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CHARACTERISTIC HAZARDOUS WASTES GENERATED AT PRIMARY METAL SMELTING AND REFINING SITES

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MEMORANDUM

SUBJECT: How Typical are the Characteristic Hazardous Wastes Generated at Primary Metal Smelting and Refining Sites?

FROM: Frank A. Smith, Economist
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TO: John Lehman, Director
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This memo addresses the question of whether the characteristic wastes produced by primary nonferrous metal smelting and refining plants are different in quantity and locational aspects from the characteristic wastes generated by other manufacturing sectors. Three basic comparisons were conducted to answer this question:

(1) waste quantitities produced at individual sites,

(2) resident human populations residing within one and five mile radii from the plants, and

(3) populations served by public water supply systems located near (one and five miles) the generating sites.

The question of whether these wastes are more or less hazardous in terms of constituent concentrations will be addressed in a separate memo regarding toxicity scoring of smelting/refining wastes vs. other similar wastes. Hazardous smelting and refining plant wastes are typically hazardous due to presence of EP toxic metals and/or corrosivity levels.

The basis for comparison in the following summary of results is "all manufacturing sectors" (SIC 2000-3999) as represented by responses from EPA's 1982-83 mail questionnaire surveys of Generators and on-site TSD General waste handlers. Data for

smelting and refining are from OSW's 1984-85 surveys of selected smelting and refining sectors, including: aluminum, lead, zinc and zinc oxide, ferroalloys, titanium metal and titanium dioxide

(TiO_2). For the most part, these are the largest generators in the primary nonferrous metal sectors since they represent mostly the large volume metals producers.

Results

1. Quantity of Waste Generated

Table 1 compares the salient statistics for six primary nonferrous Smelting and Refining (S&R) sectors (1984) against the OSW 1982 TSD General Survey for manufacturing facilities. In terms of average waste per generator, the S&R's other than TiO_2 have a significantly lower mean (6,200 vs. 62,500 metric tons per year per facility) than that for all manufacturing. On the other hand, S&R's also exhibit a substantially higher median (3,800 vs. 300 tons), indicating that they typically fall above the median size among generators. However, 90 percent of these S&R's generate less than 25,000 tons per year, which is about on a par with the manufacturing sectors as a whole. Excluding TiO_2, the largest individual generators within these six S&R sectors produce characteristic wastes in the 30,000 to 36,000 ton per year range, compared with several million tons per year for the largest individual generators in some other sectors. Statistical estimates based on the TSD general survey indicate that there were about 250 manufacturing facilities in other sectors generating in excess of 36,000 tons per year in 1981.

In summary, two conclusions can be stated:

(1) Most primary nonferrous S&R facilities that generate characteristic hazardous waste produce larger quantities than do a majority of facilities in other sectors, but

(2) S&R generation rates are not extremely large in comparison to the larger waste generators in other sectors.

Titanium dioxide would constitute an exception to these findings. Rates of characteristic hazardous waste generation

for the generators in this sector are equivalent to the 85th to 99th percentiles of all waste generators.

What if all hazardous waste except for aluminum potliners is considered characteristic waste? The table below provides a brief comparison with the addition of copper to the list of sectors.

Table 1

Individual Facility Characteristic Hazardous Waste Generation Rates (Metric tons per year)

Hazardous Waste Statistics	1983 TSD survey	Six sectors	Primary Non-Ferrous Smelting and Refining Vectors* Aluminum	Zinc 02	Zinc alloys	Lead Metal	Ferro-Titantium	
Mean	62,545	5,791	4,325	10,150	23,595	11,246	4,900	,850
Median	269	3,800	1,920	8,380	23,595	9,710	5,300	,500
Minimum	<1	40	140	2,670	7,320	3,790	40	50
Maximum	>10,000,000	39,870	29,030	19,400	39,870	25,280	32,400	4,600
Total HW	234,784,000	341,670	103,800	30,450	47,190	56,230	93,000	11,000
Number of facilities	3750	59	24	3	2	5	19	6

	Six Sectors Per NPR	Seven Sectors	All Mfgr. Sectors
Number of facilities	59	74	3,754
Total H.W.	341,670	750,500	234,784,000
Mean H.W.	5,791	10,140	62,545
Median	3,800	4,600	169
Minimum	40	40	less than 1

Maximum	39,870	91,930	over 10 million

Essentially, the transfer of proposed listed wastes to the "characteristics" category does not change the conclusions. It adds a sector with substantial waste quantities (copper) and adds additional characteristic wastes to several facilities in the lead and zinc sectors. However, it only increases by four the number of facilities with wastes in excess of 30,000 tons per year.

Figure 1 provides a cumulative frequency distribution of facility hazardous waste quantities to illustrate the relation between the 74 S&R facilities and other manufacturing.

2. What if "Large Volume" is defined in terms of Sectors (industry groups) instead of individual facilities?

The 1982 TSD Generator Survey was analyzed in terms of individual four-digit Standard Industrial Classification (SIC) industry hazardous waste management quantities. Comparisons were then drawn between the 194 manufacturing sectors represented in the survey and seven of the larger nonferrous metal smelting and refining (S&R) sectors studied in the reinterpretation.

Sector Totals

The largest hazardous waste generating S&R sector was copper with 360,000 metric tons per year. Thirty-two (32) other individual manufacturing sectors (16 percent of all sectors) in the Office of Solid Waste 1983 Mail Survey reported larger hazardous waste quantities than copper. The second largest S&R sector in our sample of seven was aluminum with 104,000 metric tons per year (excluding potliners). Forty-eight (48) other manufacturing sectors, or 23 percent of all sectors, exceeded 104,000 tons per year of total hazardous waste. The average sector total for all seven S&R sectors was also about 104,000 tons per year.

The smallest S&R sector among the seven in terms of estimated hazardous waste was titanium metal with 11,000 tons per year. This was exceeded by 109 (56 percent) other manufacturing sectors and, in turn, was larger than 85 (44 percent) of the other non S&R sectors.

On the basis of these data, we conclude that the smelting

and refining waste quantities when viewed as sector totals are well within the "normal" range of sector hazardous waste quantities for all manufacturing categories.

3. Population and Proximity to Public Water Supplies

Smelting and refining facility locations were compared to locations of other generators based on the 1982 generator survey (HWDMS). Two types of comparisons were performed:

- Population density in the vicinity of the facility (one and five mile radius)

- Population served by public water supply intakes located within one and five mile radii.

Nonferrous smelting and refining sites are somewhat more rurally located than other generators. Average population living within one mile for S&R's was 4,500 vs. 11,800 for other generators; and within five miles average population was 51,000 vs. 198,000. The conclusion is not warranted, however, that S&R's are mainly located in remote areas: 75 percent of S&R's have a population of at least 7,500 within a mile, compared with 15,000 for other generators.

Regarding distance to public water supply intakes, 59 percent of S&R's showed a public water supply intake within one mile, vs. only 40 percent of all generators in the OSW generator survey. Both S&R's and all generators showed a public water supply intake within five miles for every facility in the respective samples. On average, the water supply system near S&R's served somewhat smaller populations (2,500 vs. 5,000 for systems with intakes located within a mile of the facilities).

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