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URANIUM AIR DUST MONITORING AT ATLAS STEELS LIMITED, WELLAND, ONTARIO, NOVEMBER 6, 1963

by

C. H. McMAHON

MINERAL SCIENCES DIVISION

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SUMMARY OF RESULTS

Air dust samples were collected before, during and after the addition of uranium to steel. The uranium, wrapped in plastic, was contained in paper bags. It was added to the ladle in two lots of 50 lbs each during tapping.

Analytical results on the air dust samples collected indicated that the uranium in air concentration in the test area remained well below the maximum permissible level.

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* Senior Technician, Physics and Radiotracer Subdivision, Mineral Sciences Division, Mines Branch, Department of Mines and Technical Surveys, Ottawa, Canada.

INTRODUCTION

In the continuation of the uranium in steel programme at the Atlas Steels Foundry, Welland, Ontario, a heat test was conducted on November 6, 1963. The writer attended the test in order to collect air dust samples in the immediate area, before, during and after tapping and pouring operations. Mr. R.K. Buhr of the Physical Metallurgy Division, Mines Branch, attended to observe the metallurgical aspects of the test. The test was supervised by Mr. M.J. Kent, Project Supervisor, Atlas Steels Limited.

The heat No. 3227, SAE-8615, weight approximately 50 tons, was similar to a test heat of 13 tons made on August 9, 1963. The results of that test are covered in Mines Branch Investigation Report IR 63-98. The uranium alloy (99% depleted U + 1% Al) was added to the ladle during tapping.

AIR MONITORING PROCEDURE

Two Staplex filter sampler units (1) were used for air dust collection, and six samples were collected. Samples 1 and 2 were collected prior to tapping for background control. The No. 1 sampler unit was located on the pulpit in the area occupied by the furnace personnel. The No. 2 sampler unit was placed on the pouring platform. Each unit was mounted on a tripod base. Sample No. 3 was collected on the pulpit during tapping. The sampler unit was held by Mr. Kent who stood beside the furnace operator, who made the uranium additions. Sample No. 4 was collected on the pouring platform. The sampler unit was held by the writer close to the man operating the nozzle control lever during the pouring operations.

Samples No. 5 and 6 were collected on the pulpit and the pouring platform respectively to determine the background level in each area following the completion of the test.

OBSERVATIONS AND RESULTS

Tapping operations were completed in 4 minutes. The uranium was added in two lots, when the ladle was one-half full of metal. Mr. Kent, who monitored this operation for the writer, observed that a mild explosion took place when the second lot of uranium was added to the ladle. This he assumed could have been caused by a small amount of moisture in the added material.

Pouring operations, involving 15½ ingots, were completed in 30 minutes. The pouring was conducted in the most careful manner by the attending personnel, with the result that none of the metal was spilled in the immediate area. Atmospheric conditions during the test appeared satisfactory. The sky was overcast and inside the foundry a heavy haze, which existed prior to tapping, cleared appreciably during the test.

Three stream samples, taken during the pouring of ingots No. 1, No. 2 and No. 3, along with two slag samples were monitored for beta surface activity by the writer with a portable probe detector. The results on these tests are shown in Table 1.

The air dust filters were measured in the Mineral Sciences Laboratory for beta activity on November 8 and 12. Following this, a chemical uranium analysis was done on each sample. Results obtained are shown in Table 2.

Film badges were worn during the test by Mr. Kent, Mr. J. Matich, technical assistant to Mr. Kent, and the writer. These were sent to the Department of National Health and Welfare, Radiation Protection Division, for development. No radiation exposure was indicated on the badges.

The writer wishes to express his appreciation to Mr. Kent, Mr. Buhr and Mr. Matich for their assistance, and to the Atlas Steels Limited for the hospitality extended during this visit.

REFERENCE

1. Hi-Volume Air Samplers, using TFA No. 2133 Filters, from The Staplex Company, 777 Fifth Avenue, Brooklyn 32, New York, U.S.A.

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CMcM:DV

TABLE 1

Survey of Stream Samples

Sample	Total Counts per Minute					
	Top	Side 1	Side 2	Side 3	Side 4	Bottom
1	1800	85 - 100	--	--	--	75
2	350 - 460	140	130	150	130	90 - 100
3	180 - 220	100	150	160	180	80
Slag. Top from ladle	2000 total c/min					
Slag. Bottom from drip spoon	2000-2500 total c/min					
The background count = 70-75 c/min						

TABLE 2

Air Monitor Samples

Sample No.	Location	Sampling Time Nov.6	Exposure Time (min)	Approx. Volume Sampled (cu/ft)	Net Count Rate Beta (c/min)		Total Uranium (chemical) (μg)	U Concentration in Air (μg/cu ft)
					Nov.8am	Nov.12am		
1	On the pulpit, background prior to tapping.	9:30am - 10:11am	41	1865	17.9	14.3	2.5	0.0013
2	On the pouring platform, background prior to tapping.	9:41am - 9:56am	15	675	5.10	4.70	33.9	0.0502
3	On the pulpit during tapping.	10:15am - 10:23am	8	368	21.3	30.4	25.4	0.0690
4	On the pouring platform during the pouring operations.	10:20am-10:50.5am	30.5	1418	19.0	16.1	42.4	0.030
5	On the pulpit after tapping	10:25am - 10:55am	30	1350	19.6	16.4	17.0	0.0126
6	On the pouring platform after pouring was completed.	10:58am - 11:28am	30	1290	20.1	18.9	59.4	0.0460

Notes: (1) Maximum permissible dose of uranium in air = 5.6 μg/cu ft.
(2) Chemical analysis, by the fluorescent method in the Extraction Metallurgy Division.