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ACUTE BERYLLIUM TOXICITY - BRUSH BERYLLIUM COMPANY - LUCKEY EXPERIENCE

SYMBOL: HSI:WBH:hmh

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I have recently compiled a list of the verified cases of acute beryllium intoxication diagnosed by Brush during the year of 1950. Table I shows the individual cases by name, operation, significant material to which exposed, and degree of severity by classification. The following classification schedule is used:

A. Nasopharyngitis
B. Tracheitis
C. Tracheo Bronchitis
D. Pneumonitis.

In at least two of the cases, the exposure is somewhat obscure because of the general nature of the work assigned to the employee. In two other cases, there are two jobs which the individuals had from which the exposure might have arisen. Table II shows the distribution of cases by the main plant divisions of ore handling, sulphate handling, hydroxide, and fluoride, according to the month during which the cases occurred. In addition, there is a tabulation showing the total number of respiratory cases, the total number of dermal cases and the overall total of occupational disease by month.

From this table it can readily be seen that by far the greatest number of cases occurred in the fluoride handling operations where a minimum of 10 and a maximum of 13 cases are known to have occurred. A further breakdown of the fluoride operations indicates that of a possible 13 cases in the fluoride operations, 4 occurred in the wet metal plant, 4 occurred in the fluoride furnace operation, 1 on the reduction furnace, 2 cases were found in the ball milling step and 2 could not be allocated.

The above figures show that of a total of 17 verified cases occurring in the 12 month period, 8 cases or approximately 50% most probably occurred in either the fluoride furnace or the wet metal operations where there are 33 men employed. This would indicate that whereas the total operating force had an illness frequency of 10%, the frequency in these 2 operations is approximately 25%, while in the 4 fluoride steps of wet metal, fluoride furnace, reduction furnace and leaching, there were 54 men with an indicated frequency of 20%.

In view of the fact that by far the highest concentration of cases occurred in the month of July, with 5 respiratory and 15 dermal cases in that month, it was thought advisable to cull the samples reported during the months of June and July to determine the extent of exposure as found in our sampling. Table III shows a breakdown of the breathing zone and the general air samples as found in the reduction furnace, wet plant and fluoride furnace areas. Only one sample in all of those reported exceeds the maximum level which we have established for individual single samples. This was one sample obtained in the reduction furnace area which contained 27.3 of Be/m^3. During the same period only one general air sample exceeded twice the maximum allowable average concentration. This was also in the reduction furnace area.

In view of the lack of positive relationship between the samples and the illness, I made a similar breakdown of all samples taken in the fluoride area during the months from June through December 1950. Figure 4 shows the breathing zone samples during this period and Figure 5 shows the general air samples. In general, the interpretation of these tables appears to be that an excessive number of high samples were found only in the reduction furnace area with a relatively few high samples in other locations. The illness frequency appears to bear little relationship to the distribution of high sample results.

Although the data which have been presented here are not sufficient to be positively conclusive, certain tentative conclusions appear warranted:

1. Fluoride materials are undoubtedly significantly more toxic from the standpoint of acute disease than any other beryllium material now being handled at the Luckey plant.

2. It appears possible that Ammonium Beryllium Fluoride (encountered only in the wet plant and at the fluoride furnace) may be more toxic than any of the other fluoride compounds.

3. Unless our sampling results do not adequately portray the concentrations found in the plant, the maximum allowable levels which have been set for beryllium will have to be reduced before illness-free operation can be expected.

Enclosures:
Table I
Table II
Fig. 3
Fig. 4
Fig. 5

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TABLE I

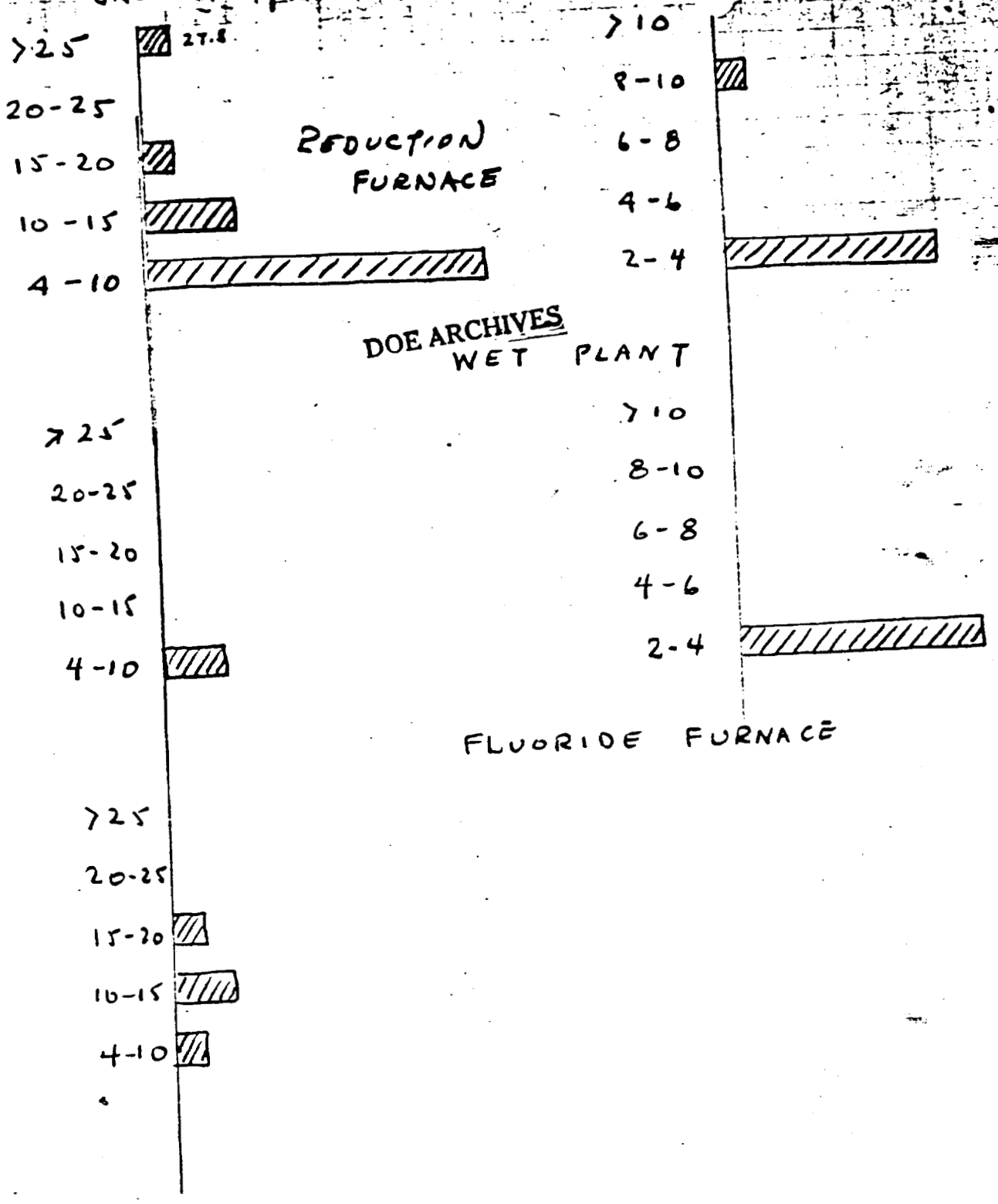
Name	Job	Material	Classification
		CH, F	D
		F	C
		F	C
		SO_4	C
		F	C-
		CH	C
		F	B
		F	B
		CH	C
		F	C
		F	B
		CH, F	D
		Beryl, F	C
		F	C
		F	C
		Beryl (?)	C
		F	C

TABLE II

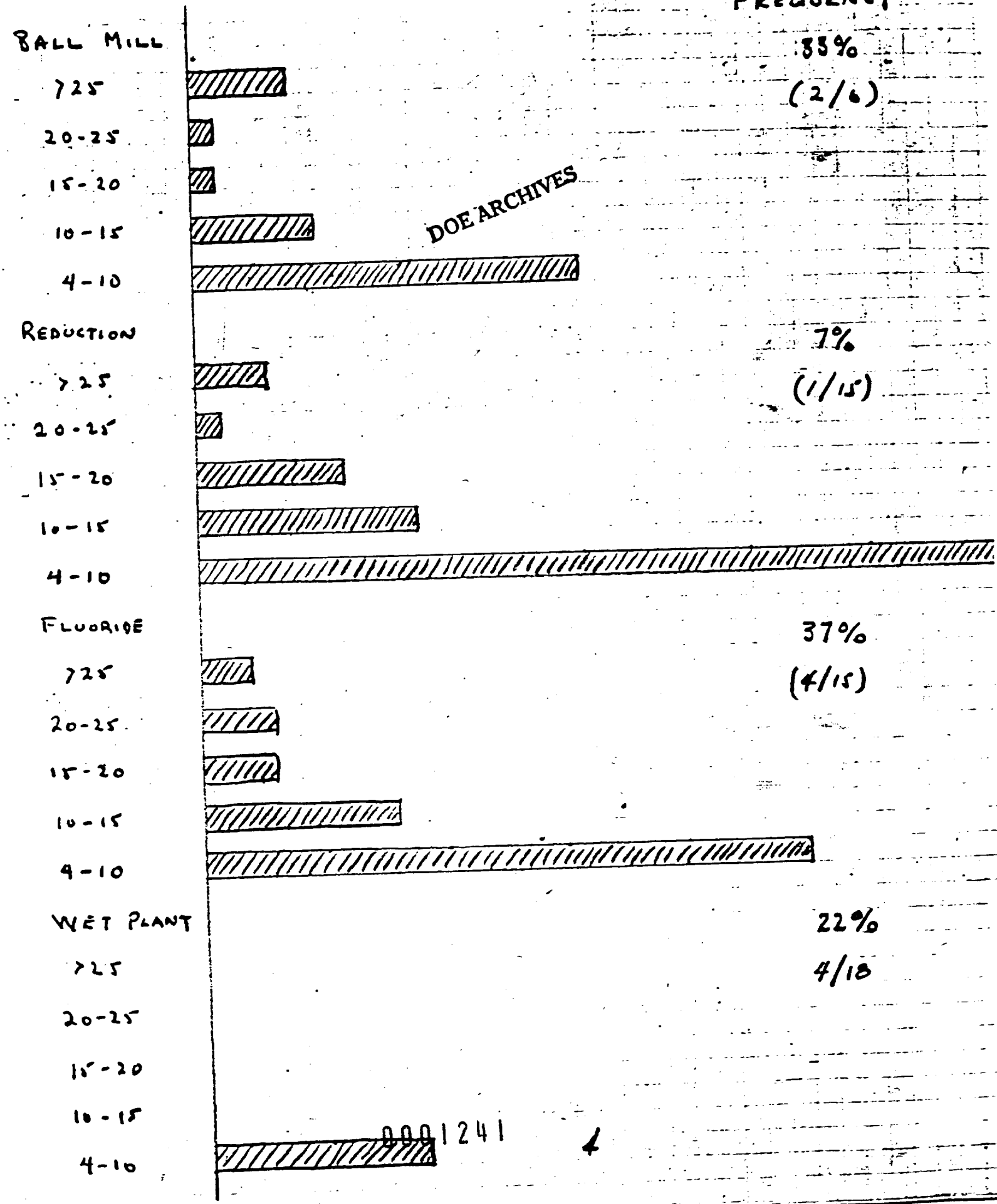
	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
Hydroxide	1	2			1						4 (+2)
Fluoride	1		1	1	5		3	1	1		13 (+3)
Sulfate handling								1			1
Ore handling							2				2 (+1)
Respiratory	1	2	1	1	5	0	4	2	1	0	17
Dermal				7	15	13	6	10	7	3	61
TOTAL	1	2	1	8	20	13	10	12	8	3	78

BREATHING ZONE - JUNE - JULY

GENERAL AIR



BREATHING ZONE SAMPLES - METAL PLANT - JUNE - DEC.



GENERAL AIR SAMPLES - META PLANT - JUNE-DEC