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**NATIONAL LEAD COMPANY
OF OHIO**

P. O. BOX 188, MT. HEALTHY STATION
CINCINNATI 31, OHIO

April 23, 1956

SUBJECT TRIP REPORT TO KNOXVILLE IRON COMPANY, KNOXVILLE, TENNESSEE,
ON APRIL 20, 1956
TO J. A. Quigley, M.D.
FROM R. C. Heatherton

CENTRAL FILES

REFERENCE

OBJECTIVE OF TRIP:

The purpose of this trip was to look over facilities for melting steel scrap and to obtain information concerning available facilities in order to plan an Industrial Hygiene survey in conjunction with a test melt of contaminated scrap.

CONCLUSIONS AND RECOMMENDATIONS:

1. Considerable fuming was observed from a melt of ordinary steel scrap. In spite of the heavy fume from the furnace there was not a visible accumulation at lower levels or in the vicinity of the crane cab. Most of the fume was escaping from the monitored roof on the mill building. Sides of the building were open all around, thereby increasing the natural ventilation through the area.
2. I was assured from the appearance of the observed operations that the melt of contaminated stainless steel which was made for Union Carbide Nuclear Company, Oak Ridge, was much worse from the standpoint of visible fume; however, the survey results were satisfactory and it was reported there was no health hazard from the work.
3. I was assured that the amount of fume and the amount of uranium in the fume could be controlled to a certain extent.
4. It is concluded that a proposed test melt of approximately 50 ton of baled uranium contaminated scrap drums could be made without significant health hazard to employees or to persons residing in the vicinity of the mill.

BACKGROUND FOR TRIP:

Government regulations permit the sale of uranium contaminated ferrous metals, provided it can be monitored and that it meets requirements for maximum contamination levels. Most of our scrap steel is of a type and degree of contamination that it must be excluded from public sale. Steel drums, which exceed contamination limits, make up a large volume of our scrap.

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In recent months investigations have been made to see if there were smelters which could or would be made available for test melting of contaminated baled drums. The Knoxville Iron Company, which had done similar work with contaminated stainless steel, expressed an interest in making a test melt. Mr. Damewood of the Fernald Area office visited the Knoxville Iron Company for the purpose of discussing such a melt. At the present, a contract between National Lead and Knoxville Iron Company is being drawn up for conducting a test melt.

PERSON VISITED:

Mr. Ivan Ratscheff, President.

DESCRIPTION OF TRIP:

After meeting Mr. Ratscheff at the plant the afternoon of April 20 and explaining to him in some detail the purpose of my visit, I obtained the following information concerning the proposed process for the test melt.

1. The furnace which would be used is an electric arc furnace, taking a full charge of about seven tons. The top part of the furnace, through which the carbon-electrodes protrude, is removable. The scrap is loaded to the bottom section by electro-magnets or a bucket.
2. About two to three tons of the scrap metal is placed in the furnace at one time. The total time required for the scrap addition and melting is about 2-1/2 hours.
3. Upon completion of the melt, the top section of the furnace is raised. The bottom section is then tilted to pour the melt into a crucible. The pour is made from the bottom section through a pour hole into ingot molds. The ingot size can be varied--from 90 pounds to five tons.
4. A total of seven men are required for the operation. Three men are used on the furnace, and four are used in preparing the crucible and molds and making the pours.

Attached is a sketch showing the layout of the mill area with the furnace room at the north end of the mill. Scrap can be unloaded from a gondola car on the siding on the north or east side of the furnace area. From there it can be moved into the building, using a bucket.

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On this trip I observed the furnace in operation soon after the first charge was made and again near the end of the melt. I also observed the pouring operation. Although the fumes were quite heavy in the building, most of them were considerably above the floor level and were leaving the building via openings along the ridge. There was very little fume apparent near the crane cab.

Mr. Ratscheff commented that when the stainless steel melt was made for Union Carbide Nuclear Company, the fumes were much heavier than during the observed melt; however, there was no appreciable air contamination measured at the time of the carbide test.

He commented that the fumes from the stainless steel melt would be much denser than from a mild steel melt. He also commented that the fuming would depend to a certain extent on the way that the scrap had been prepared. The smaller the pieces and the more compact the scrap bundle, the less fuming would result. He seemed to think that the bales, which I described as weighing about 100 pounds each and compressed to about one cubic foot, would be ideal. He also commented that the retention of uranium in the slag would depend to a certain extent on the compactness of the scrap and on the furnace additions other than steel. He recommended that the size of the charge be kept below the seven ton limit and that sufficient limestone be added to make a good slag.

Although there could be considerable choice in the ingot size, Mr. Ratscheff recommended that the ingot should be about 390 pounds each.

He described to me their method of taking ladle samples and commented that as many samples as required could be taken; however, he felt that one sample taken while pouring the next to the last ingot would be most representative of each melt. The samples thus obtained could be prepared at their plant or shipped intact for preparation and analysis in our laboratory.

The slag from each melt is poured into a semi-spherical pot for cooling. Test borings will be required on each slag batch in order to obtain representative samples, which can be analyzed for uranium content.

Although there are ordinarily no facilities for using a 110 volt sampling pump in the melt area, this is being taken care of by the electricians in the mill at the request of Mr. Ratscheff.

J. A. Quigley, M.D.
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In order to adequately survey the entire operation and to obtain meaningful results, it is proposed to use two Industrial Hygienists for the survey work. They should report sufficiently in advance of the test to monitor the surfaces of the building and to obtain some background air samples. They will also monitor the unloading operation and follow the test melt throughout, and monitor for surface contamination and take air samples after the test melt and clean-up operations are accomplished. This will require that the two men be present for about two days.

ADDITIONAL COMMENTS:

Mr. Ratscheff was very cooperative in furnishing information concerning their process and the work which was done previously for Union Carbide Nuclear Company. He showed considerable interest in making our test melt and expressed a hope for running the remainder of our contaminated steel. Apparently there is sufficient need for scrap steel in that area that he would want our scrap.

He also requested that we send the clothing which will be worn by his people for the test melt in advance, so that they can be prepared for the unloading operation.

R. C. Heatherton
R. C. Heatherton

RCH:ljm

Attach.

cc: W. Damewood
W. A. Smith, Jr.
G. W. Wunder (2)
E. L. Alpaugh
Central File

*On back
trip to Hurrell* } *4/21*
*we are sure as not the
most desirable for this type of work
since OR work will go along. Our recom-
mendation for the future, however,
will be based on our own findings.*
Yag

