to arrive at a single value have units of "rem", the unit of measurement for radiation exposure. A given quantity of effective dose equivalent carries the same ultimate risk of health effects as the same quantity of external gamma radiation exposures.

After an intake of radioactive material, an individual continues to receive radiation exposure as long as a significant quantity of the material remains in his body. For materials that leave the body within a short period of time, say a few weeks, all of the effective dose equivalent associated with the intake will occur during those few weeks. For materials such as plutonium that remain in the body for many years, the involved individual will continue to receive effective dose equivalent for many years. Recognizing this, ICRP developed the "committed effective dose equivalent" quantity, which is simply the total effective dose equivalent that is received in the fifty years following an intake. Fifty years was selected as the period of interest because it is the approximate duration of a work life. Committed effective dose equivalent, which is also expressed in units of rem, represents the total lifetime risk associated with an intake of radioactive materials.

The current ICRP estimate of cancer risk resulting from radiation exposure is 10^{-4} per rem. In other words, if 10,000 people were exposed to 1 rem of effective dose equivalent, there would be one fatal cancer in that group due to the radiation exposure.

WHAT NATIONAL LEAD KNEW ABOUT RADIATION IN THE 1950'S

1. Pharmacology and Toxicology Textbook - 1949.

2. Humans to avoid breathing and swallowing of Uranium, Radium and Thorium.

3. Dr. Quigley, Director of Health and Safety (1951-1973), NLO, said in 1958:

   A. Radiation Produces Genetic Change.

   B. " . . . Radiation can produce . . .
      a. Skin Burns
      b. Neoplasms [cancer]
      c. Cataracts
      d. Leukemia [cancer of the blood] and other blood dyscrasias [abnormal production of blood cells] . . ."

   C. "[Radioactive Materials] continue to exert an influence on the tissues surrounding them as long as they remain in the body." (for life)

   D. I believe that it is not a question of "can an industry afford proper protection?, but rather it is a fact that no industry can afford to be without it".

RADIATION HAZARDS AT FERNALD

INTRODUCTION

In any discussion it is advisable to define the terms that will be used in the discussion so that all parties will understand one another. In discussing hazards it is therefore necessary to define the word "hazard".

According to Webster's New Collegiate Dictionary, the noun "hazard" is defined as:

1. An old dice game of which craps is a simplified form.
2. Chance, a chance.
3. A risk; danger; peril; also, a source of risk. b Shakesperian: Anything risked; a stake.
4. Court tennis. One of the winning openings in a court.
5. English billiards. A stroke which pockets an object ball, called winning hazard, or a cue ball after contact, called losing hazard.
6. Golf. Any obstruction in playing a stroke, including bunkers, traps, ponds, roadways, etc.

The third definition is the one we are concerned with - particularly the last phrase, "also, a source of risk". But, this definition

does not indicate the degree of the risk. We could introduce such terms as severe hazard or negligible hazard or slight hazard or moderate hazard to denote the degree of the hazard.

The smoking a cigarettes involves some risk to the human lungs. Smoking then can be thought of as a hazard.

A housewife working with a frayed heater cord on her electric iron could be killed by the electricity in the cord. A heater cord then too can be thought of as a hazard.

A husband building a cabinet can be killed by a shorted wire on an electric hand drill which has no ground wire. An electric hand drill can also be a hazard.

A bald headed tire can cause a skid on a wet highway. The skid could wreck an automobile and kill its occupants. A tire can be a hazard.

The one who said, "The hazards of life are many", was right. There are hazards everywhere we look.

These hazards, however, can be reduced to such a point that although the risk is still there, it may be so minute as to be statistically undemonstrable.

The smoker can switch to a filter type cigarette or stop smoking entirely. The housewife can replace the electric heater cord as soon as it starts to fray. The husband can buy a drill with a ground wire. The tire can be replaced before it becomes bald headed. The application of good common horse sense can reduce the degree of the hazard to such a point that the hazard is no longer real.

Industrial Hazards:

The coming of the industrial revolution brought with it hazards which have resulted in the death or disability of many industrial employees.

Today, however, the severity of a large majority of these hazards has been reduced to a very low level. This has resulted from: 1) the understanding of the hazards, and 2) the control of the hazards.

Electricians are protected from the hazards of electricity through lockout procedures. Boiler plant operators are protected from boiler explosions by the safety valves on the boilers. Guards, rupture disks, safety harnesses, safety goggles, hard hats, face shields, and respirators are a few of the many safety devices used by industry to protect the employee.

The adoption of the recommendations and the advice of the many safety groups in this country has been instrumental in the reduction of the severity of the hazards.

Radiation Hazards:

A short time after the discovery of x-rays, man became acquainted with the harmful effects of ionizing radiation. Between 1896 and 1922, the control of the hazards of radiation were virtually non-existent in this country. In 1922, the American Roentgen Ray Society published its first radiation protection measures. The arrival of the atomic age at the University of Chicago on December 2, 1942, brought with it many unanswered problems concerning radiation. Prior to that time the world had produced only two pounds of radium. What would be the consequences if man were permitted to work with the equivalent of thousands of tons of radium?

Fortunately the persons responsible for this development were wise and far-sighted and from the beginning took adequate measures to prevent any radiation damage. In fact a new science called "health physics" had its origin at the University of Chicago in the summer of 1942. This new science was dedicated to the prevention of radiation damage to man, and it is fortunate that health physics was able to

develop on a firm foundation of knowledge and experience acquired and set forth by such men as R. S. Stone, E. O. Wollan, R. D. Evans, S. T. Cantril, H. M. Parker, and G. Failla, to mention a few.

However, it spite of every conceivable precaution to prevent radiation damage, health physics workers were not quite certain at that time what ultimate success could reasonably be expected, since the extrapolation from the 2-lb-radium age to the thousand-ton-radium-equivalent age was so great. As a consequence, during the early days of the development of atomic energy, a number of outstanding radiologists associated themselves directly with the project. As time went on, however, their success in avoiding radiation damage was much greater than had been anticipated, and one by one the radiologists left the project, because there were no cases of radiation damage and they did not have the opportunity to apply their skills in this new atomic energy field. A great deal of the credit for this successful program should be given to the hundreds of health physicists associated with the various projects, who through the years have devoted their every effort to making a study of the behavior of radiation and to the development of methods, procedures, and instruments to minimize radiation damage.

Recently the National Bureau of Standards published Handbook 59 called Permissible Dose From External Sources of Ionizing Radiation.

It may be well to read what this National Committee of Radiation Protection has to say about setting of radiation limits. Their words are:

"The concept of a tolerance dose involves the assumption that if the dose is lower than a certain value - the threshold value - no injury results. Since it seems well established that there is no threshold dose for the production of gene mutations by radiation, it follows that strictly speaking there is no such thing as a tolerance dose when all possible effects of radiation on the individual and future generations are included. In connection with the protection problem the expression has been used in a more liberal sense, namely, to represent a dose that may be expected to produce only "tolerable" deleterious effects, if any are produced at all. Since it is desirable to avoid this ambiguity the expression "permissible dose" is much to be preferred.

It is now necessary to give this expression a more precise meaning. In the first place it is well to state explicitly that the concept of a permissible dose envisages the possibility of radiation

injury manifestable during the lifetime of the exposed individual or in subsequent generations. However, the probability of the occurrence of such injuries must be so low that the risk would be readily acceptable to the average individual. Permissible dose may then be defined as the dose of ionizing radiation that, in the light of present knowledge, is not expected to cause appreciable bodily injury to a person at any time during his lifetime. As used here "appreciable bodily injury" means any bodily injury or effect that the average person would regard as being objectionable and/or competent medical authorities would regard as being deleterious to the health and well being of the individual. "Dose" is used here in its radiological sense and particularly as tissue dose in the irradiated tissue, organ, or region of interest. What constitutes the region of interest depends on the conditions of exposure and must be taken into account in assigning numerical values to the permissible dose or doses applicable to a given set of conditions."

The Health & Safety Division has always adapted the recommendations of the National Bureau of Standards except in a few special cases. Handbook 59 recommends for people over 45 years a maximum weekly permissible dose figure which is twice that for people under

45 years. The Health & Safety Division has refused to adapt this recommendation.

Radiation Protection at Fernald:

I. External Radiation.

One of the functions of the Health & Safety Division is to protect the employees of the National Lead Company of Ohio from the harmful effects of radiation.

Wherever there is a radiation hazard - i.e. any possible condition that might result in the exposure of persons to radiation in excess of the maximum permissible dose - the Industrial Hygiene & Radiation Department takes steps to prevent the overexposure of personnel. This department's protective steps consist of: 1) shielding the radiation so that the amount of radiation escaping into the environment is reduced to a permissible or below permissible level, 2) by limiting the time a person spends in the high radiation area, 3) by moving the source of radiation away from the employee. These three steps are fundamental in radiation protection.

It may be worthwhile to see how these three steps are actually utilized at Fernald.

In three of our plants there is a large amount of radiation shielding in the form of concrete barriers in the form of walls and gunnited tanks. In one of the other plants shielding takes the form of aluminum cake type covers. Incidentally, the cost of radiation protection requirements at Fernald increased the cost of this project by one-fourth.

The radiation time limit has also been used whenever personnel must go into high radiation areas for one reason or another. This recommended time limit specifies the time a man can spend in the area without exceeding 1/2 the maximum weekly permissible dose.

Sometime ago the Industrial Hygiene & Radiation Department had in use a Radiation Work Permit which has been replaced by an Industrial Hygiene Work Permit. The reason for the change is that many of the jobs inspected indicated possible exposure to industrial hazards other than radiation. In the prescribing, for example, of Air Line respirators for tank work (even though the tank has been flushed with water) the Industrial Hygiene & Radiation Department believes that an ounce of prevention is worth a pound of cure.

In several cases rotation of personnel has been used to limit the exposure of a man to radiation.

01-24-06P02:09 RCVD

SEC 00046
Office of Compensation Analysis and Support
NIOSH MS-C-47
4676 Columbia Parkway
Cincinnati, OH 45226

January 24, 2006

Attached: FOR CLARIFICATION PURPOSES

Ammended Submission for Qualification of FMPC SEC 00046 Petition.

Respectfully,

FOR CLARIFICATION PURPOSES: SEC00046

I request the following change to Form B, Part F.

F.1

Submitted with this petition are documents that identify the following areas in which monitoring was not available to Fernald workers:

*No monitoring for internal exposure for Ru contaminants. *No smears or air sampling filters were analyzed specifically for: Plutonium, Neptunium or Thorium isotopes, before Feb. 1989. *No RU contaminants were reported in analysis before 1989. **In Vivo* counts were not performed frequently enough to be of significant value in TRU dose reconstruction. *Internal dosimetry was not introduced until 1986. *Before DOE Order 5480.11 (89) bioassay data was not routinely used to estimate intake and internal organ dose. *No routine air monitoring was used to establish internal intake or exposure estimates. **In Vitro* bioassays for thorium were not performed. *No records were found of any bioassay results for Radium or daughter products during this time. *No non-uranium urinalysis was conducted. *No fecal sampling has ever been a part of the routine bioassay program. *No monitoring for non-uranium radionuclides. *No monitoring to detect TRU contaminants with the MIVRML. *No neutron dosimetry.

This lack of monitoring is confirmed in the NIOSH site profile.

In addition to the above I would like to add, the uranium urinalysis that was performed was based on chemical toxicity and not radiological toxicity. So therefore, *no radiological uranium urininalysis monitoring was performed. (In a Fernald document entitled 'Radiation Hazards at Fernald' the writer says "Before discussing the steps taken to protect personnel against the inhalation of radioactive dust, the writer would like to indicate that the present maximum allowable concentration for uranium dust is based on the chemical toxicity of uranium rather than the radiological toxicity. This can be verified by reading the footnote for the uranium concentration in the National Bureau of Standard's Handbook 52, Maximum Permissible Amounts of Radio-isotopes in the Human Body and Maximum Permissible Concentrations in Air and Water." That footnote: a) Values calculated but not used in final determination.) This will be confirmed with additional documentation.

F.2

Thorium data was lost, and a large number of records and files were destroyed in the early 1970s during declassification efforts (Dolan and Hill 1988).

Documents included identify areas of thorium processing previously unknown and not included in the data reconstruction. These areas therefore, were omitted from the characterization of the internal and external exposure environments at FMPC. Radiation sources, work processes and practices are also described in varying detail.

Documents are also included that describes how air samples were manipulated to gain desired readings, to give the appearance that radiation exposure levels were much lower than actually existed. Workers were in situations involving exposure to a mixture of radionuclides of uncertain identity and quantity. Radioactive materials were often mis-identified. Workers were subjected to exceptionally high levels of radiation exposure for long durations of time. [42 U.S.C. 7384 Findings of Congress (6) states that 98% of radiation induced cancer within the nuclear weapons complex have occurred at dose levels below existing maximum safe thresholds.] The documents show FMPC consistently operated far above those thresholds. Management hid facts from government authorities by falsifying data. This was confirmed in United States District Court.

I would like to clarify a statement that was reported in the qualification phone call letter. I don't recall stating that the TBD was based incorrectly on the assumption that procedures were appropriately followed. The statement as it was read during the interview is in the addendum, which is only now being submitted, it states: ORAU dose reconstructors assumed that FMPC operated within the guidelines established by them and for them by government agencies. I believe dose reconstructors operated in good faith and believed the information provided to the government by FMPC management was accurate and reliable for the purpose of dose reconstruction. If FMPC had followed the guidelines established by the government regulatory agencies, and limited radiation exposure as they had been requested to do, we wouldn't be going through this process. The documents show that FMPC seldomly followed the rules, and often ignored the warnings to do so; which eventually led to the government breaking it's contract with NLO, the contractor operating FMPC.

The justification for data reconstruction for thorium processes is based on the information that data prior to 1970 had been destroyed. The fact that no default exposure allowance was attributed to Plant 6 from January 1960 to July 1963 indicates that it was *not considered or included in the internal and external thorium exposure environment.* This is confirmed by the TBD. Fernald documents indicated the exposures were significantly high and continued throughout the operation until it was finally shut down. Documentation also confirms that Fernald's maximum allowable levels of exposure to thorium exceeded government recommendations by 20 times.

SEC00046

FMPC PETITION

Addendum

SEC00046 FMPC PETITION Addendum

SEC00046-FMPC PETITION: Addendum

SUMMARY:

Exposure problems occurred consistently during Fernald's operation due to design flaws, normal wear, deterioration, explosions, worker habits, inefficient processing and handling unidentified materials, just to mention a few. The extent of difficulty in attempting to maintain a safe exposure levels from such varied reasons as equipment malfunction, lack of maintenance, inadequate monitoring and material reactions on equipment and storage containers, is overwhelming.

Production demands outweighed safety concerns and exposure limits. They deemed it necessary to continue using defective equipment in spite of the dangerous levels of radiation exposure this practice was creating for the workers. They permitted these levels to persist for not just days, but for years.

Many exposure problems were in place long before they were discovered through uranium urinalysis. Even witnessed incidents often were undetectable by this method of monitoring. When monitoring did reveal an exposure problem, the source often could not be determined. The monitoring for uranium exposure only offered a 3 day window of opportunity for discovery as demonstrated by one of the case studies. This infrequency would allow innumerable exposures to occur within the frame of 1year or longer between the routine monitoring.

Failure to understand specific material processing procedures by the dose reconstructors, also attributed to oversights in exposure potential. Wrong assumptions were made concerning the exposure potential to particular worker groups. For example, engineers were assumed to have limited exposure because their job, in concept, involved drawing plans and working in a protected office environment. The nature of the workplace and its functional difficulties, required them to be in the most contaminated areas throughout the facility trying to discover the reason for potentially high exposure levels for the workers. Furnace blowouts, ventilation failures, and leaking materials were just a few of the conditions evaluated to determine whether design changes were needed to correct the problems. The theories behind the assignment of exposure potential to specific groups of workers is not always based on reality.

Incomplete records and the practice of rotating workers to limit exposure also contribute to the inability to adequately assess exposure potential. Without a thorough monitoring program, complete accurate records, and knowledge of all incidents of accidental exposure, it is impossible to estimate exposures responsibly. Fernald records reveal that workers often didn't know what constituted an incident, while other didn't recognize the sources or locations for potential exposures.

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It's one thing to attempt to reasonably ascertain what a given workers exposure dose potential was, but it's another thing to do it with reasonable accuracy. It's like putting a puzzle together when there aren't enough pieces to even give a glimpse of the scene being depicted.

The pieces of the Fernald puzzle which are included as evidence with this petition reveal some of the follow :

A worker whose nostrils are caked with black oxide, yet medical examination revealed no unusual findings.

Workers working in areas different than as noted in the records.

Respirators with the potential of creating health problems because they were filthy and failed to provide the protection intended due to improper fit, lack of use or even unavailability. Some workers were required to provide their own respiratory protection.

Management perceived record keeping as tedious work. "We have records which tell us to which plant a person is assigned and in which job classification he worked however, these records do not tell us the specific job operation he performed."(PE901)

Workers were rotated as a means of limiting exposure. Some records reveal air dust sampling for specific jobs by plant, but the person performing the job can't be determined based on the record keeping practices Fernald documents describe.

Exposure potential varied for a specific job based on the worker performing the task, the condition of the equipment, the ventilation, whether a respirator was used, and the type and quantity of material being processed. Unknown factors also apply making it impossible to estimate exposure based on limited data. Several documents indicate the extreme levels of exposure that existed from one survey to another. Levels changed by hundreds of MAC based on process changes or even by how, when or where an air sample was taken. These factors all contributed to gross errors in estimates.

PE515c states that data is useful in assessing risks to worker's health only to the extent the data are accurate, comprehensive, accessible and comparable. ORAU has already stated in the site profile that Fernald data is very limited and portions of it can't be interpreted. Testimony presented through affidavit PE747, admitted as court evidence, makes the accuracy of some air sampling data 'suspect'. The National Research Council concluded that data collected in the past (prior to 1994) are inadequate because of both the kinds of data collected and the manner in which they are stored.

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Thus far ORAU has used uranium urinalysis for internal dose reconstruction contrary to Fernald documents PE901 and PE760. They performed a data reconstruction with grossly flawed results concerning Thorium and they may have used artifact documents declared to be inaccurate by a Fernald record keeper (3455935-3455940).

Some thorium products were improperly coded and drums exploded. (Oct.61) (PE547b).

A single BZ sample of 126,200 resulted in an x-NCG of 1260 for one worker in the Pilot Plant in Nov.1970. Other samples were 180, 293, 140, 157, 159 x-NCG during the same operation

PE541 reveals there were 711.3 metric tons of thorium on site in Aug.1978.

PE533 reveals the general air samples for Plant 6 thorium emissions were 2-3 MAC, while air dust levels ranged from 10-1300 MAC. Fire and safety hazards also existed. The roof over the thorium furnace in the plant was not fire-proof. (April 1963). [These conditions are not part of the information included in what ORAU considers the 'best information available'].

PE544a Plant 6 sludge furnace underwent alteration for the oxidation of pyrophoric thorium residues to eliminate the constant danger from these materials, which had been responsible for 30 known fires in 4 years. One fire burned through a concrete slab on which drums were being stored.

PE544j In Dec.1962, the BZ sample for one Plant 6 thorium operation was 1260xMAC.

PE544i states "The MAC which we have been using for thorium is approximately 20 times that presently recommended by the National Committee on Radiation Protection." The committee in 1959 gave a provisional value of about two times the MAC, but urged that the exposure of personnel to natural thorium be kept as low as operationally possible.

PE745ww In March 1963, the Plant 6 thorium furnace BZ air dust levels ranged from 10 to 1,770 MAC.

NOTE: If Fernald's MAC is 20 times the national recommendation and samples of 1260xMAC have been taken, that puts exposure level potential at 25,200 times higher than recommended and 35,400 times higher for 1,770xMAC. In addition they had been urged to keep it as low as possible.

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PE107c Seventeen men in the Pilot Plant were exposed to uranium hexafluoride. 100% showed urinary damage.

PE114d UF4 containing up to 3% U-235, operations were performed without respirators.(March 1961). In the absence of specific enrichment information, dose reconstructors assumed only natural uranium was used prior to 1964.

PE 142 Plant 2 dumping station cleanout operations were 1800 times the MAC. The respiratory protection was not satisfactory.

PE300a Plant 6 machining area fires (April 1954), only 5 of the 26 machine operators involved were sampled. [Examination of worker records would not show exposure for that incident for 21 workers involved.] Remember, Fernald didn't see the value in keeping records and testing was performed only to evaluate air quality and monitor for possible uranium toxicity.

PE161a Ventilation was deliberately cut off.(April 1963). The areas effected were not identified.

Subcontractors often worked in their street clothes. Some were also told that they were not contaminated. They unknowingly were permitted to carried contaminants home to their families.

NA85 States that Fernald has not attempted over the years to maintain plutonium accountability. Analyses for plutonium were made only on special occasions until 1985.

PE551s(WEST) Out of specification material due to plutonium and neptunium in scrap at a ratio of 200 times higher than was typical.

ADDITIONAL disturbing information is high-lighted throughout the evidence submitted with the submission of the SEC petition for FMPC workers.

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CONCLUSION:

After reviewing the FMPC site profile and Fernald documents, I believe the following to be true.

FMPC management permitted emissions, releases and leaks of uranium, thorium, plutonium and other radioactive/hazardous materials to occur on site. They failed to determine where and how many of them were occurring. They accepted consistently high MAC levels of potential exposure, with no attempt to lower them. They failed to adequately contain the radioactive/hazardous materials located throughout the FMPC premises. They failed to warn workers of contamination and health dangers. They failed to provide a safe work environment. They failed to inform workers of potential radiation hazards and what to do to protect themselves in the event of release conditions. They failed to responsibly monitor, inform, diagnose and treat workers who were exposed to radioactive/hazardous materials. The failed to abide by ALAP and ALARA recommendations to limit exposure. They felt production concerns justified ignoring government regulations, and established that attitude in the very beginning of operations.

They even limited record keeping and monitoring based on the time required that diverted their attention from more important concerns.

FMPC management grossly failed in their responsibility to their workers.

Some data was unavailable.
Some data was limited.
Some data was incomplete.
Some data was unreliable.
Some data could not be interpreted.
Some data was improperly interpreted.

Some processes were not fully understood allowing potential exposures to go unrecognized by the dose reconstructors.

The jobs performed may not be the jobs dose reconstructed, due to errors in FMPC records. Many jobs were evaluated in their simplest form, allowing many aspects of the jobs to be overlooked and the exposures associated with them.

ORAU dose reconstructors assumed that FMPC operated within the guidelines established by them and for them by government agencies.

ORAU made estimates based on that assumption.

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ORAU interpreted data based on that assumption. They assumed '0' meant no dose emitted. When in fact '0' meant dose undetermined, dose not recorded, or dose information is unavailable. This fact can be seen in Table 5-13 and Table 5-15 of the TBD for years 1960-1963. In addendum document PE950d, Michael W. Boback, (head of Industrial Hygiene and Radiation , 1969-72) admits to the use of zeroes, in lieu of actual measurements.

ORAU interviews of workers failed to provide important information because:
The questions asked didn't prompt the answers needed.
The information provided was incomplete.
The information was ignored because it couldn't be confirmed.

I believe the information provided is sufficient for NIOSH to determine that there is insufficient 'accurate data' available to do dose reconstructions for FMPC workers, and that all workers at FMPC have been subjected to levels of radiation exposure which far exceed the limits established for their safety and protection by various United States governmental agencies; and that exposure continued beyond production.

The FMPC documents, never show a concern for the doses of insoluble uranium particles that were accumulating in the bodies of workers. Management was concerned with discovering the effects of the radiation on workers through autopsy, and stated that the use of the respirator protection complicated the exposure-intake ratio.(PE793) [NOTE: Data obtained without the use of respirators was useful in the study of intake and retention. Notations about respirator use would identify useful data, and the failure to enforce respirator use would guarantee a sufficient quantity of data available for study.]

It appears there should have been more interest in safety at FMPC.

FINAL STATEMENT:

I believe Fernald Management operated under the false premise that they could predict all potential exposure situations, and therefore could eliminate monitoring expenses from their budget. Unfortunately it cost the workers their health and their lives.

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INDEX Section 3. IEER and Other Scientific Data

PE950j IEER Qualifications
PE950d Addendum to the report "Release Estimates of Radioactive and Non-Radioactive Materials to the Environment by the Feed Materials Production Center 1951-85". [Zeroes entered without measurement.]
PE554b National Bureau of Standards Handbook 52.[excerpt]

INDEX Section 4. Attitudes and Practices of FMPC

PE397e Health Protection Review at NLO [May 1964].
PE397g Health Protection Review at NLO [April 1965].
PE397i NLO response to April 1965 Review.
PE397r Health Protection Review at NLO [Sept. 1968]. (Reviewers question the validity of the job weighted air dust sampling approach long used by NLO.)
PE397t Health Protection Review at NLO [Sept 1970].
PE718a Urinary Uranium Investigations
PE723 Reporting Requirements for Internal exposures. [Urine assay of no value].
PE765 Internal Radiation Exposure Evaluation. [Uranium urinalysis not used to evaluate internal radiation.]
3417097 Occupational Safety & Health Standard (Ionizing Radiation).
3119382 Production Division Safety Meeting Minutes
11-25-81 Letter

INDEX Section 5. Thorium Processes

PE525b Health Hazards Involved in Processing Thorium Material
PE528 Thorium Fernald [April 1956].
8-22-58 Disposal of Fernald Thorium Production Residues.
MPC-t-65 MPC Values for Thorium

INDEX Section 7. Plant Operations and Exposures

PE141 Contamination of Plant 3 Heater Tubes
PE149b Incident involving Uranyl Nitrate Burns
PE150e Refinery Uranium Exposures
PE155b Letter Plant 4
PE164 Hydrogen Fluoride In Plant 4
PE171b Comments on the Attitudes of FMPC Plant5 Personnel.....

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PE174b Beryllium Dust-Uranium Alloy Program-Plant 5
PE186a Wrist Badge Exposure
PE187b Chip Fires, Plant 5 East Ingot Saw
PE196b Letter
PE300b Justification of Basic Need for Ventilation
PE306c Re-Evaluation of Scrap Melting Operation. [Perchlorethylene exposure].
PE317d Airborne Contamination Plant 8
PE321d Hand Packing
3362751 Unaccounted for Low Enriched Uranium Plant 8. [1964]
PE323 Revisions to UAP Furnace
PE325b Incident Observation Report
PE325c Incident Observation Report
PE359 Job Order
PE360 Memo
PE371b High Air Dust Exposure Operations

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PE 950j

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ADDENDUM TO THE REPORT "RELEASE ESTIMATES OF RADIOACTIVE AND NON-RADIOACTIVE MATERIALS TO THE ENVIRONMENT BY THE FEED MATERIALS PRODUCTION CENTER 1951-85"

Arjun Makhijani, Ph.D.

Bernd Franke

May 1989

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Our principal conclusions are as follows:

- plant records are too poor to arrive at accurate releases estimates of uranium;
- official estimates are far too low and based on poor and partly deceptive methods of calculation -- they should be discarded;
- until such time as better estimates are calculated, a range of 270 to 1,400 metric tons (600,000 to 3.1 million pounds) should be used for public health purposes.
- considerable further work needs to be done to refine the estimates presented here.

Our estimate of 1,400 tons is obtained from a computer analysis of measurements of uranium in soil samples around the plant. The preliminary results from this approach do not corroborate the official estimates at all, and indicate that the releases may have been an order of magnitude higher. We find it surprising the in all the years over which official estimates have been made of uranium releases, there is no published analysis of any release estimate obtained from soil sample data.

AIRBORNE RELEASES FROM FMPC SCRUBBERS

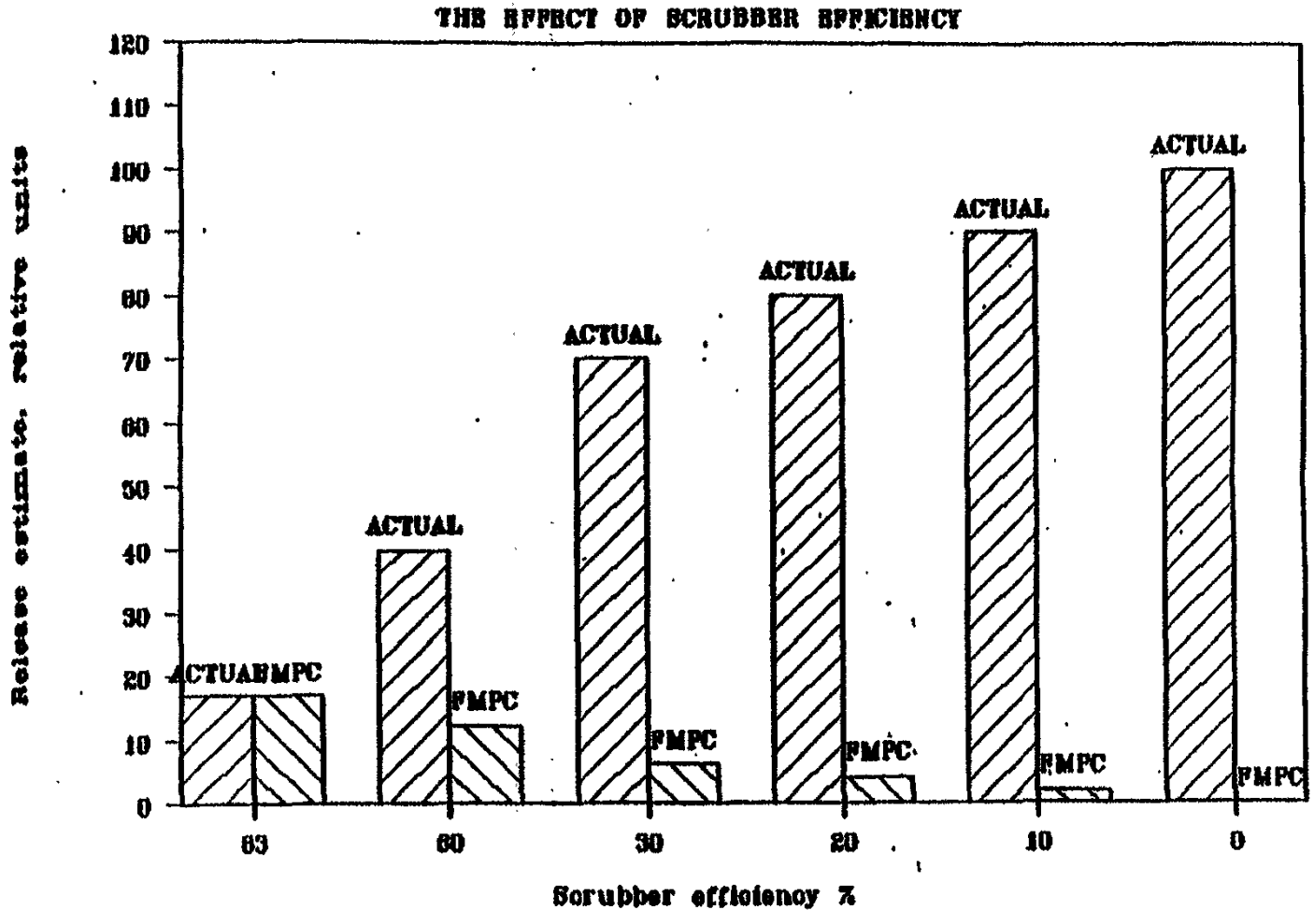

FIGURE 1

B. ADDITIONAL GENERAL PROBLEMS WITH THE OFFICIAL ESTIMATES

In the July 1988 report we discussed a great many problems with existing data on radionuclide emission to the atmosphere, generally tending in the direction of underestimates of emissions. Some additional general problems have come to light since that time.

In particular, Michael W. Boback, the head of Industrial Hygiene and Radiation during 1969-1972, stated in a deposition that analysis of a great many stack filters were made infrequently. In the interim zeroes were entered into the stack loss data sheets without actual measurements. He stated that in some cases it might have been years before the actual analysis was done.[4] For example, zero losses were recorded for Plant 6 during the entire period from 1970 to 1975 and again from 1977 to 1981, even though there was production in Plant 6 in every one of those years.

zeroes entered

In the July 1988 report, we noted the fact that stack monitoring probes were sometimes plugged, and that vacuum lines to the stack monitors were sometimes disconnected. As late as 1985, the Oak Ridge Associated Universities inspection team found that all four of the probes it inspected were partly plugged. We further reported there that inspection of baghouses were sometimes very infrequent, in violation of FMPC procedures.

Thus, it is impossible to tell at present whether actual observation of no material collected in a filter would really correspond to low losses or whether substantial losses might have gone undetected.

Boback also stated that he did not look at information from various baghouses to see which ones were operating when he and his colleagues compiled the official History of Radionuclide Discharges.

Given these facts and admissions, the official data for the entire 1969 to 1982 period for monitored dust collectors must be deemed to be at best seriously suspect and at worst scientifically worthless. We have therefore decided to discard the official data from this period for the dust collectors and to substitute estimates based on average losses per unit of production during the prior 1957 to 1969 period, when the record indicates that making up data was probably not the practice at FMPC.

To make alternative estimates, we first calculated for Plant 2/3, Plants 4 through 9 and the Pilot Plant the dust loses per unit of production for the 1957-1969 period. We obtained

[4] *Deposition of Michael W. Boback, taken by the plaintiffs at the office of Waite, Schneider, Bayless and Chesley, April 18, 1989.*

plant-by-plant production data from the recently releases Addendum to the official History of Radionuclide Discharges. We then applied this average loss per unit of production to the plant-by-plant production data for the period 1970 to 1982 (inclusive) to obtain release estimates for the period. This estimation procedure may miss accidents and sudden, large releases. It is also likely to yield underestimates of the true releases for all the same reasons that the official releases estimates are likely to be serious underestimates for the period 1957-1969.

The purpose of this re-estimation for the 1970-1982 period is enable better year-by-year data than the official release estimates to enable a better estimation of the doses, within the acknowledged limitations of the dust collector data generally.

There are some peculiar limitations of the procedure we have adopted as it relates to plant-by-plant production data. Not only does the present official release history contain estimates of zero releases from dust collectors during years when there was considerable production; the March 1989 addendum contains data for several years which shows that losses were being reported when there was no production in that plant.

ERRORS IN DATA

Thus, we have the peculiar situation that zero loss were reported when there was considerable production. For example, in Plant 8 during 1978 and 1979, and losses were being reported when there was no production. This was also the case with the Pilot Plant during 1975, 1977, 1978 and 1980.

It is possible that some explanation exists for non-zero losses for years when production was zero. For example, dust from other operations may have been routed through a particular dust collector during a period when a plant was not in production. However, it is also possible that the production data are faulty. This is a matter which needs considerable further investigation. Until such investigation resolves the issue, this will remain an uncertainty with the method we use of estimating the annual losses for the 1970 to 1982 period.

A further limitation is that it is generally acknowledged that during the 1970s much or most of the plant and equipment at FMPC was deteriorating because of a lack of funds. Thus, it possible and even likely that in many operation, the efficiency of dust collection may have markedly gone down during this period compared to the 1957-1969 period when some funds were available for improvements. This further biases our estimates in the direction of underestimation of the true releases.

C. "UNMEASURED LOSSES"

There were 430 sources of airborne emissions at FMPC. Of these 109 were point sources and other were non-point sources. Of the point sources, about 70 to 75 stacks and 5 scrubbers were monitored or sampled. Thus, about 350 emission sources, including about 30 point sources and about 320 non-point sources were not monitored. Of these sources, about 14 were denitration pots for conversion of uranyl nitrate to uranium trioxide, in Plant2/3.[5] Losses from the gulping of uranium trioxide have been estimated by Westinghouse, as noted above, and are discussed in Section F below. In this section, we deal with the remaining sources of unmeasured losses in this section, which number over 330.

There is one document dating from July 1964 which made an attempt to estimate the losses from sources where there was no monitoring of emissions. The document is attached to this paper. This is the only case in which we know that such an attempt was made at all. It included 56 sources of unmeasured losses from all plants, except Plant 2/3.

R.H. Starkey, the author of the document estimated that unmeasured losses from about 56 sources amounted to 1,700 pounds per month. This estimate was based on a combination of spot sampling (19 sources) and "educated guesses" without any measurements (37 out of 56 estimates).

Of these 1700 pounds, 700 pounds are listed as unmeasured losses from four plant 8 scrubbers. Since we are estimating these separately (see below) we omit these from our estimation in this section of "unmeasured losses". Another 20 pounds per month are listed as losses from the trash incinerator and oil burner. These two sources have been considered in the official History. We deal in this section with the remaining 980 pounds per month from 50 unmeasured sources listed in the document as unmeasured losses.

We have taken the unmeasured losses as reported in this document, and estimated the losses for other years and plant by pro-rating them according to the plant-by-plant production data in the addendum to the official History of Radionuclide Losses. For convenience, we have attached the data on production as part of the documents' appendix to this report.

Naturally, we expect that the variability in these estimates would be very high. Moreover, it is probable that these estimates would understate the losses, because "guesses" based on visual inspection would miss entirely emissions of fine particles. Indeed, the document estimates zero losses from many sources which were never measured. The

5 *"FMPC Air Emission Data Sheet, Plant 2/3"; July 19, 1085.*

document itself admits that "the losses may be every bit as high as we calculate them to be and maybe even higher."[6]

Given this information and these estimates, we found it interesting that the official History of Radionuclide Discharges does not include these estimates. We feel that the estimate of 980 pounds per month, while, seriously deficient, is far superior to ignoring unmeasured losses altogether. Even the most recent Addendum to the Official History ignores this data. Instead, it estimates the losses from unmonitored process emissions as 319 kilograms over 37 years, while the plant document shows that spot checks yielded an estimate of 440 kilograms in one month.

We should note that more than 280 sources of unmeasured losses are still not included in our estimates, making it probable that our estimates for unmeasured losses will be on the low side. One important piece of evidence for this hypothesis, is that Plant 2/3 unmeasured losses were not a part of the estimate, yet a recent official estimate has put unmeasured losses from this source at 38.6 metric tons.

In this content, it is important to discuss briefly the recent official attempt to assess losses from unmeasured sources. The Addendum to the History of Radionuclide Discharges uses "probable emissions for each monitored process for the year 1987....to estimate an emission factor per ton of uranium processed for each unmonitored process."[7]

This is a seriously deficient procedure on a number of grounds. Specifically, considerable investment and effort has gone into reducing emissions since 1985, because since that time emissions from the plant became a matter of intense controversy and legal action. Thus, it is entirely inappropriate, to say the least, to use these emission factors, without making some allowance for the much large emissions that would have ben expected during a period when less investments were being made, when there was little public scrutiny, and when much of the then-existing equipment was in poor condition.

The official estimate for releases from unmeasured process emissions is 319 kilograms over 37 years. However, we have documentary evidence, cited above that the unmeasured losses from 50 sources primarily related to plant process was about 440 kilograms in one month.

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6 *R.H. Starkey to L.M. Levy, "Information Pertaining to Unmeasured Uranium Losses", July 16, 1964.*

7 *Addendum to History; p.6.*