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**PROJECT COMPLETION REPORT FOR PROJECT P-20000-41 -
DISPOSAL OF COLD METAL OXIDES - (USED AS A REFERENCE IN
OU1 RI)**

05/27/63

P-20000-41
NLO DOE-FN
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REPORT

PRODUCTION ENGINEERING DEPARTMENT

PROJECT COMPLETION REPORT

CENTRAL FILES

C-7-1
C-7-1-1-5
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C-7-1

May 27, 1963

Project No. & Title: P-20000-41 - DISPOSAL OF COLD METAL OXIDES

Assigned To: P. D. Crothers On: 4/30/62 Date Closed: 11/15/62

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1. PROBLEM:

It was necessary to remove the metal oxide from the Plant 1 silos for shipment off-site. Arrangements for procurement and installation of materials handling equipment and shipping containers and co-ordination of the program was required.

2. CONCLUSIONS:

- 2.1 The use of paper bags for handling and shipping residues is a satisfactory low cost method providing the material flows well and the system is well ventilated.
- 2.2 The use of the silos in the Plant 1 area for long time storage of dry residues is satisfactory provided that, prior to filling, equipment is installed which will aid in the emptying of them (i.e. internal vibrators, pneumatic diaphragms, anti-bridging devices, etc.)
- 2.3 Airswept feeder valves and airvey systems are satisfactory material moving methods for low density dry residues. When using rotating feeders with powders, the shaft bearings should be isolated outboard of the seals and the seals should be of the gland or multiple chevron type rather than the lip type.

3. RECOMMENDATIONS:

- 3.1 If in the future it is decided to use the silos for long time storage, provision should be made before filling to assure that proper emptying equipment is internally installed in the silos to be used.

4. DESCRIPTION OF WORK:

Investigation was begun on approximately 1/15/62 upon the receipt of a letter from C. L. Karl to J. H. Noyes (Reference 1) which outlined the problem. This letter informed NLO of the possible sale of the material by the AEC. It requested information as to the cost, length of time, and method required to empty the silos and prepare the material for shipment excluding the use of metal drums.

Subsequent conversations with personnel of the AEC indicated that overseas shipment was also contemplated and that consideration should be made for this when choosing the method of shipment. NLO also was informed that the material would be shipped FOB Fernald.

An outline of three methods of removal with the attendant costs and removal times was presented to the AEC on 2/16/62 (Reference 5.4). The methods were as follows:

Sealed Railroad Hopper Cars

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1 cars were available at that time. A Dracco airvey system was ptying the silos and loading the cars. Cost was estimated at

6811

PROJECT COMPLETION REPORT
P-20000-41 - DISPOSAL OF COLD METAL OXIDES
May 27, 1963

\$25,000. Eight weeks removal time was estimated beginning with the start of installation of the Dracco system.

b. Paper Bags

With the use of a rental bagging machine the material would be placed in bags suitable for overseas shipment. The silos would be emptied by a Hoffman vacuum system available on site. Estimated cost was \$17,900. Estimated removal time was eight weeks.

c. Fiber Drums

This method was similar to the paper bag method except the material would have been placed in fiber drums. Estimated cost and removal time was \$36,750 and 15 weeks respectively.

On 4/10/62 the AEC issued Production Order B-409 specifying removal and shipment of the oxides by the paper bag method. The completion date was specified to be 60 days from start-up.

By 4/25/62 all engineering work had been completed and Purchase Orders issued for equipment. A Job Order Request was issued on 4/27/62 asking for completion of the survey installation, as per written instructions, by 5/25/62. This date was met.

Start-up began approximately 6/1/62. Several problems appeared immediately and were as follows:

1. The material as it came from the silos was quite lumpy causing difficulty in maintaining flow from the silos and to the surge bin.
2. Attachment of the bags to the bagging machine was difficult and tearing of the filler sleeve occurred. A smaller filler spout than usually used on the bagger with the size bag employed was required. The bagging company representative explained that since the bag was of very heavy construction for overseas shipment, its sheer bulk caused too much strain in the filler sleeve and that a smaller spout than ordinarily used was required to relieve the strain.
3. The shaft seals on the airswept feeder valve and the surge bin feeder valve failed. It appeared that the oxide, when confined and abraded in the proximity of the seals, caused a cake on the shafts with subsequent seal ruination. In the case of the airswept feeder, the resulting oxide leakage caused bearing failures also.
4. Control of the air supply to the airswept system was difficult due to it being hand operated. Variations in feed to the system caused surges which were uncontrollable. Consequently a pressure regulating valve was required.

Approximately one month was required to debug the system and little bagging was accomplished over this period. During that time chronic problems with the seals of the airswept feeder caused abandonment of it. Two of the original Sprout-Waldron feeder valves were reworked and installed to act as airswept valves. Their design

PROJECT COMPLETION REPORT
 P-20000-41 - DISPOSAL OF COLD METAL OXIDES
 May 27, 1963

eliminated the seal problem and their operation was satisfactory. Using two feeder valves simultaneously off of two silos made it possible to continue operation when material from one or the other silos was difficult to remove.

Full scale bagging was started on approximately 7/1/62. During this time continued removal and ventilation problems plagued the operation and constant attention was required to keep the system operating. The major problem was that of keeping the material flowing from the silos. Much rodding, prodding, probing, and hand manipulation was required.

All silos were emptied by 9/21/62: 23,153 bags of oxide (50# bags) were removed, or a total weight of approximately 1,400,000 lbs.

Following completion of the work, the rented bagging machine was steam cleaned of all residual oxide powder and returned to the Mead Corporation from whom it was obtained. All other associated equipment was removed, cleaned and put in storage or discarded.

5. REFERENCES:

- 5.1 Letter, C. L. Karl to J. H. Noyes, 1/10/62, "Disposal of Cold Metal Oxide Residues". C7-3
- 5.2 Letter, C. L. Karl to J. H. Noyes, 2/2/62, "Q-11 Metal Oxides". C7-3
- 5.3 Letter, C. L. Karl to J. H. Noyes, 2/18/62, "Disposal of Q-11 Oxides". C10
- 5.4 Letter, J. H. Noyes to C. L. Karl, 2/16/62, "Disposal of Metal Oxide Residues". 7.
- 5.5 Production Order B-409, 4/10/62, "Sale of Q-11 Oxides".

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