NLO Box

NY.12-5

2.23

Simonds Saw and Steel Company

Occupational Exposure to Radioactive Dust

Visit of October 27, 1948

by USAEC, NYOO

Study #1

RESTRICTED

Summaries - 1

TABLE OF CONTENTS

	Page
A. Purpose of Report	1
B. Results of Study	1
C. Method of Study	2
I. Operational Process at Rolling Mill	2
II. Job Location and Breakdown	2
III. Job Analysis Sheets - Purpose	2
D. Discussion	3
I. Table I - Alpha Exposures by Occupation	3
II. Figure I	4a
APPENDIX A	
Job Analysis Sheets	5
APPENDIX B	
Dust Samples	-

Classification Cancelled

K A Walter

Date 12/2/80

[illegible]

RESTRICTED

SIMONDS SAW & STEEL CO.

OCCUPATIONAL EXPOSURE TO RADIOACTIVE DUST

VISIT OF OCTOBER 27, 1948

PURPOSE

On October 27, 1948, dust samples were collected by Mr. P. B. Klevin, NYOO, at Simonds Saw & Steel Co., Lockport, N. Y. This survey was planned as a preliminary survey with the following objectives:

1. To estimate the cumulative exposure to personnel employed on AEC projects.

2. To provide basis for recommendations of control design and procedures.

3. To provide a basis for comparison with future samples to evaluate improvements.

RESULTS OF STUDY

It is apparent from the data that the entire group of employees is exposed to hazardous concentrations of alpha emitting dust. Of the 30 rolling mill employees considered, 24 are exposed to over 20 times the preferred alpha level. All of these 30 are exposed to 8-190 times the preferred alpha level. Their exposures are broken down as follows:

1. Eight inhale alpha emitting dust of from 120-190 times the preferred level (27%).

2. Twelve are exposed to from 21-28 times the preferred level (40%).

3. The remaining 10 employees are exposed to from 8-11 times the preferred level (33%).

From the exposures listed above, this present survey indicates the urgent need for control measures. In order to reduce the exposure of personnel to these toxic materials, the following control recommendations were made to the Production Division before awaiting the results of this report:

1. Exhaust ventilation be provided over each of the rolls.

2. A central vacuum cleaner be installed which would allow rapid, efficient cleaning of the rolling area.

3. Floor grating over entire rolling area or some other means to prevent scale from being scuffed into the air should be installed.

RESTRICTED

4. Some means for removal of scale or for the prevention of scaling during handling subsequent to rolling should be provided.

To date the only one of these which was completed was the vacuum cleaner. This was used only after each heat and the discharge, which contained about 120 d/m/m^3, was re-entering the room air.

METHOD OF STUDY

The radioactive dust samples were collected on 1-1/3" diameter "Whatman #41 filter discs, using a standard Fisher pump employed by the Medical Division, NYOO, a Wilson pump, and a small, light, air compressor with a Universal motor. The rate of flow found to be most suitable for collection purposes at the concentrations sampled was 0.0175 cubic meters per minute. The collection period varied from 30 seconds to 45 minutes, depending upon conditions of operation and dust loading. All dust samples collected were counted on a flat plate alpha counter at the New York Health Instruments Laboratory. Attached to this report are the dust sample records, containing both general air and breathing zone samples which have been used in all calculations to evaluate the employees' exposure to radioactive dust.

1. Operational Process at the Rolling Mill

   A. Billets of uranium metal are heated in furnaces to a suitable rolling temperature.

   B. The billets are taken out of the furnaces by the drag-down operator, who conveys the billets (which are held in front of him by tongs) to roll #1 (roughing roll).

   C. The billets are passed through the roughing roll twice and lengthened into rods of rough dimensions.

   D. The rough rods are then passed through roll #2 (finishing roll) twice.

   E. The rods are then dragged to the shears, cut in two, and dragged back to the pressure quencher area for marking and descaling.

2. The complete job location and breakdown of the personnel whose exposures are being evaluated are simple enough to be included on the Job Analysis Sheets.

3. Job Analysis Sheets and Purpose

   The Job Analysis Sheets give a detailed analysis of the operational time relationship of each employee at the rolling mill. This consists of a statement of total time spent on a particular job with an additional breakdown as to the number of minutes and number of times each

DISTRIBUTED

task is performed each shift. In addition, the average alpha concentration, as obtained from the Sample Record Sheets, is recorded. The average alpha concentration, multiplied by the total time, is depicted in the last column. The average alpha concentration per 10-hour work day is determined by dividing alpha concentration by total time by the number of hours (minutes) per shift.

Finally, assuming that the average man inhales 10 cubic meters of air per day, the daily alpha inhalation can be determined by multiplying the average alpha concentration by 10 cubic meters.

The intensity of the beta activity of radioactive dust was noted. However, these dusts present a minor hygienic hazard as compared with the alpha emitting dust.

DISCUSSION

The information contained in the Job Analysis Sheets is summarized in Table I below. It should be recognized that in evaluating the quantity of dust inhaled, we estimate the relationship of any given sample to the worker's total exposure time. We have endeavored to obtain complete job analysis for all operations, but it is understood that errors in judgment and irregularities of operation are likely to produce deviations of more or less importance. However, we are of the opinion that the data as summarized represent a fair estimate of the levels to which employees are exposed. The preferred alpha level of 70 disintegrations per minute per cubic meter for alpha emitting dust is based on animal studies. To date there has been insufficient industrial experience with uranium to make it possible for us to state to what extent this level affords a margin of safety for the workers.

TABLE I

Rolling Mill, Simonds Saw & Steel Co.

Occupation	No. of Employees	Approx. % of Total Personnel	Multiples of the Preferred Level
* Foreman	2	6.8	25
Roller #1, west side	4	13.6	23
Roller #1, east side	4	13.6	190
Roller #2, west side	4	13.6	11
Roller #2, east side	4	13.6	120
Pressure quencher	4	13.6	21
Stamping rods	2	6.8	23
* Furnace man	4	13.6	8
Drag-down operator	2	6.8	9

* Air samples used in evaluating exposures were general air samples of areas.

DISTRIBUTED

It is apparent from this data that the entire group is exposed to hazardous concentrations of dust. The exposure of rolling mill personnel to alpha emitting dust ranges from 8-190 times the preferred alpha level. The exposures are broken down as follows:

1. Eight inhale alpha emitting dust of from 120-190 times the preferred level (27%).

2. Twelve are exposed to from 21-28 times the preferred level (40%).

3. The remaining 10 employees are exposed to from 8-11 times the preferred level (33%).

It was found that where the maximum amount of alpha was present, a concentration of more than 1000 times the preferred level, the beta activity of the same sample was less than 0.5 times tolerance (40,000 beta disintegrations per cubic meter). For this reason it is felt that the exposure to beta emitting dust is of negligible consequence as compared to any concomitant alpha dust exposure.

PBK:ss

RESTRICTED

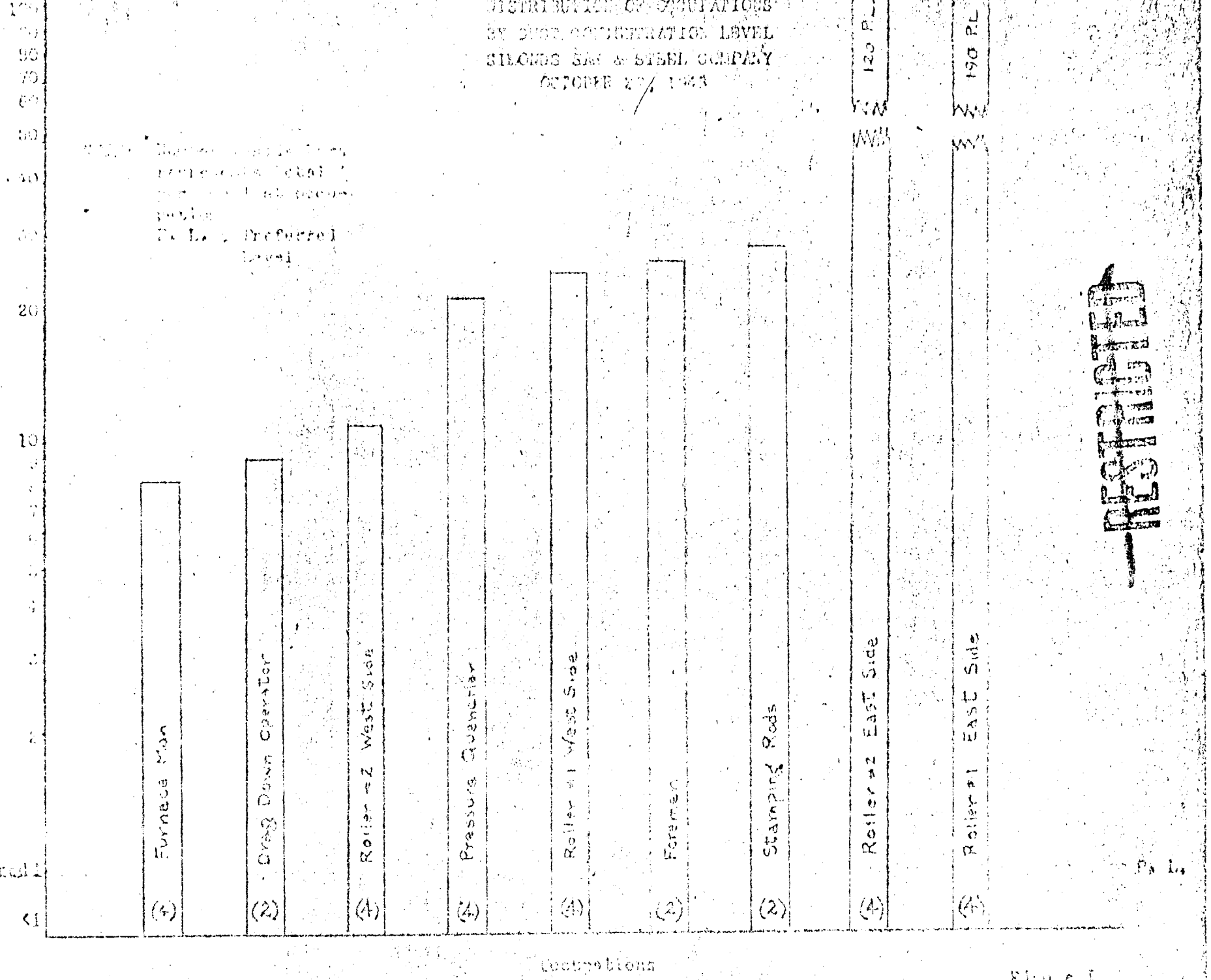

DISTRIBUTION OF OPERATIONS
BY DUST CONCENTRATION LEVEL
SILGOES SAW & STEEL COMPANY
OCTOBER 27, 1983
Preferred Level
Furnace Man
Cross Down Operator
Roller #2 West Side
Pressure Quenchter
Roller #1 West Side
Foreman
Stamping Rods
Roller #2 East Side
Roller #1 East Side
(4)
(2)
(4)
(4)
(4)
(2)
(2)
(4)
(4)
Operations

Figure 1

FOREMAN

1 man per shift -- 2 shifts per day -- total, 4 men

Operation	Total Time (Minutes)	Alpha Concentration in d/m/m³	Alpha Concentration Times Total Time
General air roller #1	135	3,615 Average of 6 samples High - 9,250 Low - 31	595,000
General air roller #2	300	971 Average of 5 samples High - 1,410 Low - 24	291,300
Lunch area	120	1,410	169,200
Locker room	15	24	310
			1,055,810

Average alpha concentration = $\frac{1,055,810}{600}$ = 1,760 d/m/m³.

Assuming 10 cubic meters of air inhaled per day, daily concentration = 1,760 x 10 = 17,600 d/m/day.

WEST SIDE ROLLER #1

2 men per shift -- 2 shifts per day -- total, 4 men

Operation	No. of Minutes	No. of Times per Shift	Total Time (Minutes)	Alpha Concentration in d/m/m^3	Alpha Concentration Times Total Time
Operators roll rough billet through roller. 1st rolling.	1/2	88	44	1,394 Average of 3 samples High - 2,700 Low - 236	61,400
Operators roll billet through rollers. 2nd rolling.	1/2	88	44	1,394 Average of 3 samples High - 2,700 Low - 236	61,400
General air west side roller #1.	---	--	367	1,925 Average of 4 samples High - 9,260 Low - 31	705,000
Lunch area (rest).	---	--	130	1,410	184,200
Locker room.	---	--	15	24	310
			600		972,310

Average alpha concentration = $\frac{972,310}{600}$ = 1,620 d/m/m^3.

Assuming 10 cubic meters of air inhaled per day, daily alpha concentration = 1620 x 10 = 16,200 d/m/day.

RESTRICTED

EAST SIDE ROLLER #3

2 men per shift -- 2 shifts per day -- total, 4 man

Operation	No. of Minutes	No. of Times per Shift	Total Time (Minutes)	Alpha Concentration in d/m/m^3	Alpha Concentration Times Total Time
Operators roll rod through roller #2. 1st rolling.	1-1/6	88	102	22,130 Average of 3 samples High - 27,900 Low - 14,800	2,250,000
Operators roll rod through roller #2. 2nd rolling.	1-1/6	88	102	22,130 Average of 3 samples High - 27,900 Low - 14,800	2,250,000
General air east roller #3.	------	--	351	1,410	494,000
Lunch room.	------	--	30	1,410	42,300
Locker room.	------	--	15	24	310
			800		5,036,610

Average alpha concentration = $\frac{5,036,610}{600}$ = 8,394 d/m/m^3.

Assuming 10 cubic meters of air inhaled per day, daily alpha concentration = 8,394 x 10 = d/m/day.

Simonds Saw and Steel Company

Occupational Exposure to Radioactive Dust

Visit of December 1, 1948

by USAEC-NYOO

Study #2

Seconds - 2

TABLE OF CONTENTS

	Page
A. Purpose of Report	1
B. Results of Study	1
C. Discussion	1
I. Table I - Alpha Exposures by Occupation	2
II. Figure I	2a
APPENDIX A	
Job Analysis Sheets	3
APPENDIX B	
Dust Samples	12

Classification Cancelled
~~Or Changed To~~ R A Walter
12/2/80
P. J. Brown 12 2 80

SIMONDS SAW AND STEEL CO.

OCCUPATIONAL EXPOSURE TO RADIOACTIVE DUST

VISIT OF DECEMBER 1, 1948

PURPOSE

On December 1, 1948, dust samples were collected by Mr. P. B. Klevin, New York Operations Office, at the rolling mill area of the Simonds Saw & Steel Co. This survey was planned as a follow-up survey to that made by Mr. Klevin on October 27, 1948. The present study was made after partial ventilation had been installed in the mill area. The objectives of this survey are as follows:

1. To estimate the cumulative exposure to personnel employed on AEC projects.

2. To estimate the effectiveness of control measures installed to date.

3. To provide basis for future control design and procedures.

4. To establish the necessity for further radioactive dust control recommendations.

RESULTS OF STUDY

It is apparent from this data that the entire group of employees is still exposed to hazardous concentrations of alpha emitting dust. Of the 30 rolling mill employees considered, 8 are exposed to from 21-36 times the preferred alpha level (27%). Fourteen inhale alpha emitting dust from 10-15 times the preferred alpha level (46%). The remaining 8 employees, or approximately 27%, are exposed to 4-7 times the preferred alpha level.

DISCUSSION

These results show a marked improvement over previous study. In the report of the survey made October 27, 1948, the entire group was exposed to 8-100 times the preferred level, the present survey shows groups to be exposed to 4-36 times the tolerance level. The survey of October 27, 1948 showed 27% of personnel exposed to over 120 times the preferred level, now none are exposed to that level.

Since the previous visit the following improvements have been made:

1. Exhaust ventilation provided over each of operating rolls.

2. Central vacuum cleaner was discharged out of doors.

3. Temporary enclosure provided over descaling device.

Verbal recommendations were made that local exhaust ventilation be provided over the descaling machine, and that floor gratings be placed on the floor. This

latter installation had been held up pending initial results.

On the basis of stack measurements, it was computed that approximately 30% of oxide material is being discharged into the atmosphere. A suitable dust collector was recommended for recovery of this material.

For a description of the methods of study, the process and a job analysis, see report of study made October 27, 1948.

TABLE I

Simonds Saw & Steel Co.
Rolling Mill

Occupation	No. of Employees	Approx. % of Total Personnel	Multiples of the Pref. Leve	
			Present Study	Previous Stu 10-27-48
Foreman *	2	6.8	13	25
Roller #1 - West side	4	13.6	12	23
Roller #1 - East side	4	13.6	21	190
Roller #2 - West side	4	13.6	15	11
Roller #2 - East side	4	13.6	36	120
Pressure quencher	4	13.6	7	21
Stamping rods	2	6.8	12	28
Furnace man *	4	13.6	4	8
Drag-down operator	2	6.8	10	9

* All samples used in evaluating exposures were general air samples of areas. It is apparent from this data that the entire mill personnel is exposed to hazardou concentrations of dust. These concentrations range from 4-36 times the preferred level of 70 disintegrations per minute per cubic meter. Figure 1 shows a break-down of personnel by operation or occupation with their actual multiple of the preferred level, also results of the previous survey made on October 27, 1948. In Figure 1 is shown the exposure levels of all personnel in each operational grou Also included are the results of the previous study (October 27, 1948) for comparison.

(3) Furnace Man

Furnaceman 10-27-43

(2) Drag Down Operator

Drag Down Operator 10-27-43

(4) Roller #2 West Side

Roller #2 West Side 10-27-43

(3) Freezing Quencher

Freezing Quencher 10-27-43

(4) Roller #1 West Side

Roller #1 West Side 10-27-43

(2) Foreman

Foreman 10-27-43

(2) Stamping Reds

Stamping Reds 10-27-43

(4) Roller #2 East Side

Roller #2 East Side 10-27-43

(4) Roller #1 East Side

Roller #1 East Side 10-27-43

RESTRICTED

FOREMAN - 1 man/shift
2 shifts/day - Total 2 men

Operation	Total Time (min)	Alpha Concentration in $d/m/m^3$	Alpha concentration times total time
General samples of rolling area	465	608 (Aver. 12 samples H. 1570, L. 78)	383,000
Lunch - Foremen's area	120	1344 (Aver. of 3 samples H 2750, L 125)	161,280
Locker room	15	24	310
	600		544,590

$$\text{Average alpha concentration} = \frac{544590}{600} = 908 \ d/m/m^3$$

Assuming 10 cubic meters of air inhaled per day

$$\text{Daily concentration} = 908 \times 10 = 9080 \ d/m/day$$

√

Simonds Saw and Steel Company

Occupational Exposure to Radioactive Dust

Visit of January 10-20, 1949

by USAEC-NYOO

Study #3

~~RESTRICTED~~

Seconds-3

TABLE OF CONTENTS

	Page
A. Purpose of Report	1
B. Results of Study	1
C. Discussion	1
I. Table I - Alpha Exposures by Occupation	2
II. Figure I	2a
APPENDIX A	
Job Analysis Sheets	3
APPENDIX B	
Dust Samples	12

Classification Cancelled

[illegible] 12/2/80

P. F. Brown 12-7-80

~~RESTRICTED~~

SIMONDS SAW & STEEL CO.

Occupational Exposure to Radioactive Dust

Visit of January 10-21, 1949

PURPOSE

During the period of January 10-21, 1949, dust samples were collected by Mr. F. B. Klevin, New York Operations Office, at the rolling mill area of Simonds Saw & Steel Co. The present study was made after complete ventilation had been installed, vacuum exhaust vented outside the mill area and exhaust fan from pressure quencher exhausted through roof. All the original recommendations of the Health and Safety Branch had been complied with except for the placement of gratings on each side of the roller floor. The study was made with the following objectives in mind:

1. To estimate the cumulative exposure to personnel employed on AEC projects.

2. To estimate the effectiveness of present control measures.

3. To provide basis for future control design and procedures.

4. To provide evidence for the justification for radioactive dust control recommendations.

RESULTS OF STUDY

Of the 30 employees considered in this study, 6 employees (or 20%) are exposed to from 26.7-37 times the preferred alpha level. Eight employees (or 27%) are exposed to 9.9-15.7 times the preferred alpha level. The remaining 16 employees (or 53%) are exposed to from 1.4-4.6 times the preferred alpha level.

DISCUSSION

It is the opinion of this office that the ventilation of the rollers is reasonably satisfactory and that the installation of gratings will greatly reduce the dust concentrations in the general mill area. It is quite evident that uranium dust is being kicked up by the personnel at the rollers and that although the vacuum cleaning system is used to great advantage, visible dust was kicked up and made airborne. A reevaluation of airborne dust after installation of floor grates will determine the necessity for increase in effectiveness of the present ventilation.

The two groups of men exposed to unexplainably high concentrations work within a few feet of each other. These are the pressure quench operators and the rod stamps. In view of the installation of local exhaust ventilation at this area, it is difficult to account for this unusual concentration. Because of the intense energy imparted to individual scale particles in the descaling machine, it is possible that large chunks of oxide may be thrown out and caught on the sampler. It was noted

ENTERED

that occasional stinging particles were caught on the face and hands of the man doing the sampling. Further study of this operation will be carried out at the next rolling cycle.

The importance of floor gratings was reemphasized, and we were informed that these would be ready for the next rolling.

For the description of the method of study, the process and a job analysis, see report of study made October 27, 1948.

TABLE I

Simonds Saw & Steel Co.

Rolling Mill

Occupation	No. of Employees	Approx. % of Total Personnel	Multiples of the Pref. Level	Multiples of Pref. Level 12-7-48
Foreman *	2	6.8	4.6	13
Roller #1, west side	4	13.6	3.8	12
Roller #1, east side	4	13.6	9.9	21
Roller #2, west side	4	13.6	4.1	15
Roller #2, east side	4	13.6	15.7	38
Pressure quencher	4	13.6	37	7
Stamping rods	2	6.8	26.7	12
Furnace man	4	13.8	1.4	4
Drag-down operator	2	6.8	1.6	10

* All samples used in evaluating exposures were general air samples of areas.

It is apparent from these data and the two previous surveys made in October and December, 1948, that although tremendous decrease in exposure has been attained, the entire group is still exposed to a higher level than desirable. Of the 30 employees considered, 6 employees (or 20%) inhale multiples of from 26.7-37 times the preferred alpha level. Eight employees (or 27%) are exposed to 9.9-15.7 times the preferred alpha level. The remaining 16 employees (or 53%) are exposed to from 1.4-4.6 times the preferred alpha level.

Some explanation for the increase in exposure to the pressure quencher and stamping rod personnel can be attributed to the increase in time for quenching the rods in order to adequately descale each rod. On the previous surveys it was noted that the quenching of the rods average 75 minutes per shift, however in this survey the quenching period was lengthened to 200 minutes, thus increasing the exposure time and the exposure.

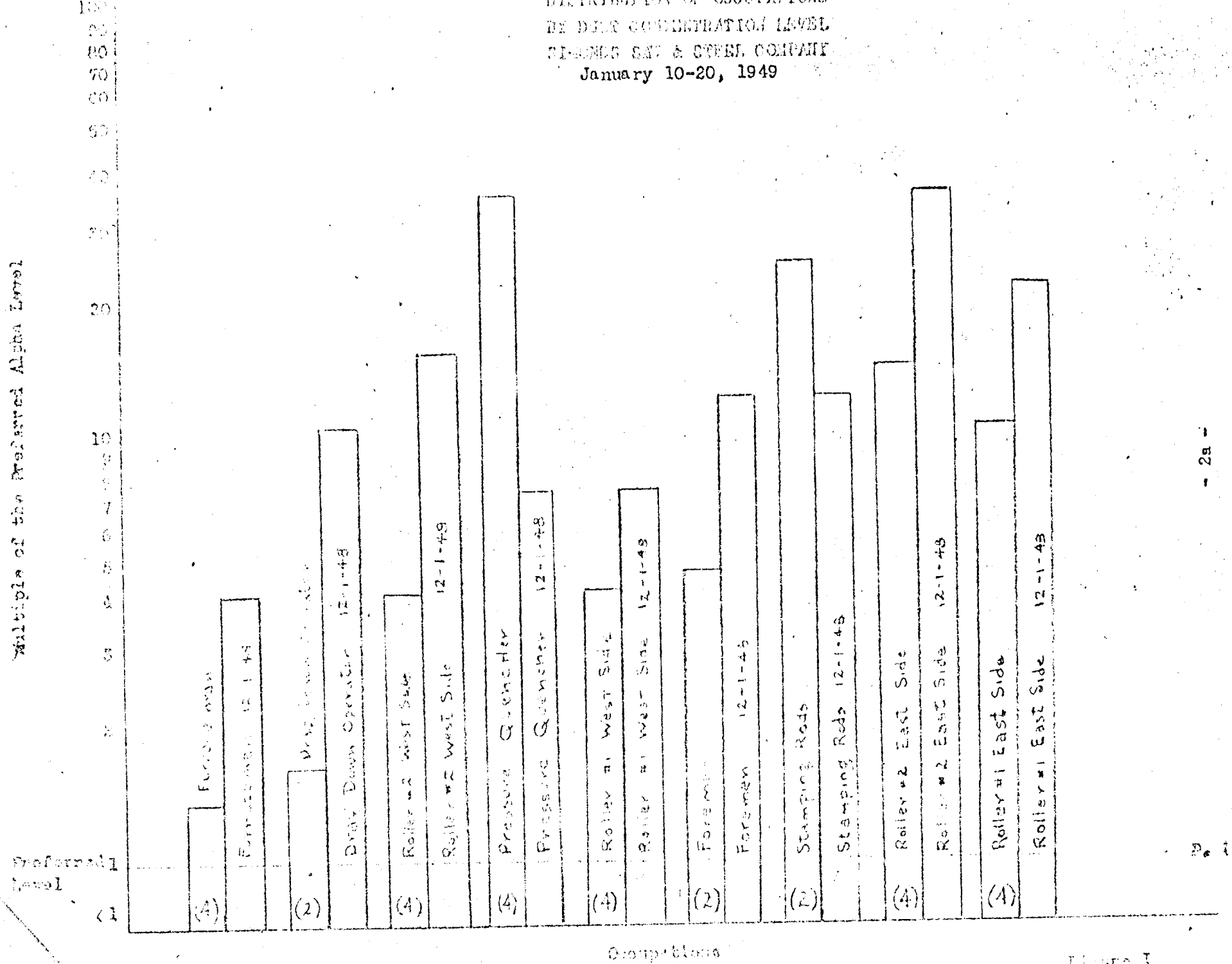

BY DUST CONCENTRATION LEVEL
SIMONDS SAW & STEEL COMPANY
January 10-20, 1949
Multiple of the Preferred Alpha Level
Preferred Level
Occupations
Furnace man
Furnace man 12-1-48
Drag Down Operator 12-1-48
Roller #2 West Side
Roller #2 West Side 12-1-49
Pressure Quencher
Pressure Quencher 12-1-48
Roller #1 West Side
Roller #1 West Side 12-1-48
Foremen
Foremen 12-1-48
Stamping Rods
Stamping Rods 12-1-48
Roller #2 East Side
Roller #2 East Side 12-1-48
Roller #1 East Side
Roller #1 East Side 12-1-48
(4)
(2)
(4)
(4)
(4)
(2)
(2)
(4)
(4)

Figure I

FOREMAN - 1 man/shift
2 shifts/day - total 2 men

Operation	Total Time (Min)	Alpha Concentration in $d/m/m^3$	Alpha Concentration times total time
Gen. air roller #1 east & west	165	408 (Av. of 15 samples, H. 4300, L. 84)	67,500
Gen. air roller #2 east & west	300	365 (Av. of 20 samples H. 4300, L. 84)	109,500
Lunch area, Foreman's area	120	122 (Av. of 4 samples H. 180, L 53)	14,640
Locker room	15	24	310
	600		191,950

$$\text{Average alpha concentration} = \frac{191950}{600} = 320\ d/m/m^3$$

Assuming 10 cubic meters of air inhaled per day

$$\text{Daily concentration} = 320 \times 10 = 3200\ d/m/day$$

Simonds Saw and Steel Company

Summary Report of Three Surveys

(October, 1948 - February, 1949)

by USAEC-NYOO

Study #4

RESTRICTED

Master Copy
Funds - 4

SIMONDS SAW & STEEL CO.

Summary Report of Three Surveys

As a result of surveys carried out at Lockport plant of the Simonds Saw & Steel Co. between the dates of October 27, 1948 and February 15, 1949, the following consolidated report is presented which includes all of the data collected.

RESULTS OF SURVEYS:

1. Dust Concentrations. There was found to be successive decrease in the exposures to radioactive dusts of all plant personnel except for a total of six men. Table 1 shows the comparative dust concentrations on the successive visits. The pressure quench operators and the rod stamping men were found to be exposed to a higher concentration on the third visit than on the previous visits. There is no apparent explanation for this elevation in exposure. It would appear from the data that some unusual conditions existed at the time of sampling and would have tended to create an artificially high exposure concentration. Additional control equipment had been installed at this location between the time of the second and the third operations.

From Table 1 it may be seen that, except for personnel mentioned above, all of the operators other than the east side rollers were exposed to less than 5 times the preferred limit of alpha emitting dust.

2. Dust Control Provisions. Before the beginning of our contract with Simonds Saw & Steel Co., general recommendations were submitted to the contractor, outlining the necessary provisions for the control of air-borne dust. These include:

a. Local exhaust ventilation over each of the rolls.

b. Installation of a central vacuum cleaner to be used after each break in the rolling cycle.

c. Floor grating or some other means to prevent the scuffing of scale into the air over the entire rolling area.

d. Provision of a means for the removal of oxide from the surface of rods immediately after rolling to prevent further dispersion of oxide dust.

At the time of the third visit, all of these control measures had been provided except for the floor grating. It is felt that a large portion of the air-borne dust which was found during the last visit is contributed by the dislodging of dust from the floors during the rolling. It is essential that floor grating be installed before a final evaluation of dust conditions may be had.

3. Radiation Exposures. Measurements were taken of the area with a Zento, to determine the degree of direct radiation and the extent of contamination of the working area and of the entire factory area. Readings were taken of the working

RESTRICTED

area and of the entire factory area. Readings were taken of the working area on October 27th and December 1st, during the period of rolling. The results of these readings show a considerable quantity of alpha radiation when the meter was held in direct contact with the floor. The readings on the floor in general vary between 10,000 and 40,000 alpha disintegrations per minute on both of these days. Readings taken on the benches and desks in the area at the same time showed a concentration of 2500-3000 alpha d/m. On February 15th, during an interim period between two rolling cycles, a similar set of readings was taken. No uranium was being handled at the time. The readings at this time varied between 3,000 and 35,000 d/m, being somewhat lower than the previous results but still showing a considerable degree of contamination. The results of these studies are shown in Table 2. Beta and gamma readings which were taken coincident with the alpha measurements show a maximum of 15 mr/hr in direct contact with the floor. However, most of the readings are 2 mr/hr or less. It was found that the highest radiation measurements both in alpha and beta-gamma were found when the instrument was in direct contact with the dirt floor which exists in many operating areas. The steel floor on which the rolling is carried out shows a much lower radiation figure.

A radiation survey was made of the entire area surrounding the plant and all the other buildings with a Zouto. Alpha readings were negligible.

4. Residual Dustiness Levels. In order to determine the degree of exposure of personnel after the cessation of operations, general air samples were spotted all over the operating area two days before, 2 days during, and 2 days after a rolling period. These samples which are plotted in figure 1 show that a dust concentration of the order of 1/2 of the preferred level remains in the plant from about 2 days after the rolling ceases until the next cycle begins. It was felt that the reason for this moderately high degree of contamination wasthe lack of adequate cleaning after the completion of a rolling cycle. In order to determine the effectiveness of a more thorough clean-up, samples were taken four days after a completed rolling period, which were felt to be indicative of the two highest areas of dustiness as found in the previous results. Three samples of approximately one hour each were taken at each of the two locations. A high pressure fire hose was then used to wash down the floor. After the floor was thoroughly cleaned, the apparatus was set up and similar samples were taken. There was no noticeable difference between the samples taken before washing and those taken after the wash. It would appear from this that the residual contamination is coming from sources other than the steel floor. It will be necessary to investigate the matter of cleaning up this area more thoroughly.

5. Uranium in Urine. In order that some correlation could be obtained between uranium exposure of individuals in this area and the amount of uranium found in their urine, urine samples were obtained from 10 different individuals for 3 days prior to a rolling period; each day during the rolling period; and 4 samples taken twice weekly after the rolling had ceased. There appears to be some correlation between the output of uranium in the urine and the degree of exposure of the men. The evidence, however, is still inconclusive and will be reported further at a later date.

TABLE I

Simonds Saw & Steel Co.

Summary of Weighted Daily Exposures

Operator	No. of Employees	Multiples Pref. Level for Continuous Exposure 10/27/48*	12/1/48**	1/10/49***	4-5-49
Foreman	2	25	13	5	5
West Rollers	8	17	13	4	3.2
East Rollers	8	155	28	13	6.5
Quench & Stump	6	25	10	28	6
Furnace Operator	4	8	4	1.4	2
Drag-down	2	9	10	1.6	2

(The preferred level for continuous exposure is 50 micrograms of uranium per cubic meter of air)

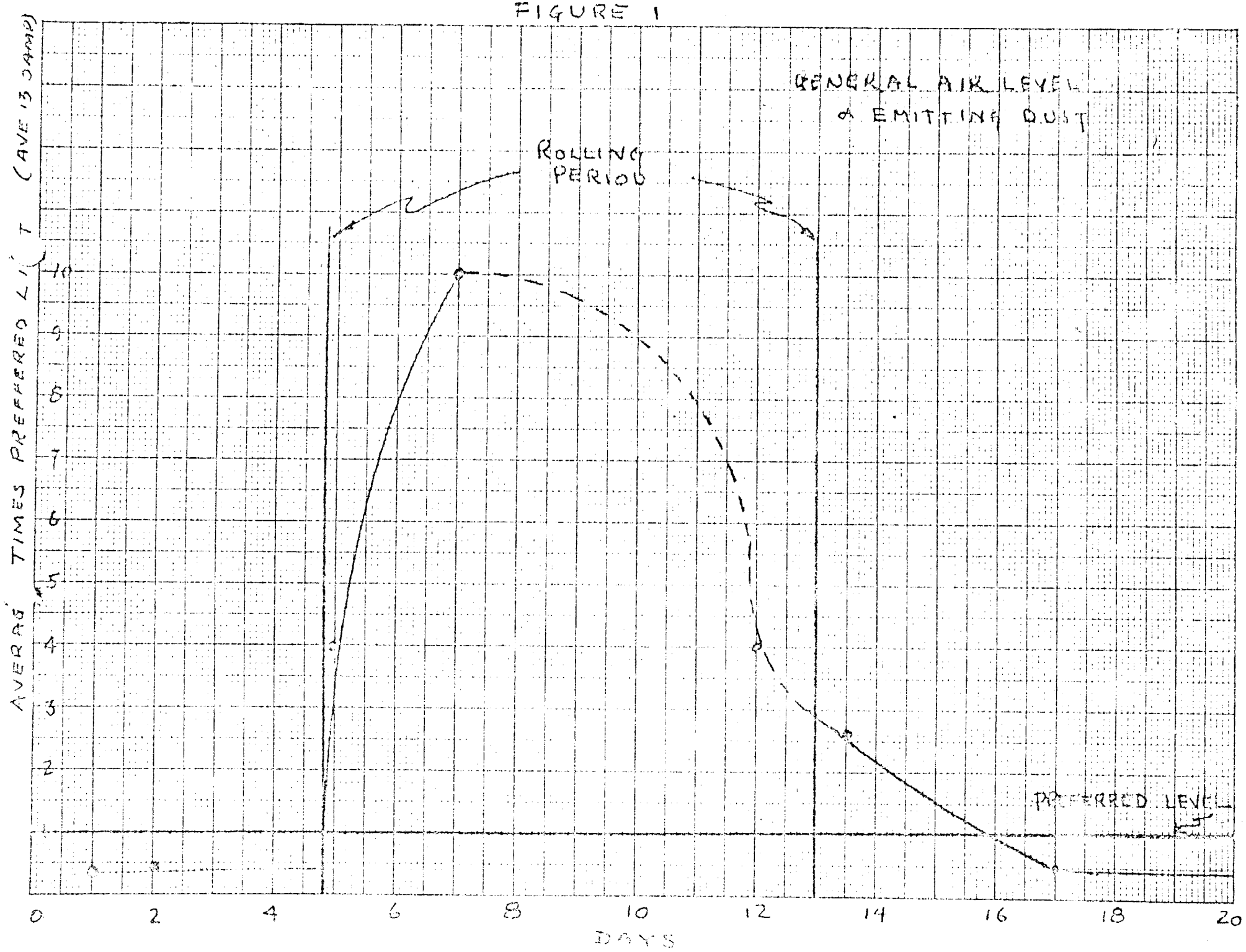
TABLE II

Surface Radiation Measurements - Mill Area

	During Rolling (10/27/48)		During Rolling (12/1/48)		After Rolling (2/15/49)
	d/m/100 cm²	mrep	d/m/100 cm²	mrep	d/m/100 cm²
East Roller 1	50,000	10.0	12,000	1.0	12,000
East Center Line	25,000	2.0	16,000	1.0	18,000
East Bench	5,000	0.5	10,000	0.5	3,000
Desk	2,500	---	2,500	---	2,500
West Roller 2	15,000	0.5	11,000	---	8,000
West After Vacuum	5,000	0.5	11,000	---	---
West Roller 1	35,000	2.0	35,000	---	3,000
West Center Line	18,000	2.0	7,500	---	5,000
Furnace Area	50,000	12.0	80,000	15.0	10,000
Shear	30,000	10.0	25,000	1.5	6,000
West Bench	3,000	0.5	3,000	---	2,500
Shipping and Receiving	40,000	---	30,000	4.5	---

* No dust control measures.
** Vacuum cleaner, and exhausts for rolls installed.
*** Exhaust for descaler installed.

FIGURE 1


GENERAL AIR LEVEL
& EMITTING DUST
ROLLING PERIOD
PREFERRED LEVEL
AVERAGE TIMES PREFERRED LIMIT (AVE 13 DAMP)
10
9
8
7
6
5
4
3
2
0
2
4
6
8
10
12
14
16
18
20
DAYS

Simonds-5

SIMONDS SAW & STEEL CO.

OCCUPATIONAL EXPOSURE TO RADIOACTIVE DUST

APRIL 5, 1949

Classification Cancelled

By

Paul B. Klevin
Industrial Hygiene Section
Health & Safety Branch

Issued April 22, 1949

Distribution:

1 - File
2 - Simonds Saw & Steel Co.
3 - Simonds Saw & Steel Co.
4 - Tonawanda Office (F. Epp)
5 - Production (F. Delmore)
6 - File

Medical Division
New York Operations Office
U. S. Atomic Energy Commission

TABLE OF CONTENTS

	Page
A. Purpose of Report	1
B. Results of Study	1
C. Discussion	1
I. Table I - Alpha Exposures by Occupation	2
II. Figure 1.	3
D. Recommendations	4
APPENDIX A	
Job Analysis Sheets	5
APPENDIX B	
Sample Record Sheets	-
APPENDIX C	
List of Rolling Mill Employees on AEC Project, April 5, 1949	14

SIMONDS SAW & STEEL CO.

OCCUPATIONAL EXPOSURE TO RADIOACTIVE DUST

APRIL 5, 1949

PURPOSE

On April 5, 1949, dust samples were collected by Mr. Paul D. Klevin, HYOO, at the rolling mill area, Simonds Saw & Steel Co. The present study was made after all of the initial recommendations of the Health & Safety Branch had been substantially complied with. The present study was made with the following objectives in mind:

1) To estimate the effectiveness of the recommended controls which have been installed.

2) To establish the need for and design the direction of further controls.

3) To gather data from which an estimation may be made of the cumulative exposure to personnel employed on this project.

RESULTS OF STUDY

All of the thirty-two employees considered in this study are exposed to less than 10 times the preferred level. Fourteen (44%) are exposed to 5.7-8.4 times the preferred alpha level and fourteen employees (44%) are exposed to 2.1-3.7 times this level. The remaining four employees (12%) inhale alpha emitting dust of 1.3 times the preferred level.

DISCUSSION

It is the opinion of this office that the ventilation of the rolls is reasonably satisfactory and that installation of gratings throughout the general mill floor will further reduce the dust concentrations in that area. A tripping hazard which now exists because of the double level floor would also be eliminated. It was noted that the gratings used on the date of the survey did not cover an area large enough to prevent uranium dust from being kicked up by the personnel in areas directly adjacent to the rolls.

Two groups of men, pressure quench operators and rod stampers, showed a marked improvement in exposure to dust concentrations over those results taken in the survey of January 10-21, 1949. This can be attributed to the use of a large pedestal fan located east of that area,

which blows air across both operations. However, general air samples taken downstream of this operation showed concentrations of from 5-6 times the preferred level, while samples upstream were approximately of the accepted level. The increase in the general air dust concentration level in the mill area is, to some extent, caused by the airborne contamination being blown from the pressure quenching and rod stamping operations.

For a description of the method of study, process and job analysis, see the previous report of study made on October 27, 1943.

TABLE I

SIMONDS SAW & STEEL CO.

Rolling Mill

Occupation	No. of Employees	Approximate % of Total Personnel	M.P.L.**	M.P.L.** 1/10-20/49
Foreman*	2	6.2	3.1	4.6
Roller #1, west side	4	12.5	1.3	3.6
Roller #1, east side	4	12.5	6.7	9.9
Roller #2, west side	4	12.5	6.1	4.1
Roller #2, east side	4	12.5	5.7	15.7
Pressure quencher	6	18.8	3.7	37
Stamping rods	2	6.2	8.4	26.7
Furnace man*	4	12.5	2.1	1.4
Drag-down operator	2	6.2	2.6	1.6

* All samples used in evaluating exposures were general air samples of areas.

** Multiples of the preferred alpha emitting dust level of 70 d/m/m^3.

It is apparent from these data and the three previous surveys made in October and December 1948 and in January 1949 that although a decrease in exposure has been obtained, the entire group is still exposed to concentrations exceeding the preferred level. Of the thirty-two employees considered, fourteen (44%) are exposed to concentrations of from 5.7-8.4 times the preferred alpha level; fourteen employees (44%) inhale multiples of from 2.1-3.7 times the preferred alpha level and the remaining four employees (12%) are exposed to 1.3 times the preferred alpha level.

DISTRIBUTION OF OCCUPATIONS
BY DUST CONCENTRATION LEVEL
SIMONDS SAW & STEEL CO.
APRIL 5, 1949

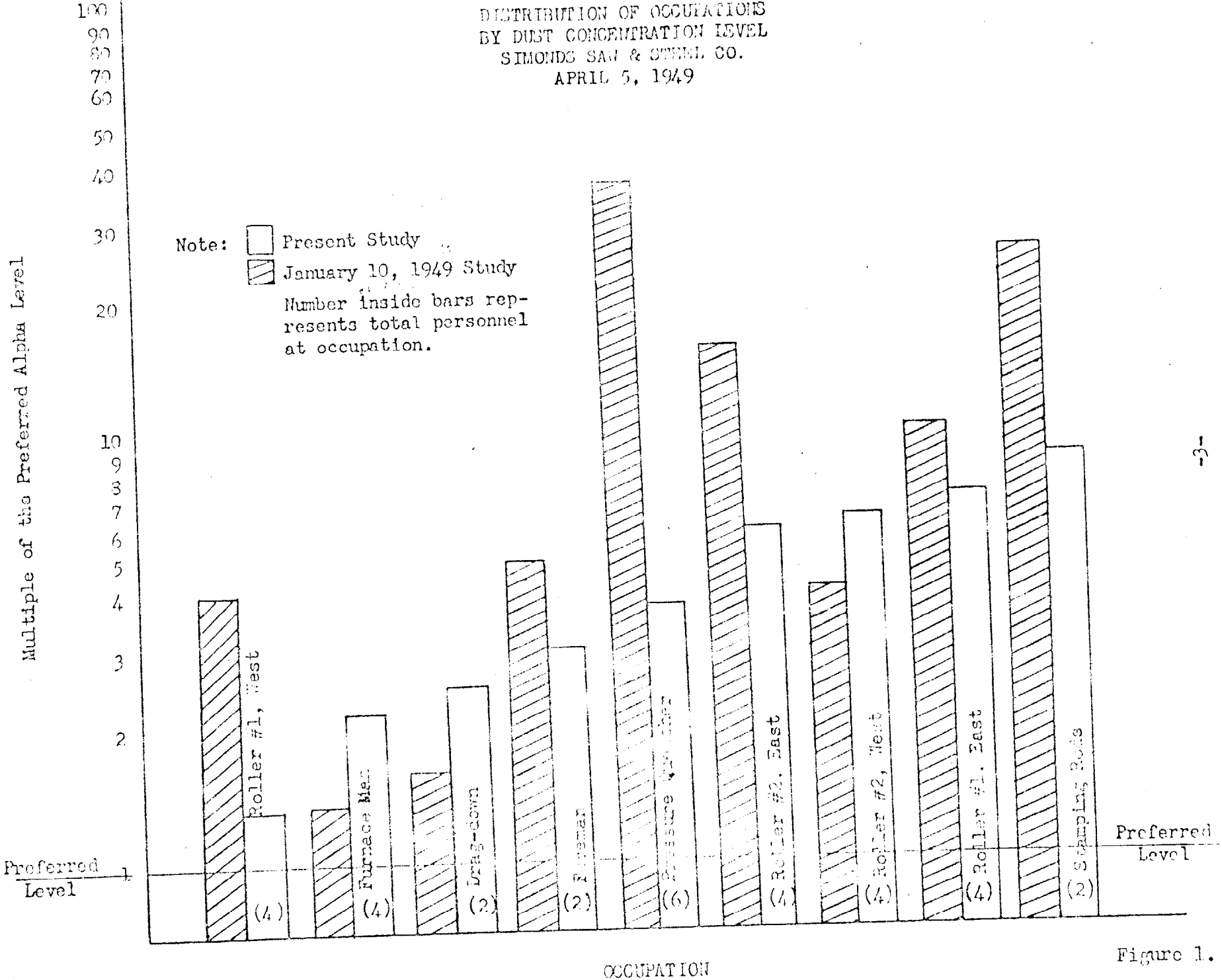


Figure 1.

RESTRICTED

Simonds-6

SIMONDS SAW & STEEL CO.

OCCUPATIONAL EXPOSURE TO RADIOACTIVE DUST

VISITS OF MAY 2-20, 1949

By

Paul B. Klevin
Industrial Hygiene Section
Health & Safety Branch

Issued June 20, 1949

Classification Cancelled

Distribution:

1 - File
2 - Simonds Saw & Steel Co.
3 - ~~Simonds Saw & Steel Co.~~
4 - Tonawanda Office (F. Eop)
5 - Production (F. Belmore)
6 - File
R. E. L. Fanford
U. S. A. E. C.
Richland, Wash.

Medical Division
New York Operations Office
U. S. Atomic Energy Commission

RESTRICTED

TABLE OF CONTENTS

	Page
A. Purpose of Report	1
B. Results of Study	1
C. Recommendations	2
D. Discussion	2
I Table 1	4
II Table 2	5
III Figure 1 (Bar Graph)	6
APPENDIX A	
Job Analysis Sheets	7
APPENDIX B	
Sample Record Sheets	-
APPENDIX C	
List of Employees, May 2—13, 1949	17

SIMONDS SAW & STEEL CO.

OCCUPATIONAL EXPOSURE TO RADIOACTIVE DUST

VISITS OF MAY 2-20, 1949

PURPOSE

On May 2-3 and 19-20, 1949, dust samples were collected by Mr. Paul B. Klevin, NYOO, at the rolling mill area of Simonds Saw & Steel Co. The present study was made with the following objectives in mind:

1) To gather data from which an estimation may be made of the cumulative exposure to personnel employed on the project.

2) To collect dust data which will be used in conjunction with the urine sampling program under way at Simonds.

3) To make an exhaust stack study in order to measure the radioactive stack effluent.

4) To find the source of high dust concentrations in the pressure quenching and rod stamping area.

5) To gather pre-rolling, rolling and post rolling dust samples in order to study the variation of dust concentration intensity.

RESULTS OF STUDY

1) Thirty-eight of the forty employees considered in this study are exposed to less than 6.7 times the preferred level during the rolling period. The other two operators (5% of the total personnel) are exposed to 12 times the preferred alpha level. Twelve (30%) inhale alpha emitting dusts of 5.1 to 6.7 times the preferred level. The remaining twenty-six employees (65%) are exposed to concentrations of 1.7 to 3.1 times the preferred alpha level. These results are shown in Table 1. A comparison of these figures with those found during the previous rolling will be found in Figure 1.

2) The exposure data contained in this report will be used in correlation with the urine sampling data.

3) Stack exhaust measurements made in the exhaust duct work over the roughing and finishing rolls revealed that an average of 0.05 grams U/m^3 was being exhausted to the outside for 25% of the total rolling

3) period, 15% of that amount being lost during other periods. Thus the total amount of uranium exhausted to the outside per day by the 480 cubic meters of air per minute from the hoods over the rolls is estimated to be approximately 15 pounds per day.

4) Concentrations of alpha emitting dust ranging from 140 to 500 times the preferred level were found during several of the components of the rod stamping operation. The dust from these operations appear to be significant contributors to the high concentrations of the surrounding work areas. There does not appear to be any other single location which is contributing more than its share to the general air level.

5) There is a rapid decrease in the concentration of alpha emitting dust throughout the mill area after rolling operations are completed. The only area with notable dust concentrations was the furnace area. This situation probably is caused by the oxide on the dirt floor being constantly scuffed up by the mill employees. These figures are tabulated in Table 2.

RECOMMENDATIONS

1) In order to eliminate source of contamination at the rod stamping area:

   A. A hood should be installed over or under the operating platform or,

   B. A new means of stamping rods should be devised.

2) Floor gratings should be placed over the entire working floor area.

3) As soon as the present furnace is changed over to a lead bath furnace, the top layer of contaminated dirt and cinders should be removed from in front of both furnaces and replaced with clean soil and cinders.

4) In view of the quantity of uranium exhausted to the outside, it is believed that it would be advisable to install dust collectors in the exhaust duct work over both rolls.

DISCUSSION

General air samples taken at different angles level with and under the sampling platform as the rod stamping operator performed his job, revealed high concentrations of alpha emitting dust for the various operations. An average of 35,000 alpha $c/m/m^3$ for a period of 30-35 seconds was found. These concentrations of 500 times the preferred level are a major contributor to the high concentrations throughout the pressure quenching and rod stamping area and to the general mill area. In

addition, dust concentrations of 140 times the preferred level were found as the shear man dropped the rods on the stamping platform. The time duration of this operation was only 6 seconds, but the operation was performed 280 times a day. It is therefore evident that some method must be devised to eliminate this source of contamination before satisfactory exposures can be obtained. This can be accomplished by means of a hood for the stamping operation or a new method for numbering the rods. (A sketch of a proposed hood has been forwarded to the company.)

General air samples taken at the rolling mill area prior to the rolling operations ranged from 0 to 40 alpha d/m/m^3 with the exception of two locations, one southwest of the roughing roll and the other northwest of the finishing roll. The values obtained in these locations were 850 alpha d/m/m^3 and 140 alpha d/m/m^3 respectively. It is believed that the sample at the former location may have been contaminated by contact as the average of general air samples taken at that location during the actual rolling operation was only 30% of that value.

The average of general air samples obtained at various locations during the rolling period ranged from 20 to 700 alpha d/m/m^3. The highest value of 10 times the preferred level was obtained in the location east center of the rolls. This high concentration may be attributed to the dust made airborne in the operation of placing billets on two rails directly northeast of the roughing roll. The oxide formed on the billets in falling on the steel plate directly would be scuffed up and made airborne by the operators while performing their tasks. It was previously recommended that floor grating for the entire floor be installed as a means of removing airborne contamination created by the above operation.

The rapid decrease in concentration of alpha emitting dusts in the rolling mill area is revealed in the two post rolling dust surveys, with the exception of the furnace area. This condition is probably due to oxide on the dirt floor.

TABLE I

SIMONDS SAW & STEEL CO. — ROLLING MILL

Occupation	No. of Employees	% of Total Personnel	M.P.L.**	4/5/49 M.P.L.**
Foreman	2	5	2.7	3.1
Roller No. 1, West	4	10	2.4	1.3
Roller No. 1, East	4	10	5.6	6.7
Roller No. 2, West	4	10	3.1	6.1
Roller No. 2, East	4	10	6.7	5.7
Pressure Quencher	4	10	5.1	3.7
Rod Stamper	2	5	12.0	8.4
Drag-down Man	2	5	2.4	2.1
Furnace Man*	6	15	1.7	2.6
Shear Man	8	20	2.0	—

* All samples used in evaluating exposures were general air samples of area.

** Multiple of the preferred alpha emitting dust level of 70 d/m/m3.

TABLE 2

PRE-ROLLING, ROLLING AND POST ROLLING GENERAL AIR SAMPLES AT 16" BAR MILL AREA

Location	Pre-Rolling d/m/m^3	Rolling d/m/m^3 (Average of 4 samples)	Post Rolling d/m/m^3 (Average of 2 samples)
Foreman's Desk	25	40	64
Northeast of Roll No. 2	9	110	8
East of Rolls, Center of Floor	40	700	20
Southeast end of Roll No. 1	850	280	20
15' Northwest of Roll No. 2	140	410	10
Southwest of Roll No. 1	20	300	10
Pressure Quench and Rod Stamping Area	4	150	9
Benches West Side of Roll No. 1	40	20	6
Mill Floor 40' West of Rolls	0	420	10
West of Floor, Center of Floor	0	130	9
Furnaces South of Mill Floor	12	132	135
Benches in Rest Area at East Side of Mill Floor	0	100	19
Locker Room	—	20	13
Average Alpha Concentration	95	215	26

DISTRIBUTION OF OCCUPATIONS
BY MEAN CONCENTRATION LEVEL
SIMONDS SAW & STEEL CO.
MAY 10 - 20, 1949

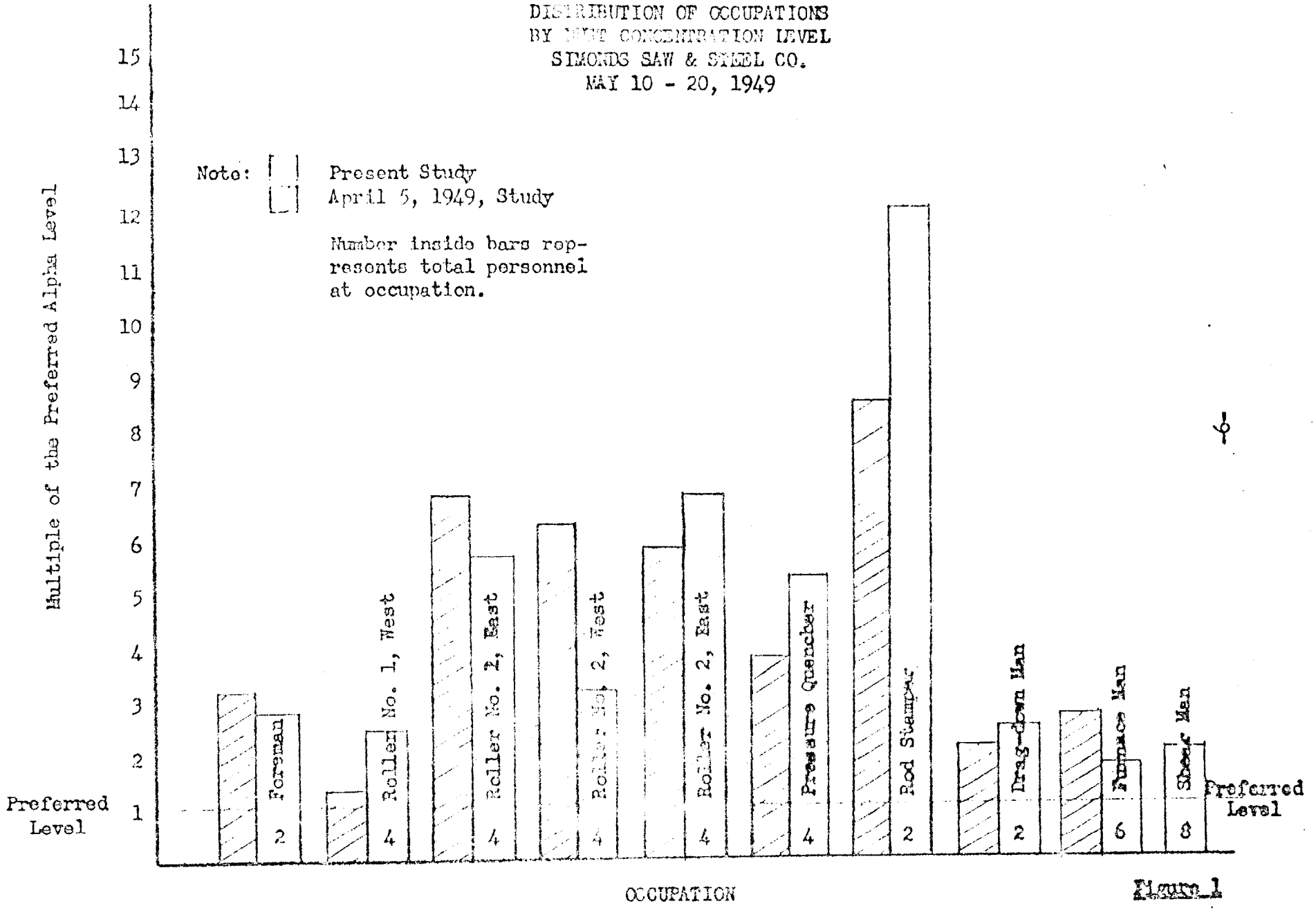


Figure 1

FURNACE MAN

3 men per shift — 2 shifts per day — total 6 men

Operation	Total Time (Minutes)	Alpha Concentration in $d/m/m^3$	Alpha Concentration Times Total Time
General air, furnace area.	375	140 Average of 9 samples - High - 580 Low - 18	52,400
Lunch and rest areas.	120	80 Average of 9 samples - High - 134 Low - 18	9,600
Locker room.	15	24	360
	510		62,360*

$$\text{Average alpha concentration} = \frac{62,000}{510} = 120\ d/m/m^3.$$

$$\text{Multiple of preferred alpha level} = \frac{120}{70} = 1.7$$

* Total adjusted to 2 significant figures.

FOREMAN

1 man per shift — 2 shifts per day — total 2 man

Operation	Total Time (Minutes)	Alpha Concentration in $d/m/m^3$	Alpha Concentration Times Total Time
General air, east side rolls #1 and #2.	150	190 Average of 22 samples - High - 1,440 Low - 8	28,000
General air, west side of rolls #1 and #2.	225	270 Average of 15 samples - High - 890 Low - 0	61,000
Lunch and foreman's areas.	120	80 Average of 9 samples - High - 184 Low - 18	9,600
Locker room.	15	24	360
	510		98,960*

$$\text{Average alpha concentration} = \frac{99,000}{510} = 190 \ d/m/m^3.$$

$$\text{Multiple of preferred alpha level} = \frac{190}{70} = 2.7$$

* Total adjusted to 2 significant figures.

7/7

SIMONDS SAW & STEEL CO.

OCCUPATIONAL EXPOSURE TO RADIOACTIVE DUST

JANUARY 6, 9 and 10, 1950

by

Paul B. Klevin
R. C. Heatherton
Industrial Hygiene Branch
Health and Safety Division

Issued February 1, 1950

Distribution:

1. File
2. Simonds Saw & Steel Co.
3. Simonds Saw & Steel Co.
4. Tonawanda Sub-Office (F. Epp)
5. Production (F. Belmore)
6. File ✓

Health and Safety Division
New York Operations Office
U. S. Atomic Energy Commission

TABLE OF CONTENTS

	Page
A. Purpose of Report	1
B. Findings	1-2
C. Discussion	3
D. Conclusions and Recommendations	4-5
Table 1 - Rolling Mill	6
Table 2 - Comparison of Stock Losses	7
Table 3 - Comparison of Pre-Rolling and Rolling General Air Concentrations	8
Table 4 - Urine Uranium Levels	9

APPENDIX A

Figure 1 - Distribution of Occupations by Dust Concentration Level

Figure 2 - Lead Bath in Operation

Figure 3 - Gas Furnace in Operation

APPENDIX B

Job Analysis Sheets - Lead Bath in Operation - 1/9/50

APPENDIX C

Job Analysis Sheets - Gas Furnace in Operation - 1/10/50

APPENDIX D

List of Employees

PURPOSE OF REPORT

On January 6, 9 and 10, 1950, dust samples were collected at the Simonds Saw and Steel Co. Rolling Mill, by Mr. Paul B. Klevin and Mr. R. C. Heatherton, NYOO. The samples were collected in order to evaluate the exposures of plant personnel to uranium dust. Urine samples were obtained from all operating personnel both before and after rolling. The primary purposes of the present study were the following:

1. To evaluate the general plant air before rolling but after an extensive plant cleanup.

2. To evaluate the effectiveness of the lead bath furnace in reducing airborne contamination.

3. To compare the quantities of airborne uranium discharged to the outdoor atmosphere under essentially similar conditions during the operation of the lead bath and the operation of the gas fired furnace.

4. To determine whether a cleanup of the area and the introduction of cold rod stamping could be sufficient to reduce the excessive exposures which were found in the pressure quenching and rod stamping areas in all previous studies.

5. To provide data for formulating recommendations which might be considered necessary for maintaining a healthful atmosphere.

6. To compare the urine uranium levels with those obtained previously from the same individuals. This should show two things:

   a) If our controls are sufficient to keep body levels below presently accepted amounts;

   b) To determine whether the concentrations are low enough to cause elimination of material which was accumulated at previous high concentrations.

FINDINGS

1. With the possible exception of the drag-down operation, the furnace tender and possibly the east side roughing roller, the results obtained in the two studies are essentially identical. These three operations show a significantly higher exposure during the operation of the gas fired furnace (2nd day) than was found when the lead bath was used (first day) for heating the billets. The operations of pressure quenching, rod stamping and west side finishing roll show concentrations which are somewhat higher on the first day than on the second.

2. The exposures are summarized as follows:

	Concentrations (multiples of preferred level)							
	5 - 10		3 - 5		1 - 3		1	
	No.	%	No.	%	No.	%	No.	%
1st day (lead)	10	25	4	10	26	65	0	0
2nd day (gas)	6	15	8	20	26	65	0	0

A complete tabulation of this data will be found in Table I.

3. A comparison of the stack exhaust data which were taken on these two days shows that the estimated loss during the operation of the lead bath was approximately 7.6 lbs. per day while during the operation of the gas burners, an estimated 18.9 lbs. per day went up the stack. The data is presented in Table 2.

4. As was found in previous studies, the concentrations in the vicinity of the rod stamping and pressure quenching areas (including Roller #2 East) was significantly higher than those found in any other location. The exception to this is in the area of the billet drag-down (including Roller #1 West) on the day in which the gas fired furnace was operating. The exposure of the pressure quenching operator on the first day being 7.4 and on the second day, 4.8 times the preferred level.

5. An analysis of the samples taken on January 6 shows two samples, one of which was in the center of the East side mill floor, and the second at the northeast corner of the mill floor having approximately one and two times the preferred level. All remaining samples taken were 1/2 the maximum allowable concentration or less, with 19 general air samples falling in this category. These results are shown in Table 3.

6. The urine samples which were obtained before rolling have been analyzed, and Table 4 shows a comparison of these results with those obtained before each of three previous rolling periods. It is significant to note that all but three concentrations reported from samples taken on January 6, 1950 are lower than any reported in the year between them and January 6, 1949, and with none of those three is the difference significant. Another item worthy of note is that whereas none of the results reported in the April or November surveys are below 5 ug/l, there were five of the twelve in this group who were in that category, with 3 mils. Arithmetic averages of the four sampled runs show this last to be the smallest obtained so far, and a progressive decrease for the last three.

7. Samples obtained after rolling, when the concentrations should have been highest, were all but one below the presently accepted maximum allowable urine concentration of 50 ug/l. This one sample being 51. The 50 ug/l figure being the most conservative advocated.

DISCUSSION

In order to locate the source of contamination from each of the operations, a plot was made of the individual samples that were taken in each location for each day of operation. These are shown in Figures 2 and 3. A grouping of all samples which showed a concentration greater than five times the preferred limit was made on each of these diagrams and there appeared to be a definite path through the operation which is taken by this high contamination. Inasmuch as the material is airborne, it would appear that there is an air stream blowing across the area which is fed by a highly contaminated source. With the lead bath in operation, this highly concentrated source can be only in the rod stamping and pressure quenching area where samples as high as 72 times the preferred limit were found. There is a narrow path across the plant which includes the pressure quenching, the west side finishing roll, and the east side roughing roll in which essentially all samples falling above five times the preferred limit may be found. With the exception of two isolated samples, one of which was taken directly above the conveyor transporting billets from the lead bath to the drag-down operator, there is no individual sample which shows a concentration greater than 2.5 times the preferred limit.

Essentially the same thing exists on the following day when two sources of heavy contamination appear to be present. One of these is again the pressure quenching operation and the other the billet heating and drag-down at the far corner of the rolling floor. It is quite obvious that all samples which are greater than 2.5 times the preferred level fall within the area which might be affected by these two operations.

Inasmuch as the introduction of the lead bath furnace should largely eliminate the contamination caused by the heated billet, the single high level source which remains to be controlled is that one which has existed and has been reported on for approximately the last six to eight months. This source is the operation of pressure quenching and possibly of rod stamping. Since the introduction of cold stamping of rods, however, this latter operation has shown considerable improvement. It is believed that unless definite specific steps are taken for the elimination of contamination from the quenching operation, it will be impossible to show any material improvement in the health conditions in this plant.

The fact that a residual air contamination of the order of 25 ug/m^3 exists, even after a thorough cleaning and a full month of no rolling indicates two things:

1. The entire mill has a low level of uranium contamination.

2. It will probably be impractical to reduce the airborne uranium level consistently below 15 ug/m^3.

EVALUATIONS AND RECOMMENDATIONS

1. The twelve operators sampled show a progressive decrease in uranium storage in the body.

2. The peak rolling figures contained in column 5 of table 4 are below our best estimates of acceptable urinary levels. Urine-uranium concentrations from 50-100 micrograms per liter have been suggested as being the maximum permissible. The fact that the levels found at what should be the peak of exposure are below the minimum of these estimates, is reasonable assurance of satisfactory intake.

3. Without major process modification, it will probably not be possible to reduce the airborne uranium during operation significantly below 150 ug/m3 (3x PL).

4. This concentration appears to be tolerable as shown by the continued decrease in uranium in urine. This fact may in some measure be due to the operating schedules. The urinary evidence appears to indicate that the present exposure levels are insufficient to cause an increase in body storage. It must be pointed out, however, that this data is very shaky and permits no conclusive deductions on the future trend of the excretion curve. This curve could continue to decrease, it may be found to be at equilibrium, or it could begin to turn up. This last is conceivable but not likely.

5. It should be possible to maintain a level of less than 150 micrograms per cubic meter in the air concentration caused in the quenching area could be eliminated.

6. The operation of lead bath heating shows a decrease in exposures in the vicinity of the billet heating and a reduction in material lost up the stack.

7. An airborne concentration of approximately 15 ug/m3 (0.3xPL) is the level below which it will probably be extremely difficult to clean the present plant between operations.

The following recommendations are made for the elimination of primary sources of atmospheric contamination in this plant:

1. The operation of dragging the scaly rods from the shear to a descaling location be eliminated or the transport surface be minimized.

2. The descaling operation be modified in some manner as to eliminate the high source of air contamination which it appears to cause.

3. After quenching, the billets should be coated with a non-evaporating liquid coating to prevent sluffing of oxide into the area. In order to accomplish these things, it is suggested that quenching be accomplished by means of direct dipping into some material such as a soluble oil, and that this dipping be accomplished immediately adjacent to the shear after the pieces have been cut.

4. If it is found that a high degree of contamination still exists in the area presently occupied by the quenching operation, and the rod stamping, it should be somewhat easier to isolate the source of the material.

5. In the event that rod coating at the shear appears to be an impractical solution, it will be necessary to transport the rods from the shear area to the quenching area in a covered conveyor, which is equipped with exhaust ventilation. In the event that the rods are dipped coated in a soluble oil, it is quite likely that further degreasing will be necessary to prevent the spread of oxide film during transport of the rods.

6. As a further alternate solution, it is recommended that a motorized conveyor be set up for the degreasing operation. This conveyor may be loaded at the roller end, and transport the rods forth and back by means of reversing tripper switchers. At the end of a predified period, the rods can be discharged at the opposite side into a coating tank in a basket. After a load has accumulated, the basket may be withdrawn and allowed to drip prior to stamping and weighing. The conveyor and pressure quench could then be totally enclosed, drained and ventilated.

TABLE I

SIMONDS SAW AND STEEL COMPANY - ROLLING MILL

Occupation	No. of Employees	MULTIPLE OF THE PREFERRED ALPHA LEVEL: Lead Bath in Operation 1-9-50	MULTIPLE OF THE PREFERRED ALPHA LEVEL: Furnace in Operation 1-10-50
Foreman	2	2.5	1.3
Roller #1 West	4	1.7	1.8
Roller #1 East	4	3.7	7.7
Roller #2 West	4	6.2	1.9
Roller #2 East	4	2.9	4.3
Pressure Quencher	4	7.4	4.0
Rod Stamper	2	5.3	2.1
Drag Down	2	1.5	6.2
Furnace Men	6	1.2	2.7
Shearman	3	2.0	1.1

TABLE 2

[illegible] OF STACK LOSSES

	Time (Min.)	Concentration ($\mu g/m^3$) Lead Bath	Concentration ($\mu g/m^3$) Gas Furnace	Concentration x Time (Lead Bath	Concentration x Time (Gas Furna
Roughing Roll					
No Operations	222	600	6000	13	133
1st Pass	192	9000	44000	173	840
2nd Pass	96	26000	28000	250	268
Total	510			446	1241
Finishing Roll					
No operations	258	650	1000	17	26
Rolling	252	10000	17000	252	430
Total	510			269	456

	Roughing Roll (230 m^3/min.)		Finishing Roll (200 m^3/min.)	
Average Concentration ($\mu g/m^3$) $\left(\frac{\text{Conc x Time}}{\text{Time}}\right)$	3750	24300	5100	9000
G/min.	2.2	6.1	1.2	2.3
Lbs./1020 min. day	4.9	13.7	2.7	5.2

Total estimated Loss:

Gas Furnace	18.9 Lbs./day
Lead Bath	7.8 Lbs./day

TABLE III

COMPARISON OF PRE-ROLLING AND ROLLING
[illegible]

Location	Multiple of Preferred Alpha Level	
	Pre-Rolling	During Rolling
Bench 40 ft. West of Rolls	0.15	0.8
Shear Pit 40 ft. West of Rolls	0.07	0.8
Finishing Roll West	0.08	4.1
Rod Stamping Area	0.23	1.5
Roughing Roll West	0.21	1.3
Pressure Quencher	0.31	17.0
Desk 40 ft. East of Rolls	0.71	1.[illegible]
Weigh Scales Rod Area	0.25	1.7
Center of Mill Floor West	0.10	1.5
Weigh Scale near Lead Bath	0.56	0.4
South Side Lead Bath Charge	-	0.[illegible]
Center of Mill Floor East	0.[illegible]	4.3
Roughing Roll East	0.25	2.8
Finishing Roll East	0.25	1.1
Gas Furnace Area	-	1.9

[illegible]

[illegible] - [illegible]

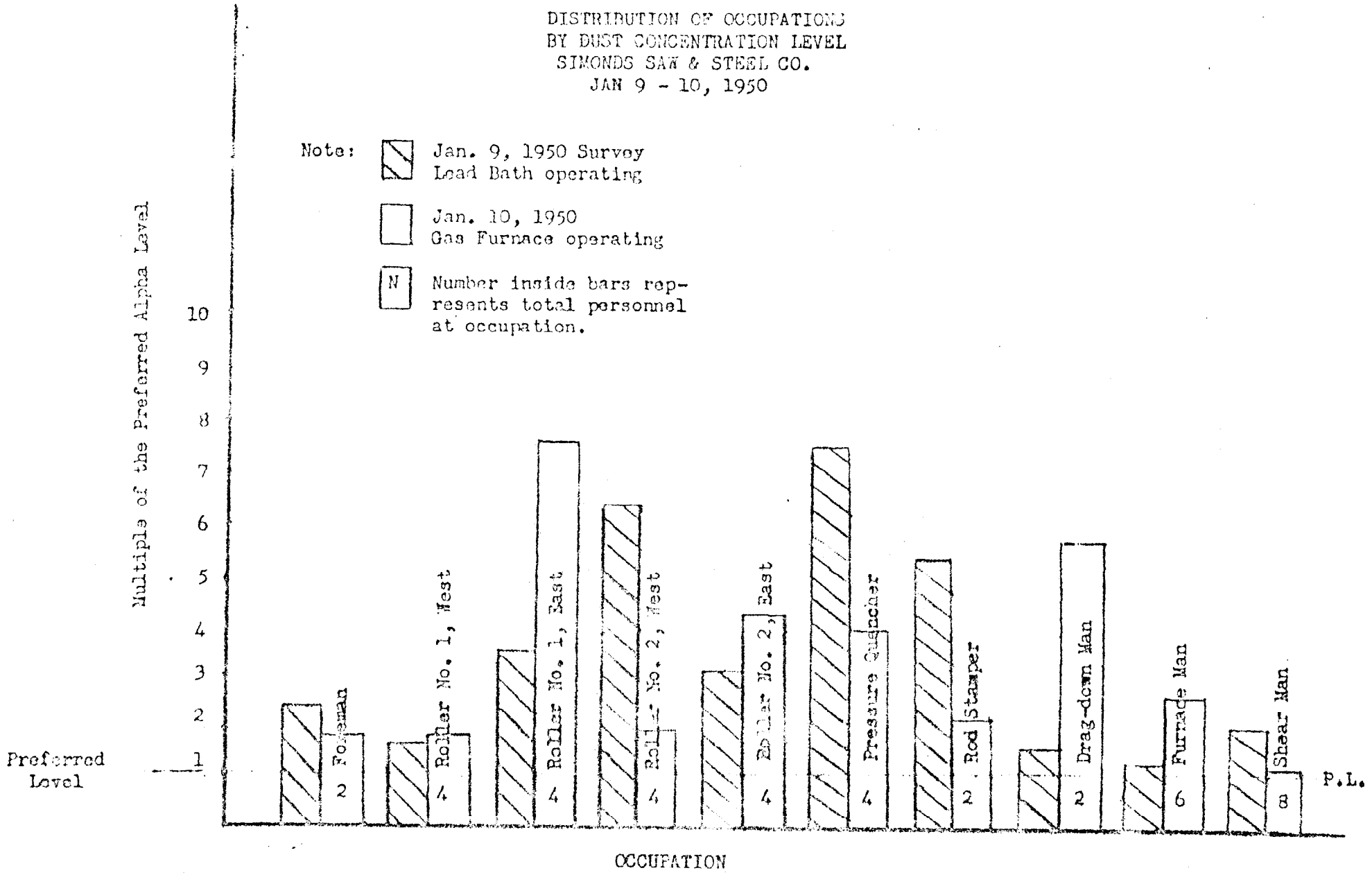
[illegible]

	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]**
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

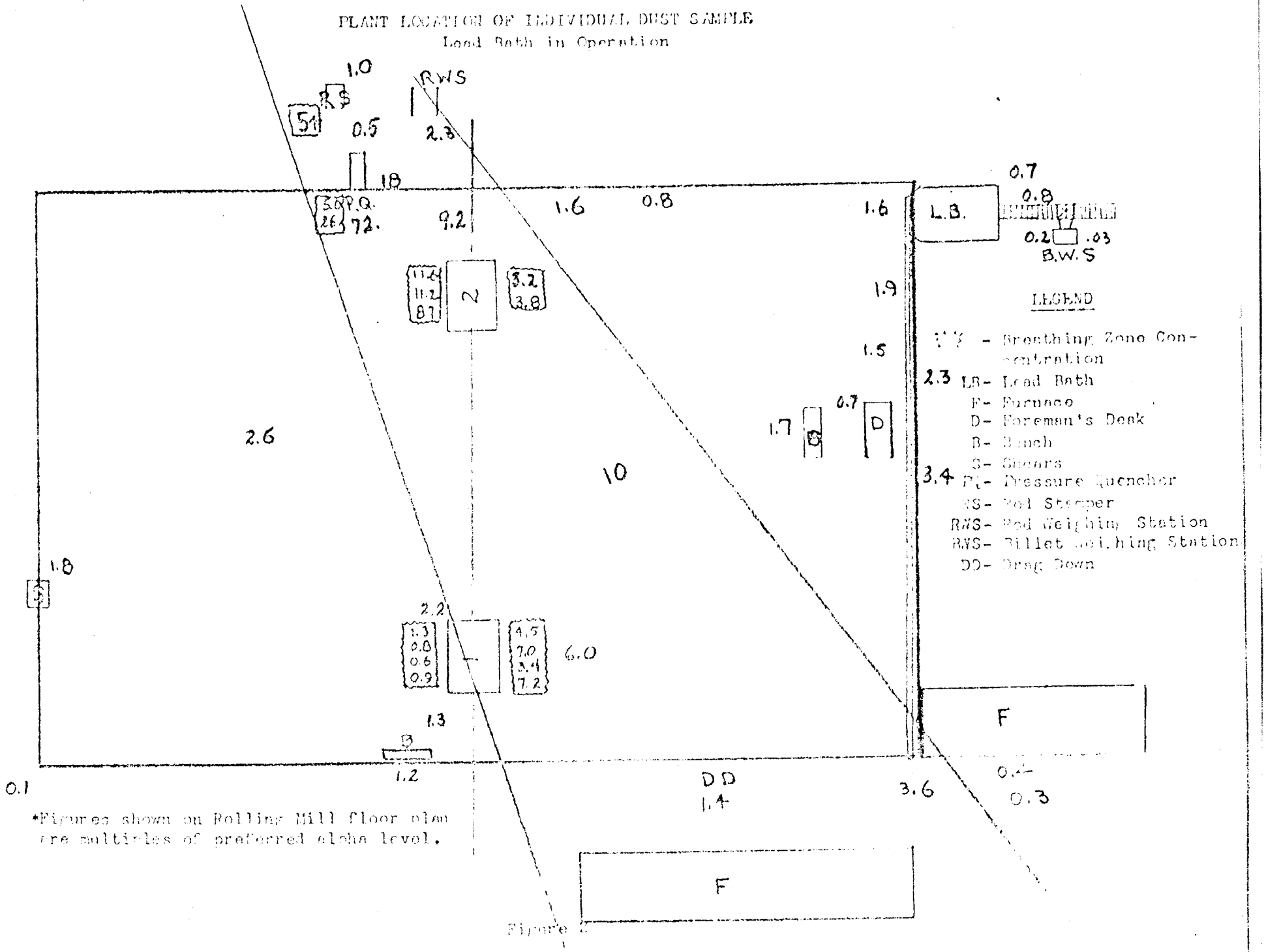
[illegible] was not include the [illegible] value which was obviously contaminated. The fact that no other individual value approaches this magnitude also indicates that the [illegible] of obtaining samples was essentially sound.

[illegible] are of area represent samples taken immediately after the [illegible] of the [illegible] series.

DISTRIBUTION OF OCCUPATIONS
BY DUST CONCENTRATION LEVEL
SIMONDS SAW & STEEL CO.
JAN 9 - 10, 1950



PLANT LOCATION OF INDIVIDUAL DUST SAMPLE
Lead Bath in Operation

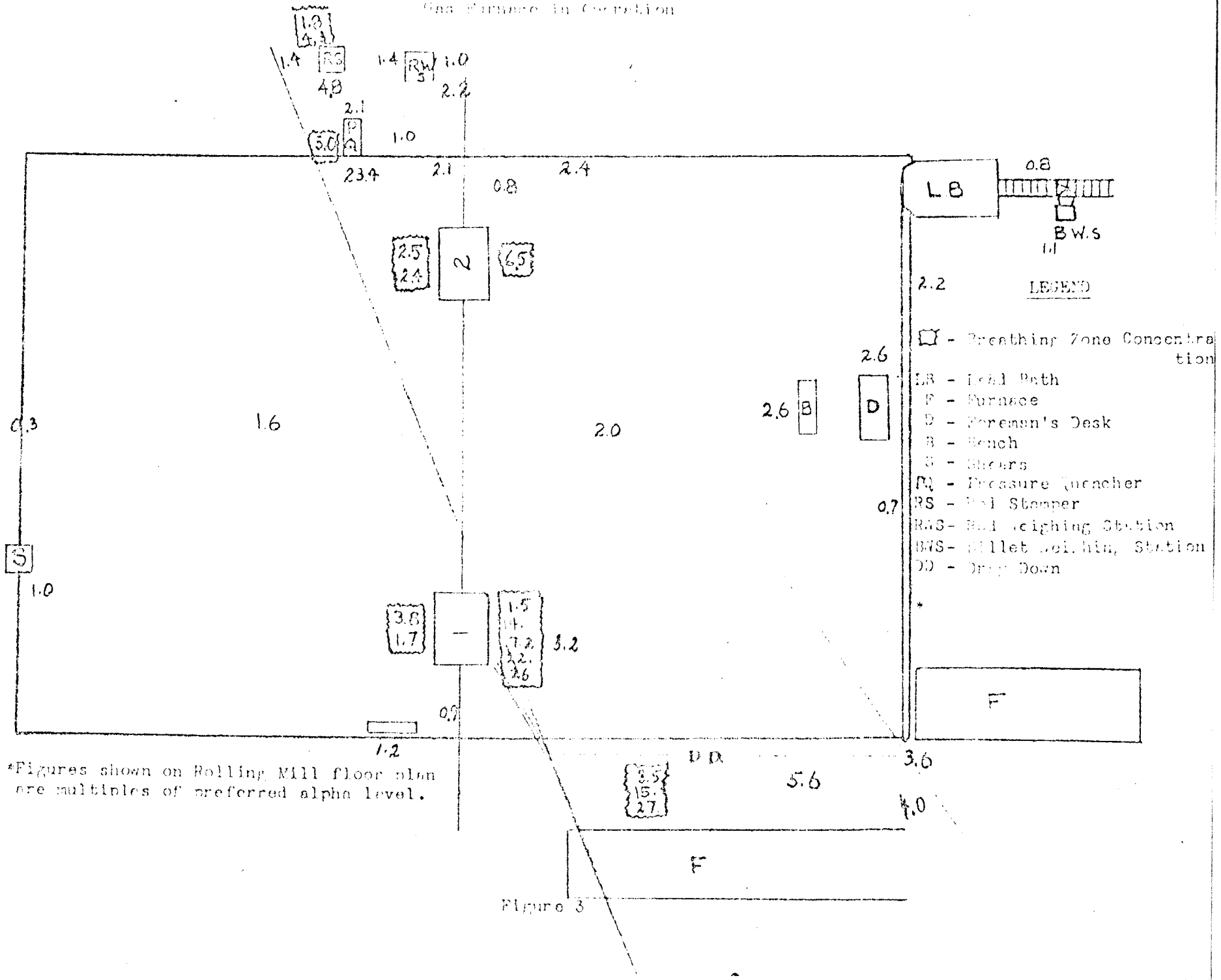


*Figures shown on Rolling Mill floor plan are multiples of preferred alpha level.

Figure 4

PLACT LOCATION OF INDIVIDUAL DUST SAMPLE

Gas Furnace in Operation



*Figures shown on Rolling Mill floor plan are multiples of preferred alpha level.

Figure 3

OFFICIAL USE ONLY

Francis J. Epp, Chief
Tonawanda Sub-office
Merril Eisenbud, Director, Health and Safety Division

June 25, 1950

REPORT - SIMONDS 8

SYMBOL: HSH:WBH

We are transmitting two copies of our report, SIMONDS - 8, which presents the summary of Occupational Exposures to Radioactive Dust in the Simonds Saw and Steel Company, during the April and May rolling periods. We believe that it is now time to commend both the plant management and the Production Division on the efforts expended in establishing healthful conditions at this plant and the results obtained therefrom.

As can be seen in the report, air concentrations which averaged greater than 50 times the preferred level in September of 1948, were rapidly reduced by April 1949 and had dropped by a factor of 10. Continued efforts were made in the direction of improving exposure conditions so that at the time of this report, two successive months show an average exposure of 1.6 times the maximum allowable concentration. There are still a couple of individual exposures in the neighborhood of four times the preferred level which we believe can be reduced by somewhat better housekeeping, by shifting the position of the east side and west side rollers, and by rapid dilution of dust in the few areas where high concentrations have been found.

Urine uranium concentrations appear to be holding on at the relatively low average figure of about 8 γ/l. There is no reason to believe at this time that the employees of this plant are absorbing appreciably quantities of uranium.

Classification Cancelled
~~Or Changed To~~
By Authority of K A Walter
Date 12/2/80
By P.T. Brown 12-2-80

Enclosure:
Report - SIMONDS - 8
(2 copies)

cc: F. M. Balmore, Production Division
R. Heatherton, Tonawanda Sub-office
Simonds Saw and Steel Company
~~S. G. Sturgess, Chief, Operations Division, Hanford~~

OFFICIAL USE ONLY

OFFICIAL USE ONLY

SIMONDS SAW AND STEEL COMPANY

OCCUPATIONAL EXPOSURE TO RADIOACTIVE DUST

by

R. C. Heatherton
Industrial Hygiene Branch
Health and Safety Division

Issued: June 21, 1950

Distribution:

1. File
2. Simonds
3. Simonds
4. Tonawanda Sub-office (F. Epp)
5. Production (F. Belmore)
6. File

U. S. Atomic Energy Commission
New York Operations Office
Health and Safety Division

OFFICIAL USE ONLY

TABLE OF CONTENTS

	Page
PURPOSE	1
FINDINGS	1, 2
DISCUSSION	2, 3
CONCLUSIONS	3, 4

Table I - Occupational Exposures of Employees

Table II - Comparison of Samples obtained before and after Rolling from Identical Individuals

Table III - Breakdown of Urine Concentrations by Concentration Level

Figure 1 - Comparison of Exposures

Figure 2 - Average Plant Exposures

APPENDIX A

Job Analysis Sheets

APPENDIX B

Sample Record Sheets

PURPOSE

An air survey of the rolling mill operations at Simonds Saw and Steel Company was made on April 13 and 14, and another on May 17 and 18, by R. C. Heatherton, New York Operations Office. On April 18 and May 22, dust samples were collected while special tests were being made at Simonds. These tests included forge-hammering of billets and finish rolling at temperatures lower than those normally used and of forged and extruded billets. The purposes of this study were:

1. To evaluate exposures of plant personnel to uranium dust.

2. To determine if there was a significant reduction in the amount of airborne contamination resulting from the following changes:

   a. The exclusive use of the lead bath for heating billets;
   b. The elimination of the rod shearing operation; and
   c. The installation of a fan with greater capacity on the quencher exhaust.

3. To provide data for further study of means of reducing airborne contamination where it is necessary and practical.

4. To determine the amount of airborne contamination resulting from forge-hammering billets and finish-rolling at lower temperatures and of pre-handled bars.

FINDINGS

1. The east side roughers and finishers showed more dust exposure during both the April and May rolling period than was shown by the study made with the lead bath in operation in January. All other operators were less with the exception of the drag down men who were slightly higher in May. In the groups showing higher exposures are ten men (or 22 percent of all rolling mill personnel).

   Following is a summary of exposures as determined from the three surveys:

Time of Study (Lead bath operating)	Concentrations multiples of the preferred level				
	< 1.0	1.0-2.0	2.0-3.0	3.0-5.0	5.0-10.0
January	0(0%)	12(30%)	14(38%)	4(10%)	10(25%)
April	15(33%)	22(49%)	0(0%)	8(18%)	0(0%)
May	23(51%)	4(9%)	10(22%)	8(18%)	0(0%)

   A complete tabulation of data is given in Table I.

2. Lower average general air contamination over the entire rolling mill area may be attributed to the changes made for the April rolling. Increasing the air flow on the quencher exhaust has resulted in much less air contamination in the quencher area and on the west side of the finishing roll.

3. While the preferred level for air contamination is not greatly exceeded, improvement is both desirable and possible. The worst conditions are now on the east side in the immediate vicinity of both rolls.

4. The forge-hammering operation was very dusty. Individual general air dust samples collected in the vicinity of the forging were from 76 to 260 times the preferred level. Samples collected in the breathing zones of men handling the billets with tongs were 220 and 400 times the preferred level.

5. Breathing zone samples collected while rolling at 570° C were from 1.2 to 4.0 times the preferred level or approximately 50% of the values obtained during the regular rolling.

6. Samples taken in the breathing zone during finish rolling of extruded and of forged billets showed concentrations of from 2 to 17 times the preferred level.

DISCUSSION

Table I shows the distribution of concentrations for the April and May rollings with the lead bath in operation and shearing eliminated as compared with the January rolling. In future reports, shearman will be listed as straighteners. Dippers, who take descaled rods from quencher, weigh and place on rack for stamping, have been added to the original list. Three shippers are also included. There are no shippers working the second shift.

Exposures have been calculated on the basis of a 10¼ hour day, 9½ hours worked, ½ hour for lunch and ¼ hour for changing clothes.

Also shown in this Table is the average plant exposure weighted by numbers of men at each job. From these figures is evident the consistency of the improvement.

Urine samples were obtained from 25 men both before and after the May rolling period. Table II shows a comparison between the samples obtained before and after rolling during January 1950, and May 1950, from identical individuals. The average of January samples is slightly lower than in May (7.3 vs 8.5), but there are a greater number of individuals in January who are higher than in May so the difference is probably not significant. The average of the after samples is likewise comparable, but shows a significant lessening of temporary excretion rate which is consistent with the drop in airborne materials. This is shown in Table III, which gives a breakdown of excretion rates according to levels. Whereas there were 6 men showing post rolling urine concentrations

in excess of 20 γ/1 in January, only one such concentration was found in May.

Comparison of exposures is shown graphically in Figure 1.

In Figure 2 is a plot of average plant exposures found during each survey, with the corresponding maximum values and the average pre-rolling urine analyses. Also noted are the dates of the various major plant improvements. The rate of decrease in average plant exposure with each improvement is shown dramatically.

CONCLUSIONS

1. Quenching and rod coating still contribute to general air contamination in the areas where these operations are performed. It may be possible to improve these areas further.

   High concentration areas just east of the rolls may result from two factors:

   a. Air movement from the rod coating and quenching areas in a southeasterly direction over the rolls and across the east mill floor.
   b. Dropping of billets to the floor on the east side as they leave the rolls. Billets pass through the rolls from the east side at floor level and from the west side at 12" to 18" above the floor.

   Slight improvement in each of these areas; rod coating, quenching, roughing roll — east side and finish roll — east side, would reduce contamination to the point where exposure in excess of the preferred level for any individual would be unlikely.

2. From a health standpoint, forging of billets is not recommended. The operation is slow so that there are long exposures to high dust concentrations. In addition, ventilation would be difficult. There also appears to be little, if any, exposure advantage to be gained from rolling at a lower temperature.

3. The value of rod-coating has not been definitely established. It is doubtful that air contamination is reduced at Simonds by coating the rods for handling in the shipping area. The coating operation itself contributes to air contamination.

4. In order that the two highest exposures, those of the east side rollers may be reduced, it has been recommended that they periodically switch positions with those on the west side.

5. It is understood that plexiglass shields extending down from the hoods in front of the rolls cannot be lowered without hampering rolling operation. The possibility of reducing the size of the openings on the east side will be investigated.

6. Urine samples taken before the rolling show no significant increase over those obtained four months before. Samples obtained after the rolling are low enough to predict a further slight decrease in storage before the next rolling period. This may not be demonstrable, however, because the results are approaching the limit of accuracy of our methods of obtaining reproducible excretion samples.

TABLE I

OCCUPATIONAL EXPOSURES OF EMPLOYEES

Comparison between January 1950, April 1950 and May 1950 Rolling Periods

Occupation	Airborne Uranium dust Concentrations (multiples of Preferred Level)		
	Jan 1950	April 1950	May 1950
Foreman	2.5 (2)	1.0 (2)	2.2 (2)
Weighup	*	1.0 (4)	0.3 (10)
Furnace	1.2 (6)	0.9 (6)	
Dragdown	1.5 (2)	1.2 (2)	2.6 (2)
Roll #1 - East	3.7 (4)	4.0 (4)	3.9 (4)
Roll #2 - East	1.7 (4)	4.3 (4)	4.6 (4)
Roll #1 - West	2.9 (4)	0.6 (4)	0.6 (4)
Roll #2 - West	6.2 (4)	1.5 (4)	2.4 (4)
Shearman (Straightaners) **	2.0 (8)	1.5 (4)	0.9 (4)
Quenchers	7.4 (4)	0.8 (2)	0.8 (2)
Dippers	*	1.1 (4)	1.1 (4)
Stampers	5.3 (2)	1.8 (2)	2.2 (2)
Shippers	*	0.5 (3)	0.2 (3)
TOTAL	(40)	(45)	(45)
Weighted Average Plant Exposure	3.33	1.62	1.64

* Not reported

** Job description changed.

NOTE:

Numbers in parentheses indicate the number of operators.

TABLE II

COMPARISON OF SAMPLES* OBTAINED BEFORE AND AFTER ROLLING FROM IDENTICAL INDIVIDUALS

	January		May	
	Before	After	Before	After
Albone	14	21	22	19
Cassenti	0	15	0	14
Cook	0	12	15	0
DiAngello	6	—	3	34
Dovoe	26	18	16	16
DiMillo	3	0	0	3
Harper	8	20	7	17
Heiser	0	0	0	0
Kinsler	12	7	1	17
Lahr	14	15	12	0
Malcom	6	14	8	16
McCarthy	1	33	15	14
Myrick	0	16	15	0
Plumbo	1	3	0	13
Payne	3	17	7	0
Pless	17	31	5	16
Reese	18	27	14	18
San Marco	0	0	0	16
Sherman	4	13	16	6
Sholtz	11	35	8	3
Ventura	2	15	15	0
AVERAGE	7.3	15.7	8.5	10.7

* Expressed in γ uranium per liter of urine

TABLE III

BREAKDOWN OF URINE CONCENTRATIONS BY CONCENTRATION LEVEL

γ/l	0	0 - 10	10 - 20	20 - 30	>30
January					
Before	5	9	6	1	-
After	3	2	9	3	3
May					
Before	5	7	8	1	-
After	6	3	11	-	1

FIGURE 1

DUST EXPOSURES
SIMONDS SAW & STEEL COMPANY
ROLLING MILL

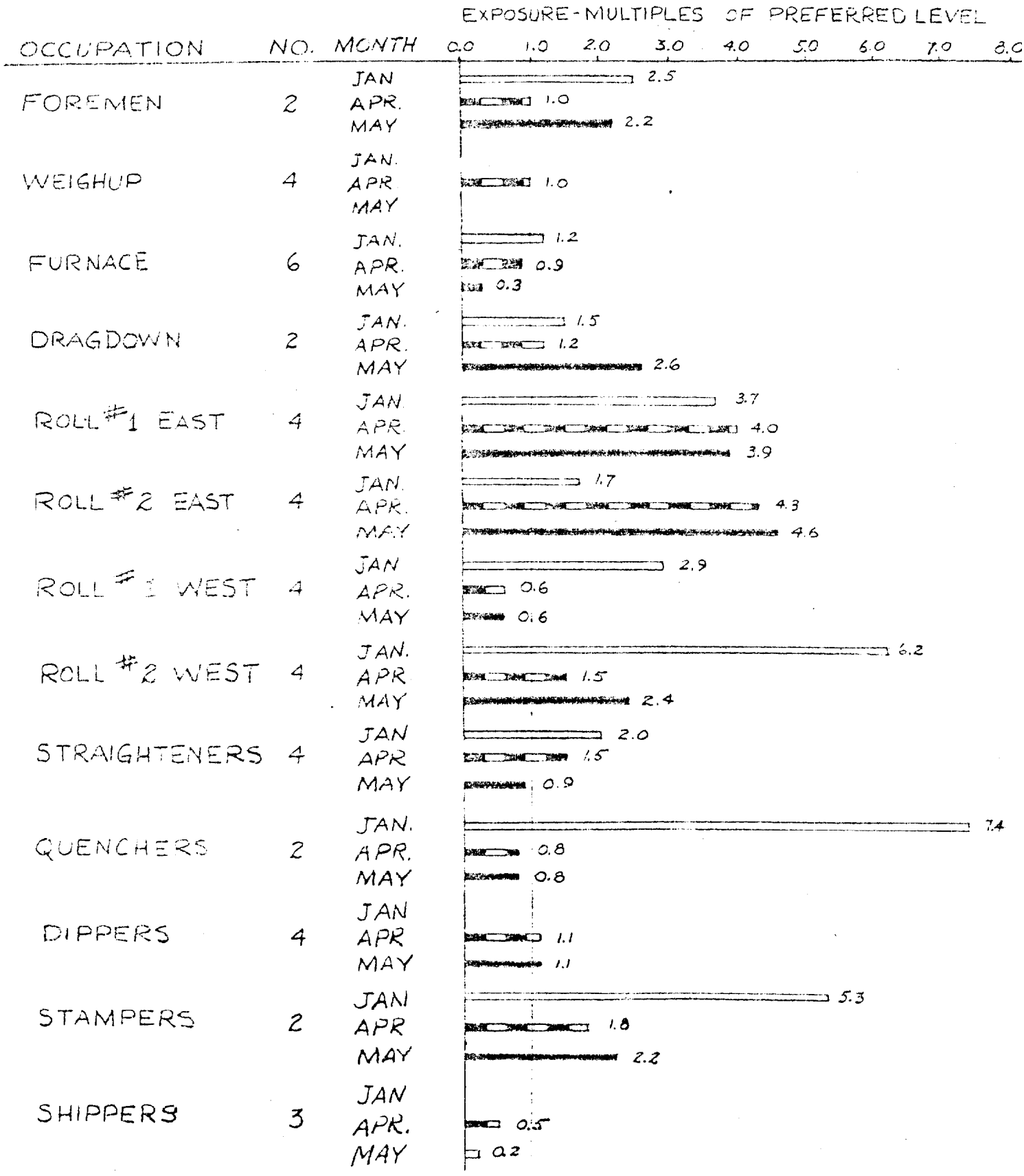


FIGURE 1

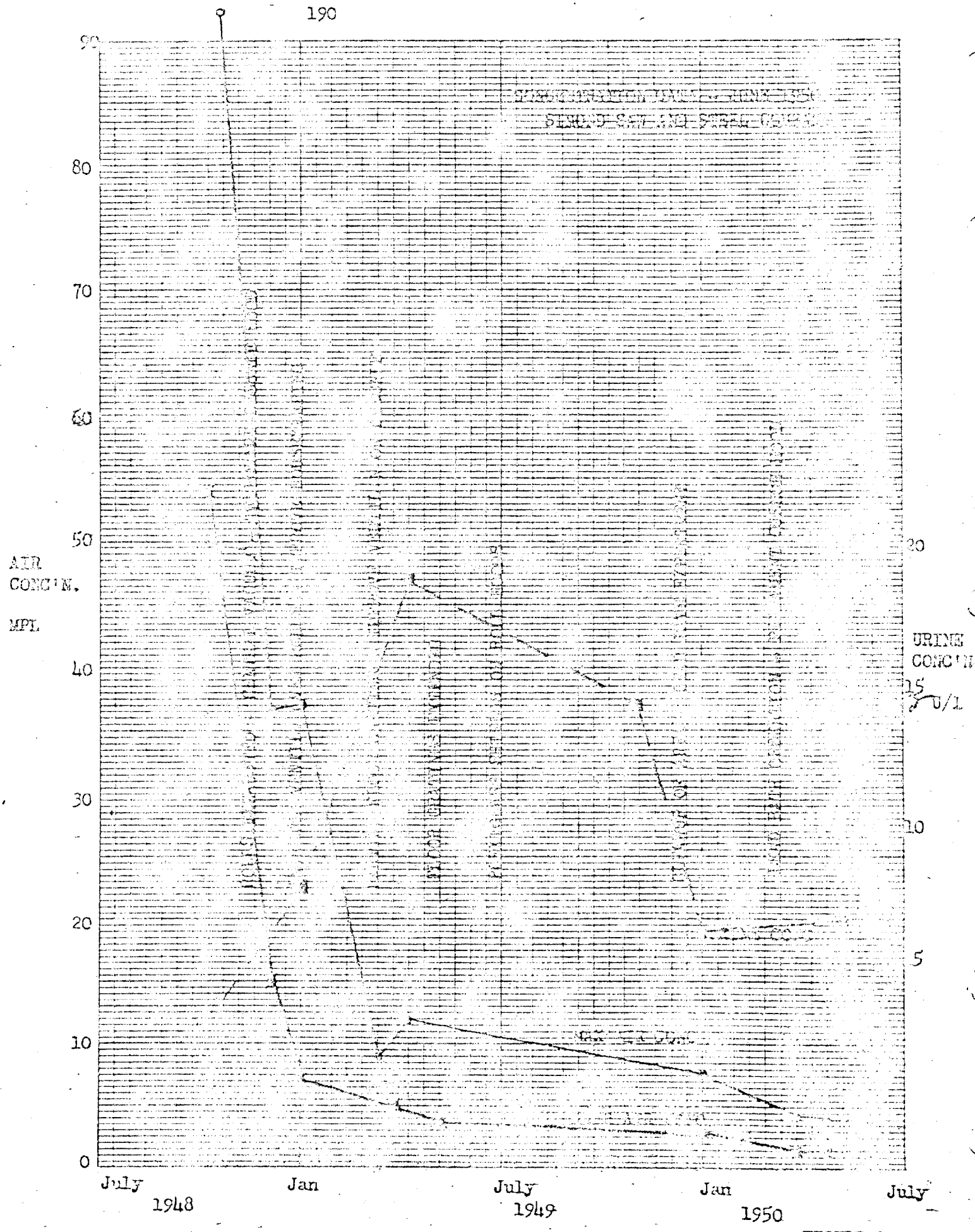

190
90
80
70
60
50
40
30
20
10
0
AIR
CONC'N.
MPL
20
15
10
5
URINE
CONC'N
U/L
July
1948
Jan
July
1949
Jan
1950
July

FIGURE 2

OFFICIAL USE ONLY

F. M. Belmore, Director, Production Division — October 25, 1950

Merril Eisenbud, Director, Health and Safety Division

SIMONDS - 9 REPORT

SYMBOL: HSH:WBH:mo

We are submitting herewith our report designated SIMONDS - 9. This report covers the occupational exposure to radioactive dust at the Simonds Saw and Steel Company as found during an air survey of the August 14 rolling operations. The report shows that the average exposure has decreased slightly over that found during May. A somewhat greater number are exposed to above the MAC than were found in May but the present report indicates that all exposures are below three times the MAC.

Urine samples taken before and after this rolling period show a somewhat higher concentration than those which were obtained previously. The pre-rolling urine samples, however, are considerably higher than would be expected. This phenomenon is being investigated. Stack samples which were taken inAugust show an estimated loss of 15.1 pounds of uranium per day as compared with 7.6 pounds per day in January. The reason for this increase is probably the elimination of the Aerodyne collector over the finishing roll.

Radiation readings to locate alpha contamination were taken throughout the plant area. High concentrations were found in the mill area and some contamination appeared throughout the plant. This is significant only from the standpoint of the material on the dirt floor being made airborne. Rafter and ledge samples in the vicinity of the rolling mill showed a considerable percentage of uraniu. The report recommends that:

1. All rafters, ledges and furnace tops be vacuumed cleaned; and

2. The quencher hood should be extended.

Enclosure:
Report (4 copies)

OFFICIAL USE ONLY

OFFICIAL USE ONLY

SIMONDS - 9

SIMONDS SAW AND STEEL COMPANY

OCCUPATIONAL EXPOSURE TO RADIOACTIVE DUST

by

Richard C. Heatherton
Industrial Hygiene Branch
Health and Safety Division

Issued: October 24, 1950

Distribution:

1 - File
2 - Simonds
3 - Simonds
4 - Tonawanda Sub-office (F. Epp)
5 - Production Division (F. Palmore)
6 - File ✓

U. S. Atomic Energy Commission
New York Operations Office
Health and Safety Division

Classification Cancelled

OFFICIAL USE ONLY

TABLE OF CONTENTS

	Page
Introduction	2
Purpose	2
Results	2, 3, 4
Discussion	4, 5, 6
Recommendations	6

TABLES AND FIGURES

Table I - Dust Exposures - August 1950

Table II - Urine Data

Table III - Comparison of Stack Losses

Figure 1 - Exposures (Bar graph)

Figure 2 - Alpha Radiation - Mill Area

Figure 3 - Alpha Radiation - Plant Area

APPENDIX A

Job Analysis Sheets

APPENDIX B

Sample Record Sheets

INTRODUCTION

This study of the Simonds Saw and Steel Company's rolling mill includes the following:

1. An air survey of rolling operations the week of August 14.

2. The collection of urine samples from mill workers before and after rolling.

3. The collection of stack dust samples.

4. A radiation survey.

5. Sampling of dust which has accumulated on the rafters and ledges in the vicinity of the rolling mill.

6. Obtaining samples of ordinary rolled steel and the first steel rolled on the 18 inch bar mill after uranium rolling was completed.

PURPOSES

1. To estimate job exposure to airborne uranium dust.

2. To correlate uranium excretion with exposure data.

3. To estimate stack losses and resultant out-plant air contamination.

4. To determine the extent of surface contamination in the plant from the rolling operation.

5. To determine the amount of contamination which has accumulated from dust settling on surfaces which are not regularly cleaned.

6. To estimate the uranium pick-up of steel rolled on the mill used for uranium work.

RESULTS

1. From the air survey weighted exposures were calculated for 33 men in 11 job classifications. Following is a summary of exposures for this and the previous survey made in May:

SUMMARY OF RESULTS OF DUST SURVEYS

	May 1950 Survey	August 1950 Survey
No. of workers studied	45.	38.
Average exposure (times MAC)	1.34	1.47
High exposure (times MAC)	4.6	2.5
% of workers below MAC	23 (51%)	8 (21%)
% 1 to 3 times MAC	14 (31%)	30 (79%)
% 3 to 5 times MAC	8 (18%)	0 (0%)

(Exposures are expressed as times the "MAC" of 50 γ/m^3)

Table I contains complete exposure data for the August survey.

2. Following is a summary of urine sample results for August:

	Pre-Roll	Post-Roll
Number of samples	20	18
Average U content, γ/liter	30.3	16.6
Highest sample, γ/liter	102.0	33.0
Number <10 γ/liter	0.	2.
Number >30 γ/liter	8.	1.

Post-roll samples in May averaged 10.3 γ/liter. Complete results for August are given in Table II. May also are given where available.

3. From stack sample results the estimated stack loss for 24 hours is 13.1 pounds of uranium as compared with 7.8 pounds in January. Stack data are given in Table III.

4. The highest radiation levels detected (small areas) were 50,000 alpha d/m/100 cm^2 and 10. mreps of beta per hour. Average levels over a wide area are given in the following table:

Distance from Rolls	West Side Alpha d/m/100 cm^2	West Side Beta mreps/hr	East Side Alpha d/m/100cm^2	East Side Beta mreps/hr
1 to 50 feet	3400	1.0	3100	1.0
50 to 100 feet	2800	-	3800	-
100 to 125 feet	1000	-	400	-

In Figure 2 are shown some of the locations where higher readings were obtained. Figure 3 shows highest readings away from the mill proper.

5. Samples of dust taken from rafters and ledges in the vicinity of the rolling mill contained from 20 to 130 milligrams of uranium per gram of dust.

6. The steel samples have not been analyzed. However, the mill scale from steel bars rolled immediately after uranium rolling was metered and radioactivity was detected.

DISCUSSION

Dust Exposures

While the August survey showed a decrease in the number of men exposed to less than the MAC, the overall results are favorable. The highest exposure for August is 2.49 for May 4.8. The average exposure for August is 1.47 - for May 1.54.

Seven men with exposures of less than 1.0 who helped reduce the May average were not included in the August survey. The data obtained were insufficient to establish weighted exposures for four men who weigh billets. There is no reason to suspect a higher exposure for these men. The three shippers were not working because of the change in method of handling uranium rods. Previously rods were loaded into box cars for shipment. In August, they were hauled by truck to LOOW. Daily handling (loading into freight cars) and shoring (the load) thus were eliminated.

Dippers with an exposure of 2.49 actually rotate with quenchers so that six men in these job classifications receive 1.0 times the MAC.

Furnace men, west side roughers and dippers showed a significant increase over the May figures. Foreman, dragdown men, east side roughers, finishers, and stampers showed a significant decrease.

Breathing zone samples were used to calculate exposures to furnace men whereas previously their exposure was calculated from general air samples in the furnace area. The rod coating operation has been eliminated. This may account for lower exposures to rod stampers who used to do the coating. The only explanation that can be given for other changes is a change in direction of air movement from east to west across the rolls as a result of drafts from open doors and sky-lights.

All rolling mill personnel work ten and one-half hours per day while uranium is being rolled. The average rolling period is seven days per month. The preferred dust level of 50 micrograms per cubic meter is for eight hours per day and approximately twenty-two days per month. The fewer days of exposure compensates for the longer working day.

Urines

It is difficult to single out a reason for the results of urine samples collected in August. Possible explanations are:

1. The group sampled work the second shift which has less supervision and consequently there are higher exposures.

2. There was an error in the analysis.

3. All or most of the samples were contaminated.

4. The group received a very high exposure a few hours before the pre-roll samples were collected and large amounts of uranium were still being excreted at the time of the post-roll sampling.

Stack Losses

There is no significant difference in roughing-roll losses in January and August. The greater loss in August in the stack over the finish roll is significant. Removal of the Aerodyne collector has resulted in the loss of an additional four to five pounds of uranium per day while rolling.

The average concentration for January was calculated using results of short term stack samples (several minutes). Samples were collected both while

rolling and while no operation was being done. Rolling continued for 17 hours per day.

August stack samples were collected for 24 hours though the mill was shut down for four hours each day.

Contamination of Plant

Small amounts of contamination may be detected at a considerable distance from the bar-mill where uranium is rolled. There is no gradual reduction with increasing distance from the mill. This indicates that contamination is probably not from airborne material but was carried on shoes from the mill to other areas. Approximately one hundred feet northwest of the mill floor outside the locker rooms, the floor is contaminated probably from handling of rods in this location, transferring from the overhead cranes to dollies. The contaminated area about fifteen feet southeast of the mill floor is the billet storage area. Highest contamination of 50,000 d/m northwest by the quencher is to be expected since there is a continuous spray of water from this quencher on the floor at this location.

Contamination on the rafters and ledges near the mill is probably material which was deposited before adequate ventilation was installed.

RECOMMENDATIONS

1. It is recommended that all rafters, ledges and furnace tops be vacuum cleaned. The dust is a possible source of general air contamination. The recovery value alone may justify the work.

2. Extend the quencher hood. A hood extension would eliminate most of the spray as well as improve ventilation. The extension toward the mill floor could have a cut-out section at the top to allow manipulation of the rods with tongs.

TABLE I

DUST EXPOSURES - AUGUST 1950

Designation	No. of Men	Multiple of P.L.	No. of Men Times Multiple of P.L.
Foremen	2	1.18 (2.2)	2.36
Furnace	6	1.18 (.3)	6.98
Dragdown	2	1.11 (2.6)	2.22
Roll #1 East Side	4	2.26 (3.9)	9.04
Roll #2 " "	4	1.96 (4.8)	7.84
Roll #1 West "	4	1.24 (0.6)	4.96
Roll #2 " "	4	1.45 (2.4)	5.80
Straighteners	4	.99 (.9)	3.96
Quenchers	2	.72 (.8)	1.44
Dippers	4	2.49 (1.1)	9.96
Rod Stampers	2	0.68 (2.2)	1.36
Total	38		55.90

Average $\frac{55.90}{38} = 1.47 \times$ P. L.

TABLE II

URINE DATA

Name	Date Sample Obtained		
	May 23 (Post-Roll)	August 14 (Pre-Roll)	August 23 (Post-Roll)
W. Sherman	6	24	15
F. DeVos	18	37	13
B. Cook	0	17	33
C. Lake	0	33	16
R. Gantaka	-	102	12
J. Bigar		46	0
N. Frasier		35	17
E. Pencille		33	9
R. Bald		31	16
E. Cleary		28	15
T. Murphy		28	19
K. Welson		22	19
A. De Filippo		22	17
J. Casserra		18	17
F. Sims		18	17
G. Apolito		17	25
M. Spring		15	18
J. Stewart		16	18
E. Puccciny		33	-
D. Lake		28	-

TABLE III

COMPARISON OF STACK LOSSES

	Roughing Roll (250 m^3/min.)		Finishing Roll (200 m^3/ min.)	
	Jan.	Aug.	Jan.	Aug.
Average Concentration (mg/m^3)	8.75	7.4	5.1	11.4
Estimated Loss (g/day)	2220	2660	1225	3280
" " (lbs/day)	4.9	5.9	2.7	7.2

Total Estimated Loss

January - 7.6 lbs/day

August - 13.1 " "

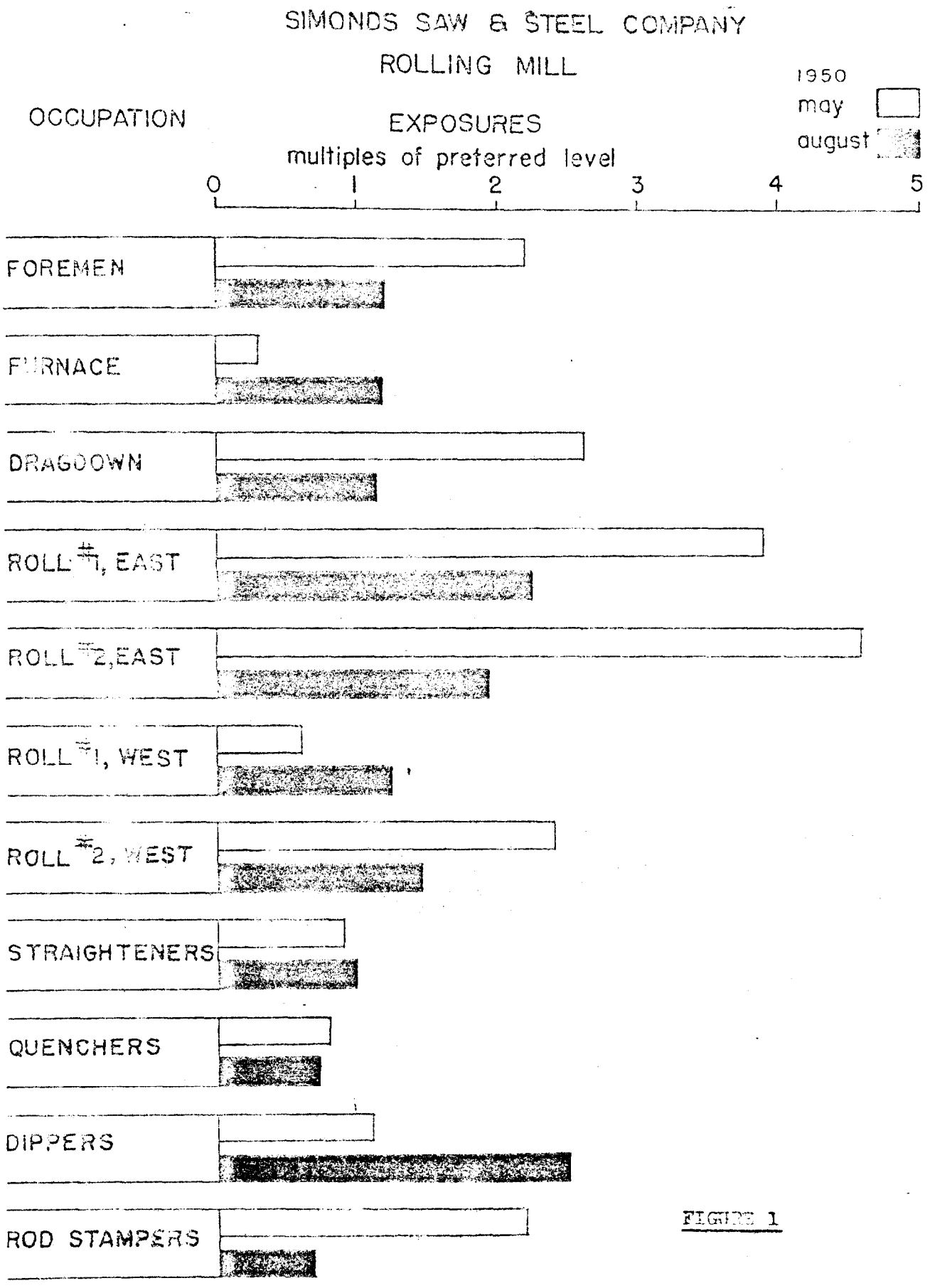
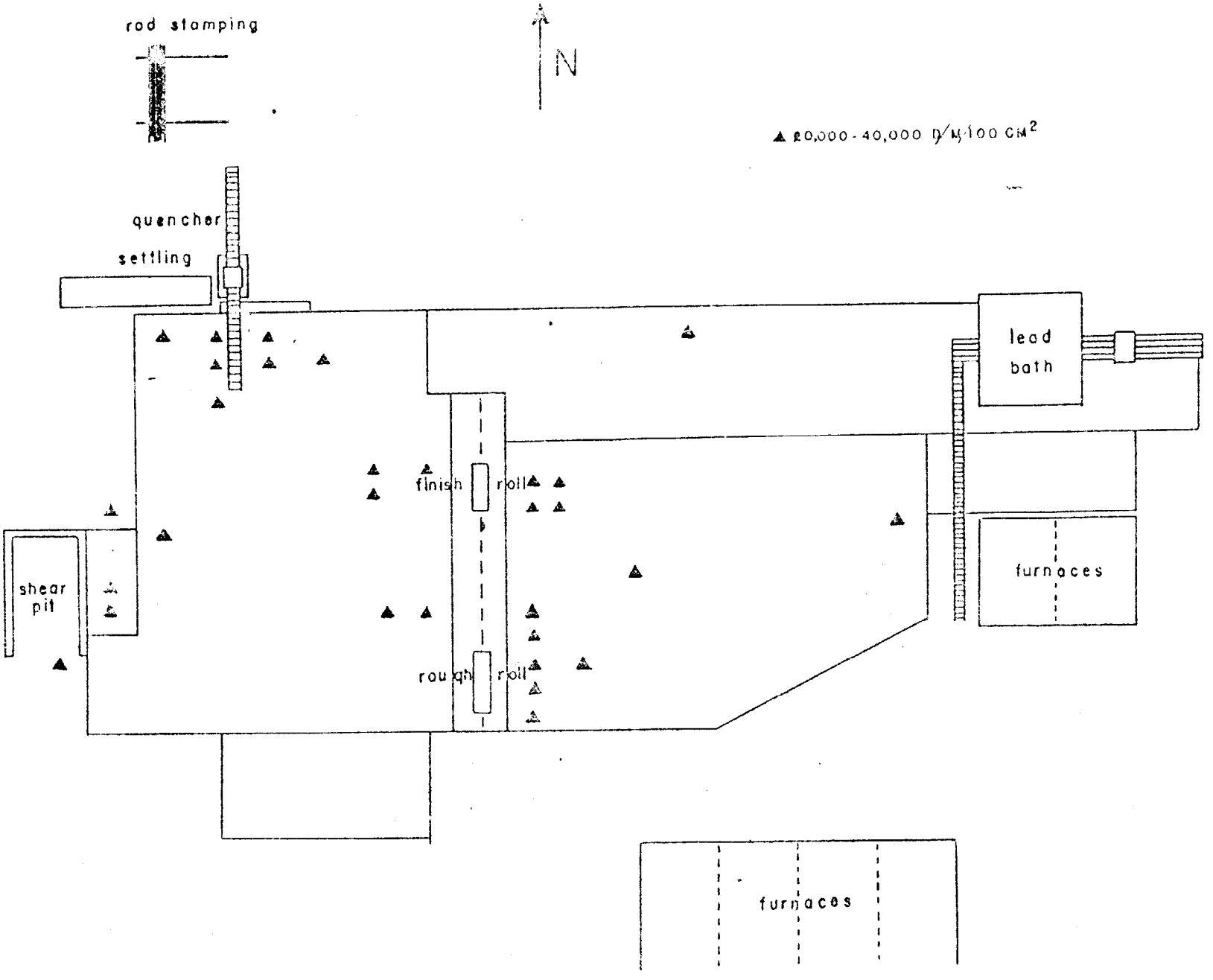

SIMONDS SAW & STEEL COMPANY
ROLLING MILL
1950
may
august
OCCUPATION
EXPOSURES
multiples of preferred level
0
1
2
3
4
5
FOREMEN
FURNACE
DRAGDOWN
ROLL #1, EAST
ROLL #2, EAST
ROLL #1, WEST
ROLL #2, WEST
STRAIGHTENERS
QUENCHERS
DIPPERS
ROD STAMPERS

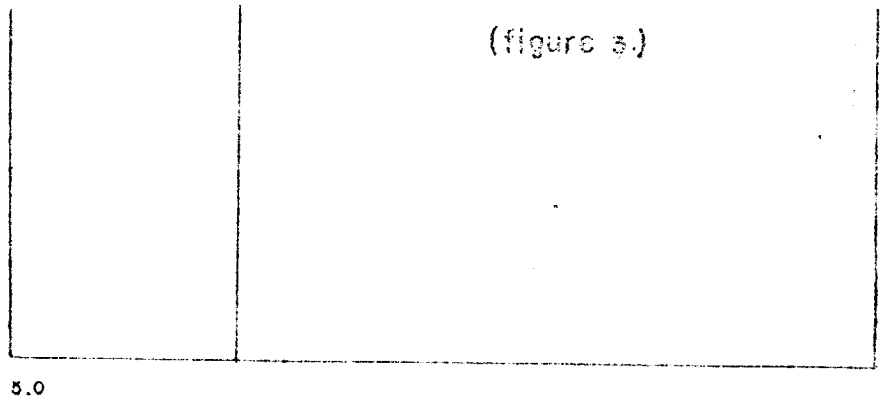
FIGURE 1

(figure 2.)

SIMONDS SAW & STEEL COMPANY

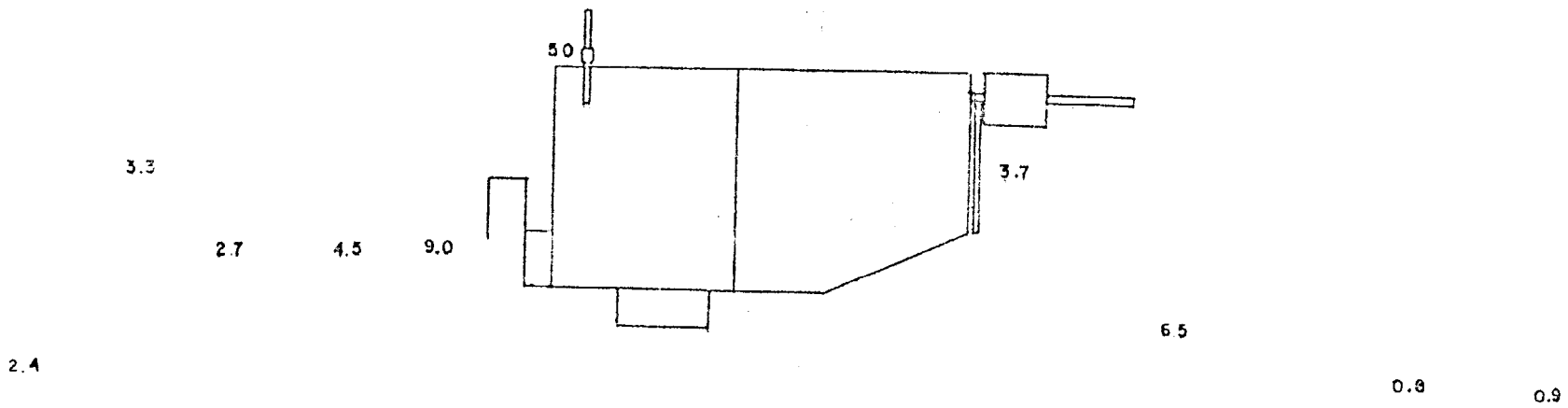
ROLLING MILL





ALPHA RADIATION

number times 1000 dis./min./100 cm^2



OPERATOR: FOREMAN 1 men/shift; ____ shifts/day; 2 men/day

Operation or Operating Area	Time per Opera. (min)	Opera. per Shift	Time Per Shift (min)(T)	No. of Samples	Concentration γ/m^3 Low	High	(C) Aver.	Con'c. Times Total Time (T X C)
1. G.A. East Side			330	7	15	113	58	19,300
2. G.A. West Side			180	5	4	80	36	6,480
3. G.A. Foreman's Area			90				118	10,620
4. G.A. Locker Room			30				24	720
	ΣT		630				$\Sigma (T \times C)$	37,120

$\Sigma \frac{(T \times C)}{\Sigma T}$ = 58.8 γ/m^3 = 1.13 Times the Maximum Allowable Concentration.

OPERATOR: FURNACE MEN 5 men/shift; ____ shifts/day; 5 men/day

Operation or Operating Area	Time per Opera. (min)	Opera. per Shift	Time Per Shift (min)(T)	No. of Samples	Concentration γ/m^3 Low	High	(C) Aver.	Con'c. Time Total Time (T X C)
1. Seven cold billets charged, seven heated billets discharged from lead bath	7.3	19	139	3	15	133	63	9,030
2. G.A. East Side			481	7	15	113	53	25,500
3. G.A. Locker Room			30				24	720
	ΣT		630			$\Sigma (T \times C)$		35,250

$\Sigma \frac{(T \times C)}{\Sigma T}$ = 56 γ/m^3 = 1.16 Times the Maximum Allowable Concentration.

OFFICIAL USE ONLY

SIMONDS - 10

SIMONDS SAW AND STEEL COMPANY

OCCUPATIONAL EXPOSURE TO RADIOACTIVE DUST

by

Richard C. Heatherton
Industrial Hygiene Branch
Health and Safety Division

Issued: March 20, 1951

Classification Cancelled
12/2/80

Distribution:

1 - File w/Sample Record Sheets
2 - Simonds
3 - Engineering & Const. (S. Brown)
4 - Tonawanda Sub-office (F. Epp)
5 - Production Division (F. Belmore)
6 - File ✓

U. S. Atomic Energy Commission
New York Operations Office
Health and Safety Division

OFFICIAL USE ONLY

TABLE OF CONTENTS

	Page
Scope	2
Purpose	2
Summary of Results	2
Tabulations	2
Table I	3
Table II	3
Discussion	3, 4

Figure 1 - Comparison of Dust Exposures
Aug. 1950 - Jan. 1951

APPENDIX A

Job Analysis Sheets

APPENDIX B

Sample Record Sheets

SCOPE

This is a report of the Industrial Hygiene survey made at Simonds on January 9 and 10, 1951. During the January rolling period, the following changes were made in the normal rolling procedure:

1. The last two of seven rods in each heat were finished with a continuous water stream wetting the rolls.

2. Dip quenching was used instead of pressure quenching.

PURPOSE

The purpose of the survey was to obtain information in order to:

1. Estimate job exposure to airborne uranium dust.

2. Determine if there was any difference in exposure which could be attributed to the change in rolling procedure.

3. Determine if there are any new sources of air contamination.

4. To make recommendations for correcting conditions which contribute to exposure.

SUMMARY OF RESULTS

In the January survey, 24 men in 7 job classifications, or 68% of the total number studied, had dust exposures which were higher than in the last previous survey. Twelve men in 3 job classifications had lower exposures. Any benefit derived from wetting the rolls while finishing was not noticeable in the dust results. Higher exposures to rod stampers are attributed to the substitution of dip quenching for pressure quenching.

TABULATIONS

1. Table I is a comparative summary of results of this and the last previous survey.

TABLE I

	Jan 1951 Survey	Aug 1950 Survey
No. of workers studied	38	38
% less than MAC	10.5	21
% 1 to 3 X MAC	68.5	79
% more than 3 X MAC	21.0	0
Average Exposure (multiple of MAC)		1.47
Highest Exposure (multiple of MAC)	18.9	2.5

2. Table II contains complete exposure data for the January survey.

TABLE II

Job Description	No. of Men	Multiple of MAC	No. of Men X Multiple of MAC
Foreman	2	1.63	3.26
Furnace Operators	6	1.63	9.78
Dragdown	2	1.80	3.60
Roll #1 East	4	12.40	49.60
Roll #2 East	4	18.90	75.60
Roll #1 West	4	0.97	3.88
Roll #2 West	4	1.07	4.28
Straightacers	4	1.15	4.60
Dippers	6	1.83	10.98
Rod Stampers	2	1.65	3.30
TOTAL	38		168.88

$$\text{Average Exposure} = \frac{168.88}{38} = 4.44 \text{ X MAC.}$$

3. Figure 1 depicts the exposures according to jobs for the August and January surveys.

DISCUSSION

High exposures to the East side rollers are mainly the result of having the plexiglass shields off the hoods over the rolls, thus decreasing the effectiveness of the hoods. There is also considerable evidence that the addition of water to the rolls increases the air contamination. This is due to an increased carry-off of fine fume in the steam cloud. Little significant value is given to differences in exposures of other East side workers - foreman, furnace operators and dragdown men. It is assumed their exposures would be somewhat greater because of higher general air contamination from dust which should have been removed at the rolls. There is

generally greater air movement from West to East in the Mill Area. For this reason, there is little change in exposures to West side rollers, straighteners and dippers.

When rods are dip quenched, there is more scale on the rods when they are removed from the quench tank. There was noticeably more oxide on the floor beneath the rods which had been stamped. The higher exposure to rod stampers and higher general air contamination in the quenching and rod stamping area are significant.

It was learned that the omission of shields on the hoods in the beginning was through oversight. After that, no one bothered to put them on. This situation is understandable. However, it is desirable not to have similar situations occur. It is recommended that ventilation and other prescribed dust control measures should be used throughout each rolling period. Changes or substitutions should not be made without notification to the Health and Safety Division.

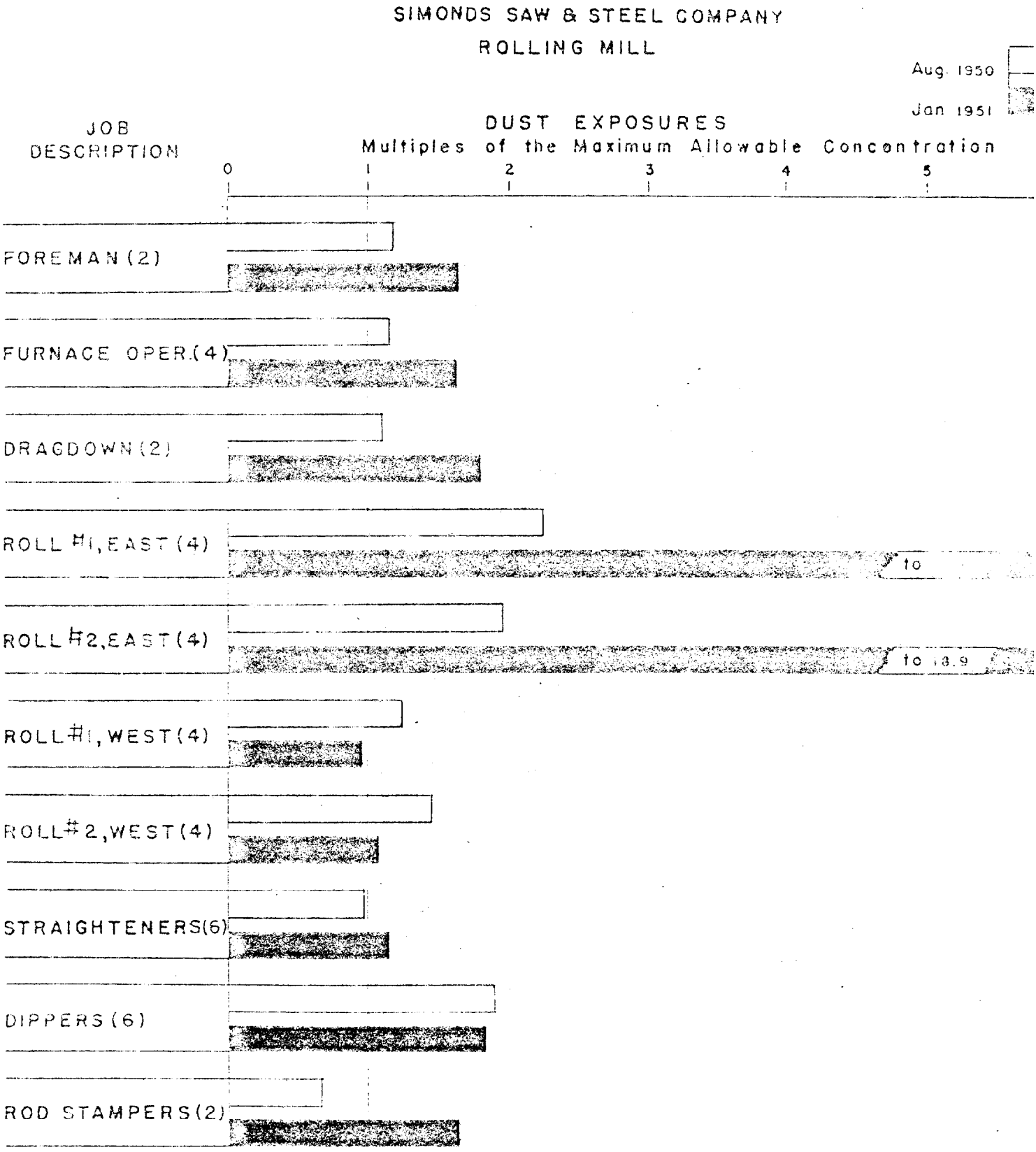

SIMONDS SAW & STEEL COMPANY
ROLLING MILL
Aug. 1950
Jan 1951
JOB DESCRIPTION
DUST EXPOSURES
Multiples of the Maximum Allowable Concentration
0
1
2
3
4
5
FOREMAN (2)
FURNACE OPER.(4)
DRAGDOWN (2)
ROLL #1, EAST (4)
to
ROLL #2, EAST (4)
to 13.9
ROLL #1, WEST (4)
ROLL #2, WEST (4)
STRAIGHTENERS (6)
DIPPERS (6)
ROD STAMPERS (2)

FIGURE I.

OFFICIAL USE ONLY

SIMONDS - 11

SIMONDS SAW AND STEEL COMPANY

OCCUPATIONAL EXPOSURE TO RADIOACTIVE DUST

by

Paul B. Klevin
Industrial Hygiene Branch
Health and Safety Division

Issued: October 12, 1951

KA Walter 12/2/80

P. F. Brown 12-2-80

Distribution:

1 - File
2 - Simonds
3 - Simonds
4 - Tonawanda Sub-office
(F. W. Malone)
5 - Production Division
(F. Belmore)
6 - File

U. S. Atomic Energy Commission
New York Operations Office
Health and Safety Division

OFFICIAL USE ONLY

TABLE OF CONTENTS

	Page
Scope	2
Purpose	2
Results of Study	2
Table I	2
Table II	3
Figure 1	4
Discussion	5
Figure 2	6
Conclusion	7
Appendix A	8
Appendix B - Job Analysis Sheets	
Appendix C - Sample Record Sheets	

SCOPE

This is a report on the semi-annual Industrial Hygiene survey conducted by Mr. P. B. Klovia at Simonds Saw and Steel Company on August 20-21, 1951. During this rolling period, normal rolling procedures were followed.

PURPOSE

The present study was made with the following objectives in mind:

1. To gather data from which an estimation of the daily weighted average exposure can be determined for all project personnel.

2. To compare personnel exposures with those obtained in previous surveys.

3. To determine if there are any new sources of airborne contamination and to make recommendations for correcting non-satisfactory conditions.

RESULTS OF STUDY

Of the forty-two plant employees studied, 30 (71.5%) are exposed to concentrations exceeding the maximum permissible alpha level. None, however were found to exceed 3 times the maximum permissible concentration. A complete breakdown of the daily weighted exposure of the rolling mill employees is as follows:

1. Table I is a comparative summary of this and the August 1950 survey.

TABLE I

	Survey 8/9/50	Present Survey 8/20/51
No. of Employees Studied	38	42
Average Exposure (times MAC)	1.47	1.48
Maximum Exposure	2.5	2.5
% of Personnel below MAC	21	28.5
% 1 to 2 times MAC	58	57
% 2 to 3 times MAC	21	14.5
% greater than 3 times MAC	0	0

2. Table II and Figure I summarize a comparison of the daily weighted personnel exposures over a 9½ hour day according to individual jobs.

TABLE II

SINDERS SAW AND STEEL - ROLLING MILL

Occupation	No. of Employees	Multiple of the Preferred Level		
		Survey 8/20/50	Survey 1/9/50	Survey 8/21/51
Foreman	2	1.18	1.63	2.1
Roller #1 West	4	1.24	0.97	1.88
Roller #1 East	4	2.26	12.4	1.77
Roller #2 West	4	1.45	1.07	1.63
Roller #2 East	4	1.96	18.9	2.5
Pressure Quencher	2	0.72	1.83	1.3
Rod Stamper	2	0.69	1.65	1.07
Drag Down	2	1.11	1.80	1.67
Billet Loader	2	---	---	1.13
Heater (Furnace man)	2	1.16	1.63	1.03
Heater Helper	2	---	---	1.8
Shearman	8	0.99	1.15	0.93
Weighers	4	---	---	0.81
	42			
AVERAGE EXPOSURE (X MAC)		1.47	4.44	1.40

WEIGHTED AVERAGE EXPOSURE (MAC)

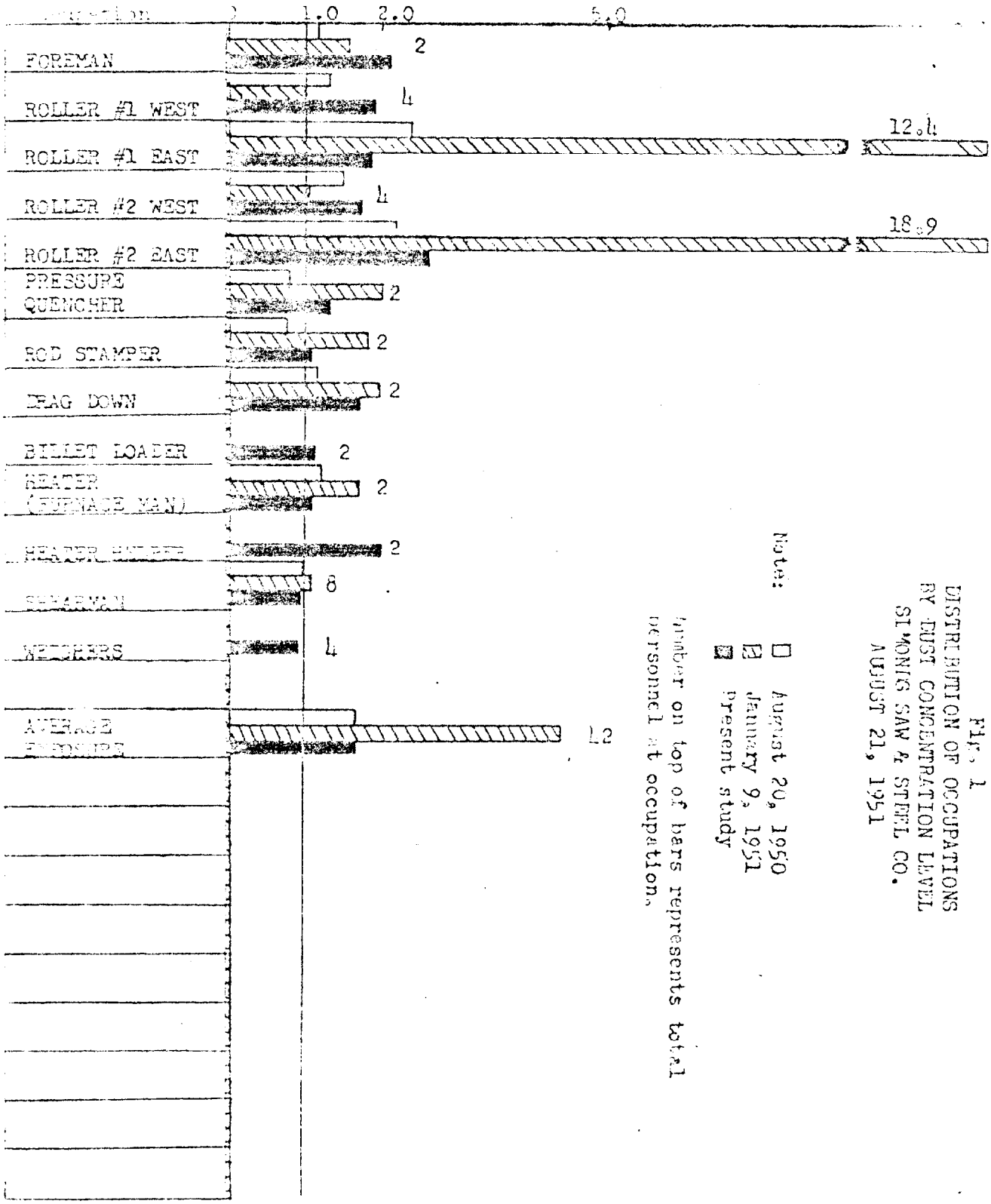


Fig. 1
DISTRIBUTION OF OCCUPATIONS
BY DUST CONCENTRATION LEVEL
SIMONIS SAW & STEEL CO.
AUGUST 21, 1951

DISCUSSION

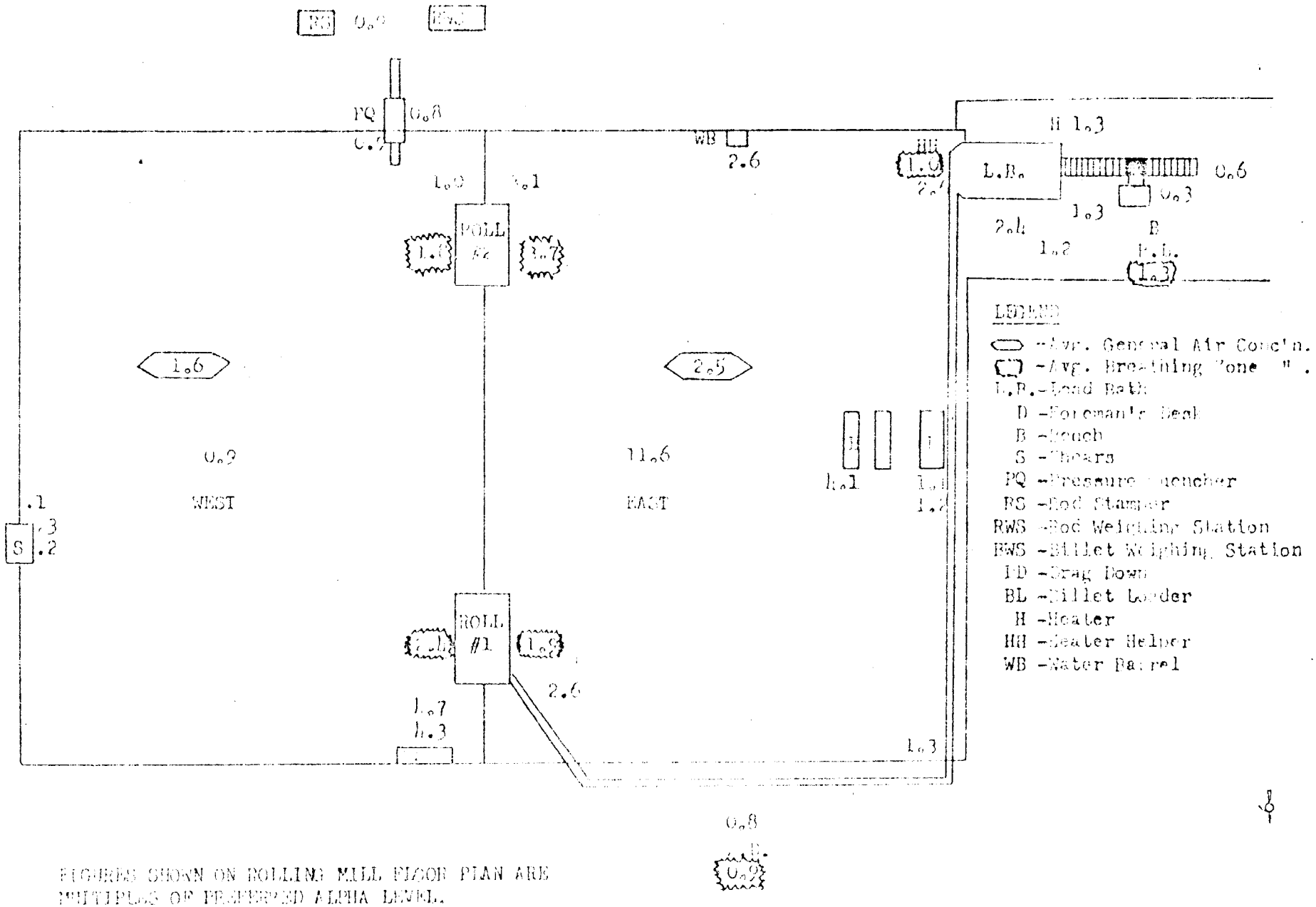
The results of this survey show no overall improvement in personnel exposures. The average exposure of 1.46 MAC found for the present survey compares to 1.47 MAC for the August 1950 survey. It should be pointed out, however, that significant reductions in personnel exposures were shown for Rollers #1 and 2 East personnel over the survey of January 1951. Daily weighted exposures of 1.77 and 2.5 MAC were found in the present study for Roller #1 and 2, respectively as compared to 12.4 and 18.9 MAC determined in January. This marked reduction in the East Roller's exposures is primarily due to the re-use of plexiglass head shields which were omitted at the time of the previous survey by oversight. These results show quite clearly the role of effective dust control measures in reducing airborne contamination.

In order to demonstrate how the daily weighted exposure of practically all rolling mill personnel can be reduced further without any major expense, a diagram showing the location of individual general air and operational breathing zone samples has been prepared. (See Figure 2)

Although during previous surveys there appears to have been an air stream blowing across the rolling mill area from West to East, the average of all the general air samples taken in both the East and West areas was in this case of the same order. The pattern depicted in Figure 2 signifies that the airborne contaminants were locally produced. For example, the lead bath area shows breathing zone and general air concentrations ranging from 0.3 MAC found for the billet storage area to 2.6 MAC found at the lead bath discharge. Broom sweeping observed at this location, in our opinion, was the prime contributor to the dust level found since operational breathing zone samples average only 1.0 MAC for 4 samples. Further evidence of airborne contamination was found at the center of the East Side mill floor and at the bench directly west of the Foreman's desk. Concentrations of 11.6 and 4.1 MAC found at the former and latter locations more than likely originated as the result of operators' constant tracking of dust from rolls to the bench and vice versa. One other operation which produced high general air and breathing zone samples was that of the Roller #1 West operation. Average of 3 breathing zone samples taken at this location was 2.4 MAC while the general air samples averaged 4.5 MAC. Removal of the grating from a position directly at the #1 West Roll to a location approximately two feet due west of the rolls is primarily responsible for these high concentrations. Constant pounding of the billets directly on the steel plate after the billets pass through the rolls, in addition to oxidized scale being released from the billets onto the floor create this unsatisfactory condition.

Fig. 2

PLANT LOCATION OF INDIVIDUAL DUST SAMPLES



FIGURES SHOWN ON ROLLING MILL FLOOR PLAN ARE MULTIPLES OF PREFERRED ALPHA LEVEL.

CONCLUSION

In order to reduce airborne contamination in operations and other areas frequented by rolling mill personnel, the following recommendations are presented:

1. Broom sweeping around the lead bath charging and discharging areas should be completely eliminated.

2. Vacuum clean the rolling areas, rod stamping, weighing and lead bath areas at least once each heat.

3. More powerful vacuum should be employed to remove material between the gratings in front of the rolls. This may be achieved by cleaning the dust collector or using a more powerful tool.

4. The practice of flinging small rod shearings (6" to 8" long) across the heat rolling area to the pressure quencher should be eliminated as it creates both a health and a safety hazard.

5. Common sanitary considerations dictate that two sets of coveralls should be issued to each man on the rolling crews for any rolling longer than 5 days. A uniform change every four days would eliminate the present practice of changing into their own clothes during the uranium rolling operation.

A copy of the above recommendations was transmitted to Mr. F. Holan directly after the completion of the Simonds rolling.

APPENDIX A

SIMONDS SAW & STEEL

Job		Day Shift	Night Shift
Foreman		Harold Kinsler	Lewis Malcolm
Heater		Ed Cook	Anthony DiNulla
Finishers			
East Side		Anthony Ventura Wayne S. Harman	Norman Frazer Geo. Albone
West Side		Ed Cleary Bob Litchfield	John Bigar Bill Spring
Roughers			
East Side		James Gardner Ralph Yates	Bill Eaustice Joe French, Jr.
West Side		Howard Glen Kurth	Fred Sims Warren Skye
Drag Down (Billet)		Charles Myrick	Walter Litchfield
Heater Helper		Ed Shelts	Dick Carey
Billet Loader		Clifford Lake	Wm. Bowers
Shearman		Daniel Polumbo	Earl Kaiser
Rod Draggers		Al Reese John Dodge Leslie Weyers	T. Murphy Jack Kanter Chester Walker
Pressure Quencher		Tom Winters	A. Tice
Rod Stacker		Carl San Marco	Angelo DeFilippo
Weighers	alternate at pressure quencher	(Robert Gorman (Hugh Gardner	Gilbert Peters Howard Simonds

SIMONDS - 12

SIMONDS SAW AND STEEL COMPANY

OCCUPATIONAL EXPOSURE TO URANIUM

by

Paul B. Klevin
and
Martin S. Weinstein
Industrial Hygiene Branch
Health and Safety Division

Issued: February 13, 1953

Distribution

1 - File (Health & Safety, NYOO)
2 - Production Division, NYOO
3 - Simonds Saw & Steel Company
4 - National Lead of Ohio
5 - National Lead of Ohio
6 - File (W. B. Harris, H&S)

U. S. Atomic Energy Commission
New York Operations Office
Health and Safety Division

TABLE OF CONTENTS

	Page
SCOPE	3
PURPOSE	3
RESULTS OF STUDY	3
DISCUSSION	4
CONCLUSIONS	6
TABLE I - Breakdown of daily weighted exposures	3
TABLE II - Comparison of daily weighted personnel exposures	4
TABLE III - Comparison of General Air and Breathing Zone Concentrations of Operations West of the Rolls	5
Figure 1 - Average Daily Weighted Exposure	
Figure 2 - Layout - Uranium Rolling Area	

APPENDIX A

List of Personnel

APPENDIX B

Job Analysis Sheets

APPENDIX C

Sample Record Sheets
(Copy 1 only)

SCOPE

This is to report the semi-annual Industrial Hygiene survey performed on December 9, 1952 at Simonds Saw and Steel Company, Lockport, New York. During this survey normal rolling procedures were followed (see previous Simonds reports).

PURPOSE

The survey was made with the following objectives:

1. To gather data from which to calculate the daily weighted average exposure of rolling mill personnel.

2. To compare personnel exposures with those obtained in the previous survey.

3. To recommend any necessary physical and procedural changes to correct sources of airborne contamination.

RESULTS OF STUDY

Of the forty-three plant employees studied, thirty-seven (86.5%) are exposed to concentrations exceeding the maximum permissible alpha level. The exposures of ten employees (23.5%) exceeded the maximum permissible level by a factor of three and eight (18.5%) by a factor of four. A complete breakdown of the daily weighted exposures of the 16" Bar Mill employees is as follows:

TABLE I

	Past Survey 8/20/51	Present Survey 12/9/52
Number of Employees Studied	42	43
Average Weighted Exposure (d/m/M3)*	104	147
Maximum Exposure (d/m/M3)	175	294
Less the 70 d/m/M3	12 (28.5%)	6 (13.5%)
70 to 140 d/m/M3	24 (57%)	21 (49.5%)
140 to 210 d/m/M3	6 (14.5%)	6 (13.5%)
Over 210 d/m/M3	0	10 (23.5%)

*d/m/M3 = disintegration per minute per cubic meter of air

70 d/m/M3 = maximum allowable concentration (MAC) tentatively used by the New York Operations Office.

Table II and Figure 1 summarize a comparison of the daily weighted personnel exposures over an 8 hour day according to individual jobs.

TABLE II

16" BAR MILL

Occupation	No. of Employees	Multiple of the Preferred Level	
		Survey 8/21/51	Survey 12/9/52
Foreman	2	2.1	1.4
Roller #1 - West	4	1.88	2.3
Roller #1 - East	4	1.77	1.7
Roller #2 - West	4	1.63	4.1
Roller #2 - East	4	2.5	1.4
Pressure Quencher	4	1.3	3.3
Rod Stamper	2	1.07	4.2
Drag Down	2	1.67	0.86
Billet Loader	2	1.13	0.93
Heater (Furnace Man)	2	1.03	1.1
Heater Helper	2	1.8	1.1
Shearman	7	0.93	1.8
Rod Weighers	2	0.81	2.5
Billet Weighers	2	----	0.93
	43		
Average Exposure (MAC)		1.48	2.1

DISCUSSION

The results of this survey show a slight recession of the personnel exposure standards. An average exposure of 2.1 MAC was found for the present survey as compared to 1.48 MAC found for the August 1951 survey. Significant increases in personnel exposure were shown for the Roller #2 - West, Pressure Quencher, Rod Stamper, and Rod Weigher personnel. Increases in the average daily weighted exposures from 1.63 to 4.1 MAC for Roller #2 - West, 1.02 to 4.2 MAC for Rod Stamper, 1.3 to 3.3 MAC for Pressure Quencher, and 0.81 to 2.5 MAC for Rod Weigher was found for this survey as compared to the August 1951 survey.

The increase in personnel exposure is primarily due to the increase in both general air and breathing zone concentrations at the operations West of the rolls. Table III compares the breathing zone and general air concentrations for this and the previous survey for the personnel showing significant increases in daily weighted exposures.

TABLE III

COMPARISON OF GENERAL AIR AND BREATHING ZONE CONCENTRATIONS OF OPERATIONS WEST OF THE ROLLS

Operation	Type of Av. Conc.	Past Survey 8/20/51	Present Survey 12/9/52
Rough Roll #1 - West	GA	110	131
	BZ*	269	160
		70	597
Finishing Roll #2 - West	GA	110	131
	BZ	125	560
Pressure Quencher	GA	60	198
	BZ	155	357
Rod Stamper	GA	60	370
	BZ	220	247
Shearman	GA	62	131

* Breathing zone samples taken for each of the two rolling passes.

In our survey report of August 1951 rolling this office stated that removal of grating from a position directly at the #1 West Roll to a location approximately two feet due west of the rolls is primarily responsible for high dust concentrations. During the present survey the same condition prevailed allowing for the pounding of billets directly on the steel plate floor after the billets pass through the rolls and in addition causing oxidized scale on the floor to become airborne. It was observed that broom sweeping prevailed in most areas and that vacuum cleanup of the mill areas were too infrequent especially in the pressure quench and rod stamping areas where oxide scale covered the floor area under the quench roller conveyer and the dirt area under the rod stamping operation.

Recommendations made in the August 1951 survey report included the following:

1. Elimination of broom sweeping in the lead bath charging and discharging areas.

2. Vacuum clean the rolling areas, rod stamping, weighing and lead bath areas at least once a heat.

These recommendations for reducing airborne contamination were not followed by the mill employees.

CONCLUSIONS

If a reduction in airborne contamination in operating area is to be attained the following procedures must be observed:

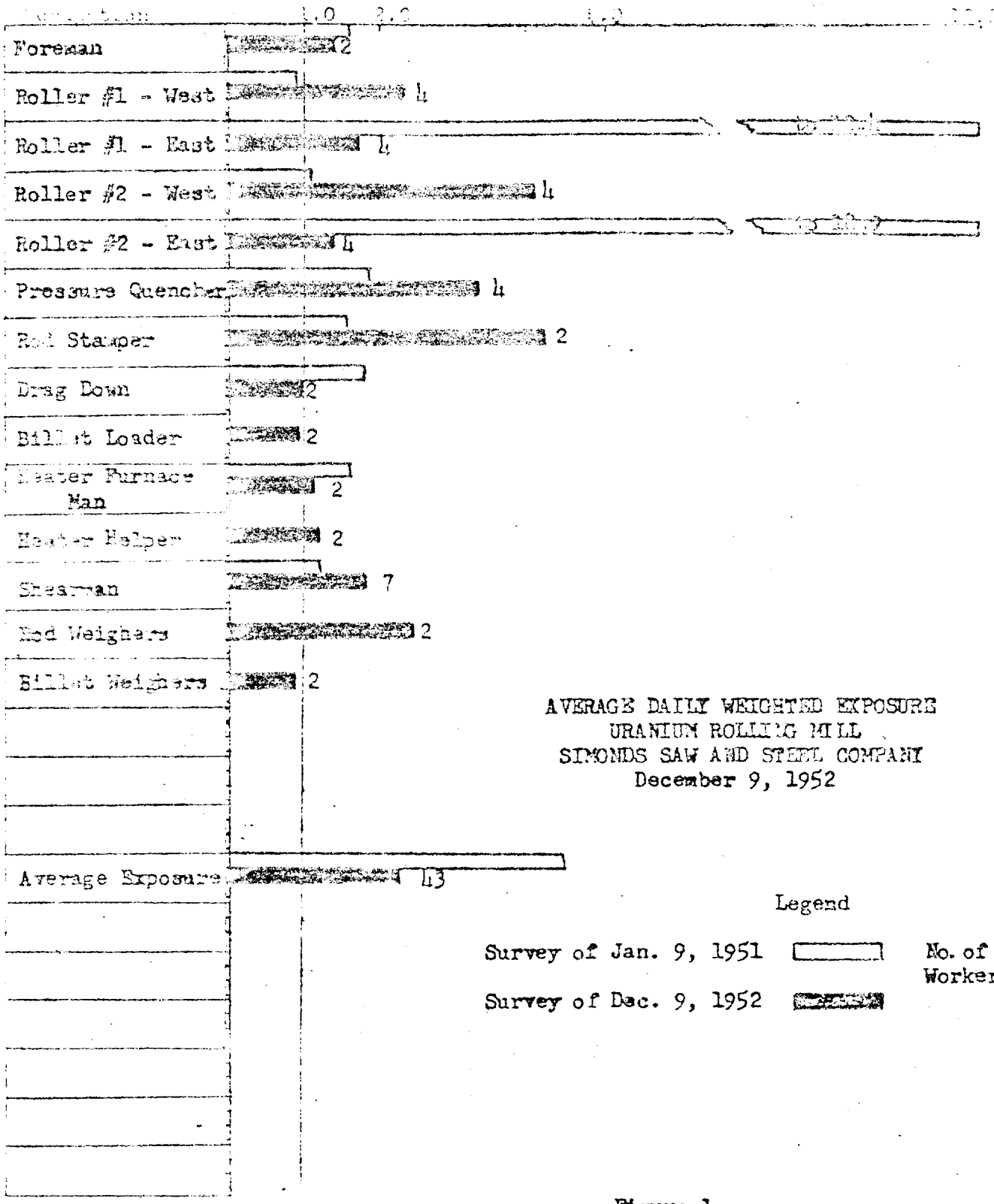
1. Vacuum clean the rolling areas, rod stamping, weighing and lead bath areas at least once a heat.

2. Broom sweeping around the lead bath charging and discharging areas should be completely eliminated.

3. Replace operating directly in front of #1 Rolls West. Install small rollers on grating so that rough rods can slide along over rolls unimpeded.

4. Repair gratings which have been flattened by the weighty rods.

WEIGHTED AVERAGE EXPOSURE (MAC)



AVERAGE DAILY WEIGHTED EXPOSURE
URANIUM ROLLING MILL
SIMONDS SAW AND STEEL COMPANY
December 9, 1952

Figure 1

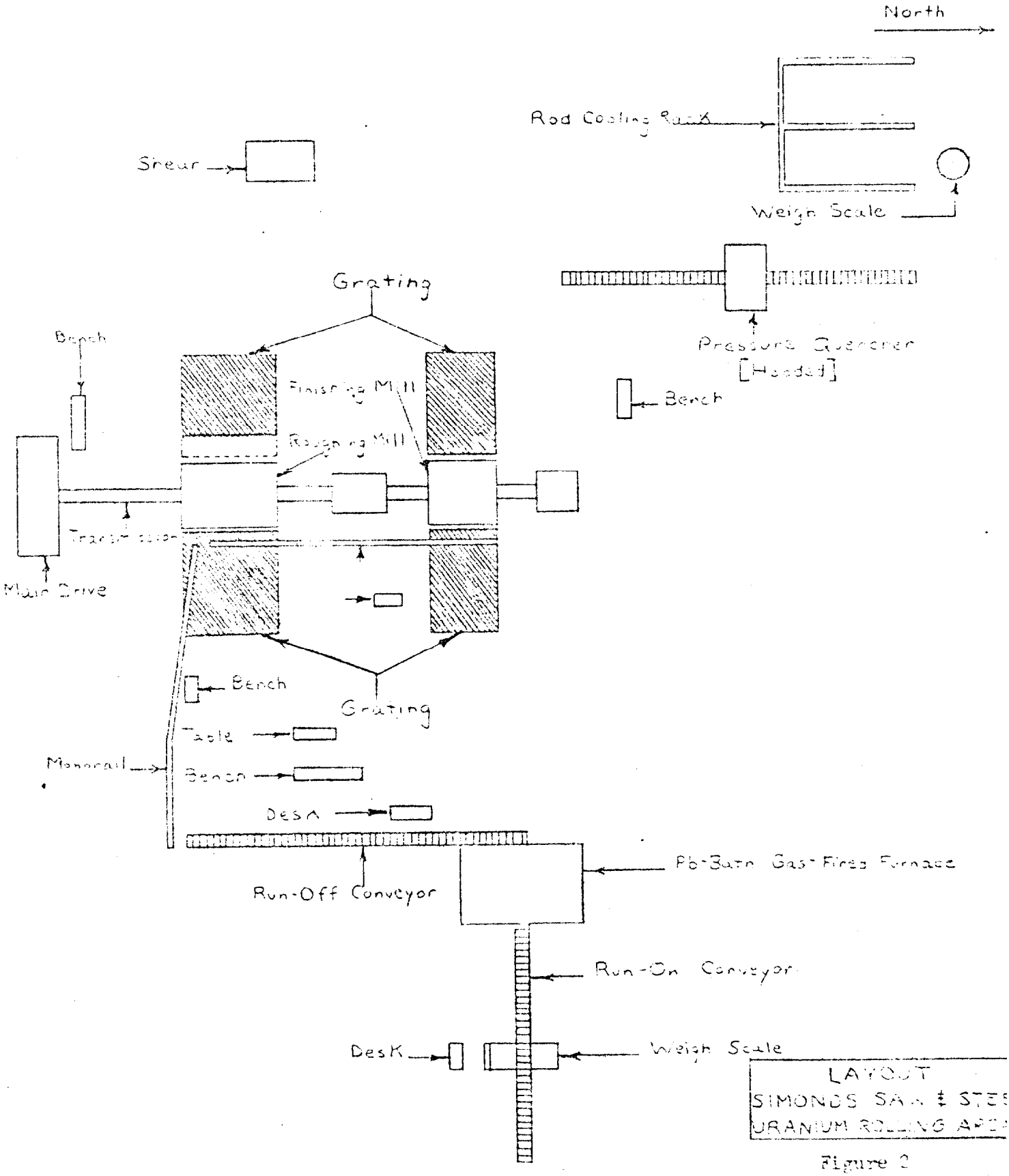

North
Rod Cooling Rack
Shear
Weigh Scale
Grating
Pressure Quencher
[Hooded]
Bench
Finishing Mill
Roughing Mill
Bench
Transmission
Main Drive
Bench
Grating
Table
Monorail
Bench
Desk
Pb-Bath Gas-Fired Furnace
Run-Off Conveyor
Run-On Conveyor
Desk
Weigh Scale
LAYOUT
SIMONDS SAW & STEEL
URANIUM ROLLING AREA

Figure 2

LIST OF PERSONNEL - 16" BAR MILL

December 9, 1952

JOB	DAY SHIFT	NIGHT SHIFT
Foreman	L. Malcolm	E. Cook
Heater	A. DiMillo	F. Devos
Roller #2 - East Side	A. Ventura W. Sherman	G. Albone N. Fraser
Roller #2 - West Side	R. Litchfield W. Weyman	R. Snow J. White
Roller #1 - East Side	J. Albone A. Reese	H. Croft A. Schilke
Roller #1 - West Side	J. Gardner G. Kurth	F. Sims F. Wiseman
Drag Down (Billet)	C. Myrick	B. Parker
Billet Loader	C. Kake	W. Bowers
Heater Helper	E. Schultz	R. Carey
Shearman	D. Palumbo	T. Moahr
Rod Draggers	W. Litchfield W. Spring R. Strang	A. Porter D. Munch
Pressure Quencher	W. Echlin P. Smith	L. Hatch R. Gibbons
Rod Stamper	N. Winters	A. DeFillippo
Billet Weigher	R. LaMont	G. Krause
Rod Weigher	H. Gardner	G. Appolito

OFFICIAL USE ONLY

SIMONDS - 13

SIMONDS SAW AND STEEL COMPANY

OCCUPATIONAL EXPOSURE TO THORIUM

by

Paul B. Klevin
and
Martin S. Weinstein
Industrial Hygiene Branch
Health and Safety Division

Issued: February 20, 1953

Classification Cancelled
~~Or Classified To~~
By ... K A Walter
By ... Date 12/2/80
J. T. Brown 12-2-80

Distribution

1 - File (Health & Safety, NYOO)
2 - Production Division, NYOO
3 - Simonds Saw and Steel Company
4 - National Lead of Ohio
5 - National Lead of Ohio
6 - File (W. B. Harris, H & S)

U. S. Atomic Energy Commission
New York Operations Office
Health and Safety Division

OFFICIAL USE ONLY

TABLE OF CONTENTS

	Page
SCOPE	3
PURPOSE	3
RESULTS OF STUDY	3
OPERATIONAL PROCESS AT THE 10" ROLLING MILL	5
DISCUSSION	6
CONCLUSION	6
TABLE I - Summary of daily weighted personnel exposures	3
TABLE II - 10" Rolling Mill Personnel	4
TABLE III - Pre-rolling and Rolling General Air Concentrations at 10" Mill	4

Figure 1 - Average Daily Weighted Exposure

Figure 2 - Layout of 10" Thorium Rolling Area

APPENDIX A

List of Personnel

APPENDIX B

Job Analysis Sheets

APPENDIX C

Sample Record Sheets
(Copy 1 only)

SCOPE

This is a report of a survey performed during the period November 24-25, 1952 at Simonds Saw and Steel Company, Lockport, New York. This initial survey of thorium billet rolling covered the health and safety problems existing during this rolling operation.

PURPOSE

This survey was made with the following objectives in mind:

1. To gather data from which to calculate the daily weighted average exposures of thorium rolling personnel.

2. To recommend to Simonds Saw and Steel any physical or procedural changes which should be made to correct estimated overexposures.

RESULTS OF STUDY

Tentative maximum permissible concentrations of 70 d/m/M3 for thorium has been used as a benchmark in this analysis.

All of the twenty mill employees studied were found to be exposed to concentrations exceeding the maximum permissible alpha level. Twelve (60%) of the 10" Bar Mill employees are exposed to concentrations greater than ten times the tentative preferred level. A complete breakdown of the daily weighted exposure of the rolling mill employees is as follows.

Table I is a summary of the daily weighted personnel exposures of this survey.

TABLE I

Number of Employees Studied	20
Average Weighted Exposure (d/m/M3)*	1030
Maximum Weighted Exposure (d/m/M3)	2800
Less than 70 d/m/M3	0
70 to 210 d/m/M3	3 (15%)
210 to 350 d/m/M3	1 (5%)
350 to 700 d/m/M3	4 (20%)
Over 700 d/m/M3	12 (60%)

* d/m/M3 = disintegration per minute per cubic meter of air

70 d/m/M3 = maximum allowable concentration (MAC) tentatively used by the New York Operations Office

Table II and Figure 1 summarize the individual average daily weighted thorium exposures over a 7 hour day according to individual jobs.

TABLE II

10" ROLLING MILL PERSONNEL

Occupation	Number of Employees	Av. Weighted Conc. d/m/m3
Furnace Heater	1	365
Furnace Helper	1	365
Billet Drag Down	1	245
Rougher - North	1	1470
Stranner - North	1	1820
Rougher - South	1	890
Stranner - South	1	890
Extra Roller	1	2380
Finisher - North	1	2800
Hookman - North	1	2800
Finisher - South	1	1120
Hookman - South	1	1120
Rod Drag Down	1	785
Rod Straightener	1	785
Rod Stamper	1	1065
Rod Shearer	3	154
Foreman	1	595
Assistant Foreman	1	595
Total Number of Employees	20	
Average Exposure		1030

Table III contains the pre-rolling and rolling general air concentrations found at specific locations in the 10" Mill area.

TABLE III

PRE-ROLLING AND ROLLING GENERAL AIR CONCENTRATIONS AT 10" MILL

Location	General Air Concentrations (d/m/m3) Pre-Rolling 11/24/52	Rolling 11/25/52
North of Gas-Fired Furnace	19	350
At Desk North of Gas-Fired Furnace	13	750

Table III - continued

Location	General Air Concentrations (d/m/m^3) Pre-Rolling 11/24/52	Rolling 11/25/52
At Large Bench North of Gas-Fired Furnace	70	110* 240**
6' N.E. of Roughing Roll	8	250
30' North of Center of Rolls	8	1200
6' N.W. of Finishing Roll	<1	490
60' N. of Finishing Roll (Rod Stamping Area)	<1	540
Rest Area South of Gas-Fired Furnace	9	119
6' S.W. of Finishing Roll	7	184
30' South of Center of Rolls	8	85
6' S.E. of Rough Roll	13	50
30' N.W. of Finishing Roll	9	150
N. Center - Directly in Front of Rolls	<1	4900
S. Center - Directly in Front of Rolls	9	4450
Locker Room - Wash Area	<1	<1
Locker Room - Center of Locker Area	<1	<1

* During lunch time - furnace closed

** During normal furnace operations

OPERATIONAL PROCESS AT THE 10" ROLLING MILL

A. Billets of thorium metal are heat in a gas-fired furnace to a suitable rolling temperature.

B. The billets are taken from the furnace by the drags down operator who conveys each billet to the roughing roll employing a pair of tongs from an overhead monorail.

C. The billets are passed through the roughing roll several times and then conveyed to the leader pass roll where a rod of tough dimensions is attained.

D. The rough rod is then passed through a finishing roll until a correct diameter rod is obtained.

E. The rods are dragged to the shears, cut in two, stamped, and then removed to a storage area where they are packed and crated.

DISCUSSION

In previous rollings at Simonds Saw and Steel the ventilated 16" Bar Mill was employed. However, for this rolling all of the 93 thorium billets processed were rolled in an unventilated 10" Bar Mill located southeast of the larger mill. From the data it is evident that the high concentrations found during this one day rolling was directly due to the lack of effective control measures. Aside from lack of suitable dust control measures for this operation which include local exhaust ventilation over the three rolls, floor gratings in front of the rolls and a central vacuum cleanup system, there were malpractices of good industrial hygiene procedures which contributed to the high alpha concentrations. These were:

(1) No cleanup during the entire rolling operation.

(2) Sweeping of steel plate floor area with brooms after completion of rolling.

(3) Stacking of thorium rods on flat steel bed of conveyor.

(4) Tracking of dust from the rolls to the rest areas.

The NYOO has been informed by National Lead of Ohio, administrator of the Simonds Saw and Steel contract, that uranium rolling on the 10" Bar Mill had been made prior to and after the present survey and that the mill is specifically used for special rollings for small size diameter rods required for reactor development. It was recommended by National Lead that if the 10" mill was to be used, the following should be done:

(a) Rollings should be performed on the weekend or when other plant personnel are not at work.

(b) Protective clothing should be worn by all mill personnel and visitors.

(c) All personnel in the mill area should wear respirators.

At the time of this thorium survey none of the above recommendations had been complied with.

CONCLUSION

In order to reduce airborne contamination in operations and other areas frequented by 10" Bar Mill personnel, the following recommendations are presented.

1. If special rollings of either uranium or thorium is to be a continuing function it will be advisable from both a health and accountability standpoint to:

   a) install suitable exhaust ventilation over each of the rolls with an adequate collector;

   b) employ a vacuum cleaner to remove material from the entire mill floor area;

   c) install floor grating over the entire rolling area or some other means to prevent scale or dust from being scuffed into the air;

   d) have all mill employees and visitors wear protective clothing;

   e) perform the rod stamping operation over a grating which should be installed on the extreme end of the conveyor;

   f) vacuum the entire area including the rod stamping and shear areas at least once a heat.

2. If infrequent rollings are to be done on the 10" mill:

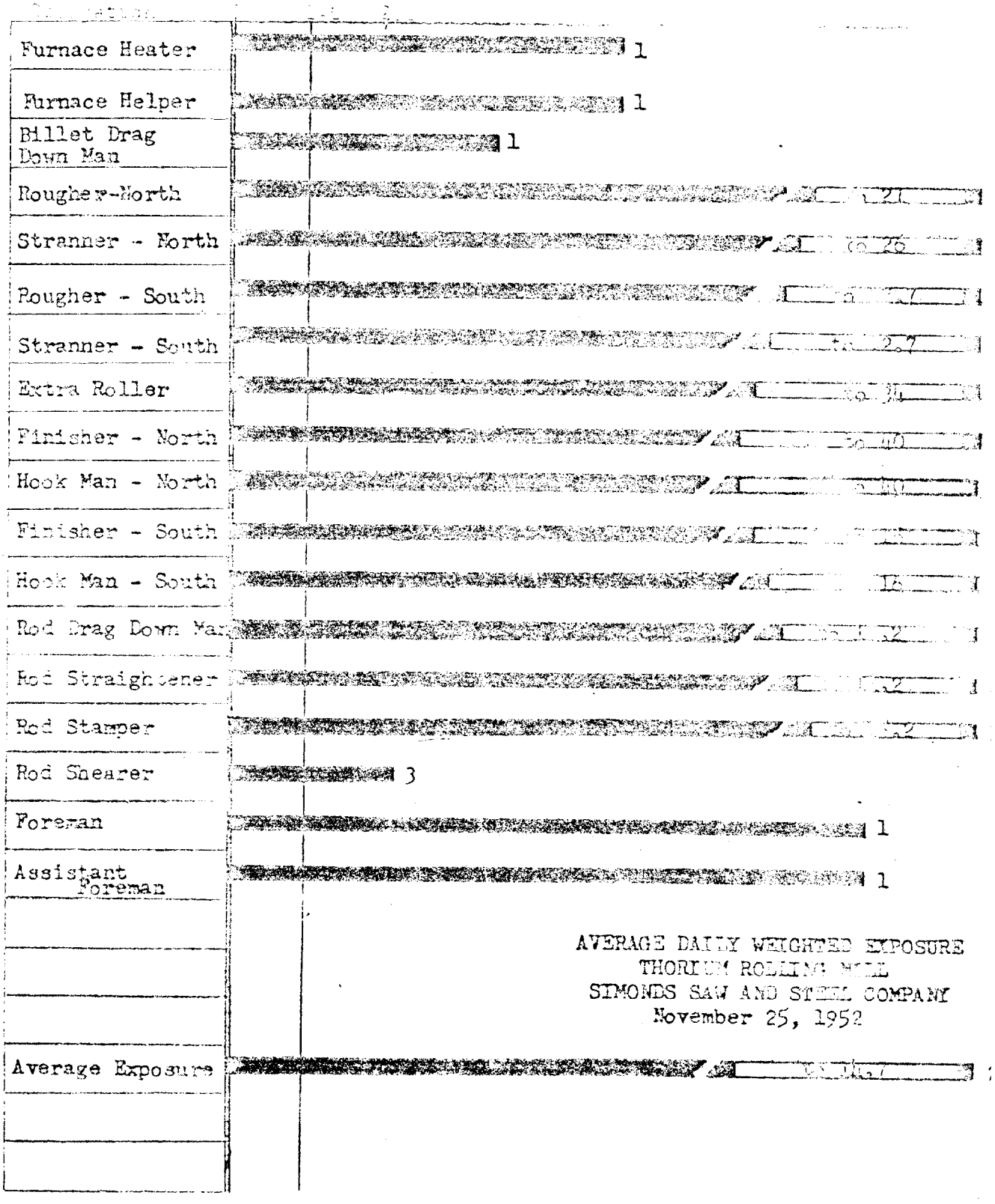
   a) rolling should be performed on a weekend or when no other plant personnel other than the 10" mill employees are at work;

   b) protective clothing should be worn by all mill personnel and visitors;

   c) showers should be required for all personnel working in the mill area;

   d) respirators should be worn by all personnel in the mill area;

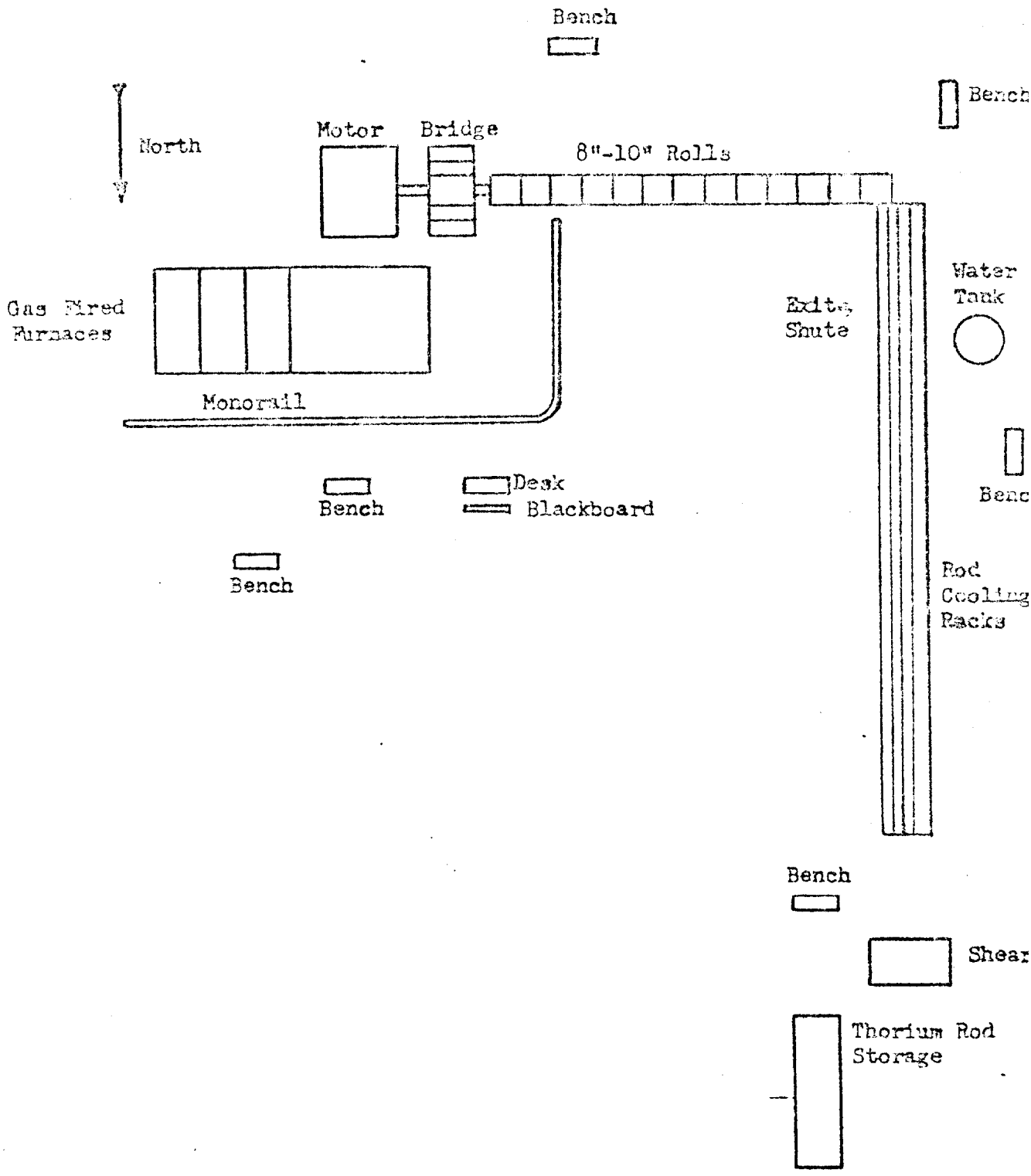
   e) eating and smoking should be curtailed in this area.



AVERAGE DAILY WEIGHTED EXPOSURE
THORIUM ROLLING MILL
SIMONDS SAW AND STEEL COMPANY
November 25, 1952

Number on top of bars represents total personnel at occupation.

Figure 1



LAYOUT OF 10" THORIUM ROLLING AREA
SIMONDS SAW AND STEEL COMPANY
LOCKPORT, NEW YORK

Figure 2

LIST OF PERSONNEL

JOB	
Furnace Heater	Walter Edgar
Furnace Helper	Howard Blackley
Drag Down (Billet)	Nicholas Coppola
Roughers - North Side -	Nelson Collopy (Rougher)
and Leader Pass Roll	Nelson Winters (Strenner)
Roughers - South Side -	Ralph Schultz (Rougher)
and Leader Pass Roll	John Babich (Strenner)
Finishers - North Side	Walter Winters (Finisher)
	Joseph D'Angelo (Hook Man)
Finishers - South Side	Arthur Newman (Finisher)
	John Dinnocenzo (Hook Man)
Drag Down (Rod)	Cleary
Rod Straightener	Tom Strong
Rod Stamper	Joe Tice
Shears	Joe Tyler
	Carmen Cassenti
	Carl San Marco
Extra Man	Anio Mabelo
Foreman	Frank Edgar
Assistant Foreman	Harold Kingler