TECHNICAL ENVIRONMENTAL IMPACTS
of Various Approaches for Regulating Small Volume Hazardous Waste Generators

PURSUANT TO THE RESOURCE CONSERVATION AND RECOVERY ACT OF 1976

VOLUME II. APPENDICES

PREPARED FOR

U.S. ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF SOLID WASTE
WASHINGTON, D.C. 20460

UNDER:

CONTRACT NO. 68-02-2613, WORK ASSIGNMENT NO. 27
AND
CONTRACT NO. 68-03-2560
WORK DIRECTIVES T-5012, T-5014 AND T-5015

DECEMBER 10, 1979

TRW ENVIRONMENTAL ENGINEERING DIVISION

TECHNICAL ENVIRONMENTAL IMPACTS
of Various Approaches for Regulating Small Volume Hazardous Waste Generators

PURSUANT TO THE RESOURCE CONSERVATION AND RECOVERY ACT OF 1976

VOLUME II. APPENDICES

PREPARED FOR

U.S. ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF SOLID WASTE
WASHINGTON, D.C. 20460

UNDER:

CONTRACT NO. 68-02-2613, WORK ASSIGNMENT NO. 27
AND
CONTRACT NO. 68-03-2560
WORK DIRECTIVES T-5012, T-5014 AND T-5015

DECEMBER 10, 1979

TRW *ENVIRONMENTAL ENGINEERING DIVISION*

KEY PROJECT PERSONNEL

Program Management and Technical Direction

M. Ghassemi

Data Analysis and Final Report Preparation

M. Ghassemi
K. Yu
K. Crawford
B. Edmondson
S. Quinlivan
R. Scofield

Data Base Development and Computerization

S. Quinlivan
M. Powers
B. Edmondson
J. Davis

Data Acquisition and Preparation of Assessment Summary Sheets

K. Crawford
H. Fisher
M. Ghassemi
S. Paige
P. Painter
S. Quinlivan
G. Richard
K. Scheyer
R. Scofield
A. Takata
C. Yu
K. Yu

APPENDICES

APPENDIX A - ASSESSMENT SUMMARY SHEETS FOR SIC'S ELIMINATED FROM CONSIDERATION AS SMALL VOLUME HAZARDOUS WASTE GENERATORS

APPENDIX B - ASSESSMENT SUMMARIES FOR SIC'S CONTAINING SMALL GENERATORS OF HAZARDOUS OR POTENTIALLY HAZARDOUS WASTES

APPENDIX C - MISCELLANEOUS SUPPORT DATA

CONTENTS

CONTENTS (CONTD)

CONTENTS (CONTD)

CONTENTS (CONTD)

CONTENTS (CONTD)

CONTENTS (CONTD)

CONTENTS FOR VOLUME I

CONTENTS FOR VOLUME I (CONTD)

APPENDIX A

ASSESSMENT SUMMARY SHEETS FOR SIC'S ELIMINATED FROM CONSIDERATION AS SMALL VOLUME HAZARDOUS WASTE GENERATORS

INDUSTRY: Annimal Services, Except Veterinary SIC: 075

ASSESSMENT SUMMARY:

Activities in this industry which may generate hazardous wastes are cattle spraying, sheep dipping and vaccinating of animals. Cattle spraying is primarily carried out by businesses engaged in the extermination of other pests as well, and thus is included in the assessment of SIC 7342. Except at slaughterhouses, dipping is reported to be an extremely rare event now which is only done in the case of such things as a scabies outbreak. No evidence of businesses engaged in non-veterinarian vaccinating of animals was found.

SUMMARY OF AVAILABLE DATA:

- State and county level agricultural officials indicated that dipping of animals was done as a preventive measure at slaughterhouses and in the case of an outbreak of a disease such as scabies. Outbreaks requiring dipping are very infrequent, only one has occurred in California in the last 10 years.
- Representatives of the American Veterinary Medical Association, California Department of Agriculture, and Los Angeles Agricultural Commission were not aware of any businesses other than veterinarians which were engaged in the vaccinating of animals. Vaccinations are reportedly done by either a veterinarian or the owner of the herd.

SOURCES OF INFORMATION USED:

(1) American Veterinary Medical Association

(2) Los Angeles County Agricultural Commission

(3) California State Department of Agriculture

INDUSTRY: General Building Contractors and Heavy Construction Contractors

SIC: 15,16 (except for "special trade")

ASSESSMENT SUMMARY:

Only the activities of the "special trade" section of SIC's 15 and 16 is expected to produce potentially hazardous wastes. The wastes from the special trades are addressed in connection with SIC 17, Construction - Special Trade Contractors (see Appendix B).

SUMMARY OF AVAILABLE DATA:

- Generally, firms engaged in the construction industry (major groups 15 and 16) have the potential to produce hazardous wastes. The majority of these hazardous wastes are produced by the "special trade" portion of the industry. About 75% of the special trade work (painting, roofing and sheet metals work, etc.) is carried out by the special trade firms in SIC 17 (Construction - Special Trade Contractors) which often work under a subcontract to the general contractors in SIC's 15 and 16; only 25% of the special trade work in the construction industry is carried out by the firms in SIC's 15 and 16. The wastes from special trade contractors are addressed in connection with SIC 17.
- Some small amounts of greases, oils, solvents and coolants will be generated from maintenance of construction equipment and vehicles. The nature of SIC 16, heavy construction, indicates that this portion of the industry could be expected to produce significant amounts of such maintenance wastes. However, there is no data currently available which delineates whether the maintenance of these equipment and vehicles is performed by the contractor's firm or by a public maintenance shop. The latter would constitute classification of these wastes under SIC 7538 or 7539.

SOURCES OF INFORMATION USED:

- National Association of Home Builders
- American Building Contractors Association
- Associated General Contractors of America

INDUSTRY: Tobacco Manufacturers SIC: 21

ASSESSMENT SUMMARY

No hazardous wastes are generated by the plants in this industry. The solid wastes generated are primarily tobacco dust (which is sold or sent to landfills) and "paper" products such as labels, cotton, packaging material, etc.

SUMMARY OF AVAILABLE DATA:

- This SIC includes establishments engaged in manufacturing cigarettes (SIC 2111), cigars (SIC 2121), smoking and chewing tobacco and snuff (SIC 2131) and tobacco stemming and redrying (SIC 2141).
- Tobacco processing in general, and manufacture of cigarettes (SIC 2111) in particular, is essentially the same for all plants and consists of "assembling/packaging" a "finished" product into marketable items; in the process certain flavoring agents may be added to certain brands. The "assembling/packaging" consisting of (a) addition of steam to aged and dry tobacco in a blending operation where various grades of tobacco are mixed to achieve different quality products, (b) machine cutting, (c) drying (to about 13% moisture content) and (d) packaging. Liquid waste is the steam condensate which is sent to drain; the solid wastes are tobacco dust (at one plant, collected by bag filters and sent to landfill) and paper waste (labels, cotton filter, etc.).
- Tobacco dust is also the only process waste produced in manufacture of cigars (SIC 2121). The tobacco dust is sold (to a "customer" at the one plant contacted); in addition to tobacco, the only other material used is a paste ("imported") which is applied to cigars to hold the head "down." About 450 kg/mo (1000 lb/mo) of tobacco dust is produced at one plant which employs 50 people and has an annual sales of $775,000.
- Tobacco redrying (SIC 2141) is a seasonal operation. Tobacco is purchased from a warehouse and "chopped" and dried. Tobacco dust is the only waste. One plant contacted employs 400 people during processing season and only 15 people during off-season.

SIC: 21

SOURCES OF INFORMATION USED:

- The Tobacco Institute
- Three individual establishments

INDUSTRY: Apparel and Other Finished Products Made from Fabrics and Similar Materials   SIC: 23

ASSESSMENT SUMMARY:

Waste generated by the subject industry ("cutting room" floor waste consisting of discarded fabric materials) is not generally considered hazardous. However, since leather trimmings/fines have been shown to release heavy metals to water during leaching, wastes from certain establishments in SIC's 2371, 2381, 2386 and 2387 which manufacture leather goods, may be potentially hazardous. In the absence of more substantiated data on hazardous characteristics (if any) of leather trimmings/fines, these wastes have been considered nonhazardous for the purpose of this assessment. The leather trimmings are separated from the other wastes; that portion which can be reused is sold and the fine "powdery" waste which can not be reused is disposed of as refuse.

SUMMARY OF AVAILABLE DATA:

- This industry, known as cutting-up and needle trades, includes establishments producing clothing and fabricating products by cutting and sewing purchased woven or knit textile fabrics and related materials such as leather, rubberized fabrics, plastics and furs.
- SIC's 2371 (Fur Goods), 2381 (Dress and Work Gloves), 2386 (Leather and Sheep Lined Clothing) and 2387 (Apparel Belts):
  - Some plants in these SIC's produce leather-containing goods and hence generates wastes containing leather fines and discarded trimmings.
  - Because of the value of leather, the scraps which can be potentially reused are separated from other wastes at the source and sold for reuse (e.g., manufacture of pieced-leather garments). Segregation at the source is apparently no problem. The leather pieces which cannot be reused (leather "fines") are disposed of with regular refuse and taken to refuse disposal site.
  - Because of a significant rise in the price of leather in recent years, plants are now using increasing care to reduce wastage.
  - One plant involved in the wholesale and manufacture of men's and boys' belts employs 58 people, has annual sales of $2.5MM and generates about one "dumper" per week of leather wastes, which is sent to landfill disposal. One plant which is involved in the manufacture and retail sales of fur goods employs 16 persons (no waste quantity data available).

- Other 4-digit SIC's in the SIC 23 Category

  - The cutting room floor waste reflects the characteristics of the original cloth/fabric; no chemicals are used in the operation.
  - About 6% of the fabric (raw material) is wasted as the cutting room floor waste; typical plant employing 150 to 300 employees produces about 18,000 kg/mo (40,000 lb/mo) of waste.
  - Excluding the "custom" making plants (which may number as much as several thousands), there are an estimated 35,000 to 45,000 plants in the industry; about 90% of these plants are in the 150- to 350-employee size range. Employments in few plants may be as high as 7,000-8,000.
  - Because of large quantities and nature of waste, waste disposal is a major problem for the industry. When single-material fabric (e.g., 100% wool, cotton, etc.) are used, the waste can be sent to recycling (production of new fabrics); when mixed-material fabrics (e.g., cotton-polyester) are used, the waste cannot be processed for reuse. Waste segregation (i.e., separation of recyclable wastes) at the source is essential to effective waste management. Disposal in open dumps and landfills is currently the prevalent waste disposal practice. Waste incineration is known to be in practice in at least one large plant.

SOURCES OF INFORMATION USED:

- American Apparel Manufacturing Association
- Three individual establishments

INDUSTRY: Hardwood Veneer, Plywood and Glued Wood Products   SIC: 243,2492,2499

ASSESSMENT SUMMARY:

The large quantities of wood-derived solid wastes generated by firms manufacturing veneers, plywood, particle board and other glued products, are not considered hazardous. For certain smaller volume products which are coated (e.g., paneling), wastes resulting from coating operations may be hazardous but are likely to be generated by most firms in quantities greater than 5000 kg/mo.

SUMMARY OF AVAILABLE DATA:

- The subject SIC's cover establishments primarily engaged in manufacturing millwork, veneer, plywood and structural wood members (SIC 243); particleboard (SIC 2492); and wood products, not elsewhere classified (SIC 2499).
- The major wastes generated by firms in SIC's 243, 2492 and 2499* which manufacture glued wood products (e.g., veneers, plywood, particleboard, etc.) are wood-derived containing small amounts of solidified glue resins which are not considered hazardous. The glue application process is generally conducted in a nearly "closed" system with most of the cleanup wastes recycled to next batch of resin mix. Waste material not recycled eventually become components of the wastewater treatment sludges. For softwood plywood phenolic formaldehyde resins are employeed; for hardwood plywood urea formaldehyde resins are used. Any resin containing wastes which are relatively dry are burned with wood wastes as fuel at most plants.

SOURCES OF INFORMATION USED:

- American Plywood Association
- Hardwood Plywood Manufacturers Association
- Effluent Guidelines Division of EPA

---

*Establishments engaged in the production of paneling and related material which are not classified elsewhere are considered to be included in this SIC; such establishments may employ solvent coating (and hence would generate hazardous wastes) are addressed elsewhere in this report.

SIC: 243, etc.

- Development Document for Proposed Effluent Limitations Guidelines and New Source Performance Standards for the Wet Storage, Sawmills, Particle Board and Insulation Board Segment of the Timber Products Processing Point Source Category, EPA 440/1-74/033, August 1974
- One industry consultant

INDUSTRY: Paper and Allied Products SIC: 2611,2621,2631, 2646,2661

ASSESSMENT SUMMARY:

Although large quantities of solid wastes are generated by pulp and paper mills, the bulk of these wastes would not be considered hazardous. Certain wastes such as wastewater treatment sludges, green and white water dregs, lime muds, residues from wood waste incineration, and slaker rejects may be hazardous due to the presence of heavy metals and toxic organics. Available information indicates that even the small mills in the subject SIC's would generate more than 5000 kg/mo of such potentially hazardous waste.

SUMMARY OF AVAILABLE DATA:

- The subject SIC's cover the following establishments: pulp mills (SIC 2611); paper mills, except building paper mills (SIC 2621); paperboard mills (SIC 2631); pressed and molded pulp goods (SIC 2646); and building paper and building board mills (SIC 2661).

- Large quantities of nonhazardous wood and bark wastes are generated by pulp mills and integrated pulp and paper mills. It is estimated that about 10% of the incoming wood ends up as waste of this kind. The industry trend is toward incineration of these wastes onsite with heat recovery for process use.

- Wastewater treatment sludges are the largest volume hazardous waste generated by firms in the subject industry. Estimates for quantities of wastewater treatment sludges from the smallest integrated pulp and paper mills are shown in Table 1. From these estimates it appears that even the smallest integrated mills would generate WWT sludges in amounts greater than 5000 kg/mo. (It should be noted that the sludge quantities shown in the table are on a "dry solids" basis, and that on a "wet solids" basis the sludge quantities would be perhaps 20 to 30 times as much as those shown in the table.) Estimates of wastewater treatment sludges for the paper mills also indicate that the smallest of such mills should produce sludge quantities in excess of 5000 kg/mo.

- Tests conducted on a number of pulp and paper mill sludge samples by the National Council for Air and Stream Improvement indicate that some sludges may be considered hazardous due to the leachability of

TABLE 1. ESTIMATED WWT SLUDGES QUANTITIES FOR SMALLEST MILLS

Mill Category	Production Capacity tonne/day (ton/day)	Sludge Generation kg/tonne (lbs/ton) dry solids	kg/mo dry solids
Kraft paperboard, packaging, papers, newsprint, tissue	222 (245)	31 (62)	207,000
Kraft coated and uncoated papers	27 (30)	68 (136)	56,000
Sulfite tissue and paper	91 (100)	46 (92)	125,000
Groundwood newsprint, coated and uncoated papers	834 (920)	56 (112)	30,000
NSSC/semi-chemical	N/A	12 (24)	N/A
Deinked tissue, coated and uncoated papers	37 (41)	156 (312)	174,000
Recycled paperboard	27 (30)	16 (32)	13,000
Nonintegrated papers	11 (12)	30 (60)	9,800
Nonintegrated tissue	6 (7)	54 (108)	10,000
Nonintegrated tissue from wastepaper	N/A	209 (418)	N/A

metal or due to aquatic toxicity. Sludge characteristics can be highly variable from mill to mill.

- Chemical pulping wastes such as green liquor dregs, slaker rejects and unburned lime kiln rejects are produced by all pulping operations. Approximate quantities produced are estimated at 15-20 kg/tonne of product. The smallest mill producing 30 tonnes/day of product would generate about 13,00-18,000 kg/mo of chemical pulping wastes. These wastes may be considered hazardous due to their alkaline nature and presence of leachable heavy metals.
- Wastes from repulping (secondary fiber reclamation) are estimated at around 93 kg/tonne of product. The smallest mill with a production capacity of 30 tonnes/day would generate about 80,000 kg/mo of pulp wastes. Repulping wastes contain a wide variety of materials, many of which may be considered hazardous (inks, pigments, binders, etc.).
- No data are available for mills engaged in the production of pressed and molded pulp goods (SIC 2646) although it appears likely that such mills would generate wastewater treatment sludges in amounts similar to mills manufacturing other pulp products.
- No data are currently available for mills engaged in production of building paper and building board (SIC 2661). Since the major difference between such mills and other fine and tissue paper mills is the addition of additive or filler materials to the paper or pulp (e.g., asbestos, asphalt), it appears that such mills would generate wastewater treatment sludges in amounts similar to mills manufacturing other papers. Sludges from mills in SIC 2661 would likely contain hazardous substances derived from additives, coatings or fillers.
- Most solid wastes and sludges in the industry are disposed of by land application or landfilling with no special precautions. Combustible wastes are increasingly being incinerated at modern mills. Chemical wastes from pulping are often combined with aqueous mill wastes for treatment and thus become components of WWT sludges.

SOURCES OF DATA USED:

- Hazardous Waste Listings: Pulp and Paper Mills Draft Report by Enviro Control Inc. to OSW/EPA, March 1979
- Development Documents for Effluent Limitation Guidelines - Pulp, Paper, and Paperboard Category, EPA 440/1-74/025a and 400/1-76/047a and b
- Draft Report on Economics of Hazardous Waste Disposal in Several Industries, Energy Resources Co. for OSW/EPA, 1979
- Economic Impacts of Pulp and Paper Industry Compliance with Environmental Regulations, A. D. Little for EPA, May 1977
- Solid Waste Management Practices in the Pulp and Paper Industry, EPA Contract 68-03-0207, February 1974
- Effluent Guidelines Division of EPA
- OSW/EPA
- National Council of the Paper Industry for Air and Stream Improvement (NCASI)

INDUSTRY: Converted Paper and Paperboard Products SIC: 2642,2643,2645, 2647,2648,2649, 265

ASSESSMENT SUMMARY:

Because of the nature of their production operation, establishments in the subject SIC's are not expected to product wastes of a hazardous nature.

SUMMARY OF AVAILABLE DATA:

- Establishments in the subject SIC are primarily engaged in production of envelopes (SIC 2642); bags, except textile bags (SIC 2643); die-cut paper and paperboard and cardboard (SIC 2645); pressed and molded pulp goods (SIC 2646); sanitary paper products (SIC 2647); stationary, tablets and related products (SIC 2648); converted paper and paperboard products, not elsewhere classified (SIC 2649); and paperboard containers and boxes (SIC 265).

- Establishments in the subject SIC's are engaged in manufacturing finished paper products from purchased paper or paperboard. The operations involved are often mechanical (folding, cutting, stamping, molding) and do not result in the generation of wastewaters or wastewater treatment sludges. Solid wastes generally consist of non-hazardous paper scrap.

SOURCES OF INFORMATION USED:

- Effluent Guidelines Division of EPA

- Hazardous Waste Listings: Pulp and Paper Mills, Draft Report by Enviro Control, Inc. for EPA, March 1979

- National Council of the Paper Industry for Air and Stream Improvement (NCASI)

INDUSTRY: Lubricating Oils and Greases (except blenders and compounders*) SIC: 2992

ASSESSMENT SUMMARY:

The lubricating oil and grease rerefining industry (one of the subcategories in SIC 2992) is well characterized and all data agree that these facilities are large hazardous waste generators. The smallest of the 24 to 27 rerefiners currently operating has a production capacity of 250,000 gal/yr. OPerating at 80% capacity in 1975, this facility would have generated over 30,000 lbs/mo of sludge and 750 lbs/mo of spent clay. Based on this quantity, rerefiners would not be considered small generators. Acid sludge produced in rerefining contains approximately 40% acid, 2% Pb and 30-40% organics, the majority of which are asphaltenes and other heavy polymers. Other hazardous trace metals found in significant amounts are As, Zn, Cd and Cr.

SUMMARY OF AVAILABLE DATA:

- SIC 2992 includes establishments primarily engaged in blending, compounding and rerefining lubricating oils and greases from purchased mineral, animal and vegetable materials. Petroleum refiners engaged in the production of lubricating oils and greases are classified in Industry 2911. Examples of products are shown below:

  brake fluid, hydraulic
  cutting oils, blending and compounding from purchased materials
  lubricating greases and oils not made in petroleum refineries
  lubricating oils, rerefining
  oils and greases, blending and compounding from purchased materials
  rust arresting compounds, animal and vegetable oil base
  transmission fluid, hydraulic

  Only the rerefining industry is addressed here.

- The industry had 27 active rerefiners as of September 1976. The Association of Petroleum Rerefiners estimates two or three are no longer operating.

- Production was 193 million liter (51 million gallon) in 1975, which is 44% of total capacity (including known inactive facilities).

---

*That fraction of this industry which includes establishments primarily engaged in blending and compounding lubricating oils and greases, and which has been determined to include small hazardous waste generators, are not addressed in this summary sheet

- Rerefineries are generally older facilities and are small, with none having more than 25 employees. The largest plant produced 37.8 million liter (10 million gallon) in 1975, which represented 20% of the industry output. The median production for 1975 was 4.34 million liter (1.15 million gallon).
- Twenty-one rerefiners are known to use the acid/clay treating process; two use distillation/clay and one uses the O'Blany modified distillation/clay process.
- The rerefiners are located in or near large cities where raw material and markets are available. Four plants are in California, three in Texas, two in Minnesota, Two in Wisconsin and one each in 16 other states.
- Rerefining is most often accomplished in three steps: (1) pretreatment with heat and chemicals (acids or bases), (2) distillation of a mixture of the waste oil and bleaching clay, and (3) post treatment to filter the spent clay and perhaps acid neutralization or additional finishing.
- The principal waste of the acid/clay process is acid sludge, a black tar with a high sulfuric acid content. It contains most of the metals, solids and polar compounds (original additives or reaction products). Among metals found in significant concentrations are Pb, Zn, Fe, Si, Ba, Ca, Na, Mg and P.
- Caustic sludge is generated by only two rerefiners. It apparently does not contain as much aromatics as acid sludge. The pH ranges from 10 to nearly neutral.
- Whenever vacuum distillation and clay treatment is used to recover lube oils, the distillation column bottoms can be sold as an asphalt extender.
- The clay, of course, has contacted and adsorbed the waste oil during distillation. Much of the oil and associated contaminants can be removed with solvents or by burning it off. Adsorbed materials of special concern is disposing of the clay include heavy metals (especially lead), phenols and organics, some of which are possibly carcinogenic.

- The rerefining in 1975 of 193 million liter (51 million gallon) of oil resulted in the generation of the following quantities of waste:

Waste Type	tonne/yr (dry weight)
Acid sludge	33,045
Caustic and other sludge	8,180
Spent clay	15,700

- The overwhelming majority of rerefiners having acid sludge dispose of these wastes at offsite or onsite landfills without treatment. Only about 20% of the rerefiners treat their acid sludge to reduce leaching problems when the wastes are put into landfills.

- Nearly two-thirds of caustic and "other" sludges generated are used as an asphalt extender and plasticizer. The remainder is used equally for road oil and for fuel.

- Spent clay is disposed of in the following manner: 7% is used on roads, 9% is mixed with a fixative and deposited in a landfill, and 84% is sent to landfills without treatment.

- In addition to rerefining, there is a less sophisticated component of the industry which reclaims or reprocesses oil. Reclaiming removes water, solids and some organics primarily by heat, filtration, and gravity or centrifugal separation. Reprocessing will use higher temperatures to remove more light organics and generally uses some type of chemical treatment, e.g., neutralization.

- Limited information about waste oil reclaiming and reprocessing activities suggest about 100 firms produce 378 to 756 million liter (100 to 200 million gallon) annually. A total of 40,000 to 80,000 tonne of sludge and tank bottoms are produced which will be characterized as hazardous waste.

- Because these firms appear to be all rather small, a typical facility will be described by the arithmetic average of production and waste generation statistics. On this basis, an individual facility would probably have to dispose of some 33,000 kg of waste each month. Therefore, the amount of hazardous waste produced by reclaimers and reprocessors appears to exceed the small hazardous waste generator definition.

SIC: 2992

SOURCES OF INFORMATION USED:

- Assessment of Industrial Hazardous Waste Management Practices: Petroleum Rerefining Industry, USFPA, 1977
- Waste Oil Recycling and Disposal, EPA-670/2-74-052, August 1974
- Report on Industry by J. G. Mascotte and H. M. White of Aerospace Corporation (ATR-78-7384-1), 1978
- Management of Environmental Risk: Limited Integrated Assessment of Waste Oil Rerefining Industry, Teknekron, Inc., 1978
- Association of Petroleum Rerefiners
- DOE, Bartlesville Energy Technology Center, Bartlesville, OK
- Six individual establishments

INDUSTRY: Cement, Hydraulic SIC: 3241

ASSESSMENT SUMMARY:

All establishments in this SIC would be large waste generators. The waste generated (kiln dust) amounts to 10 to 20% of kiln feed. The smallest plant would generate more than one million killogram of waste/month. Under Subtitle C of RCRA kiln dust would most likely be considered as "special waste."

SUMMARY OF AVAILABLE DATA:

- This SIC covers establishments primarily engaged in manufacturing hydraulic cement, including Portland, natural, masonary, and possolan cements.
- There are 51 companies; 166 plants with annual production ranging from 0.18×10^6 to 27×10^6 tonns.
- Raw materials used are lime, silica, alumina and iron.
- 34% of plants return kiln dust to kiln.
- Some plant leach the dust with water to reduce the alkali content. Leached dust is returned to kiln.

SOURCES OF INFORMATION USED:

- EPA-Effluent Guidelines Division Development Document: Cement Manufacturing Point Source (EPA 440/1-74-005a)
- Portland Cement Association

INDUSTRY: Stone and Clay Products

SIC: 325,326,3274, 3275,3281,3291, 3292,3295-7, 3299

ASSESSMENT SUMMARY:

Except for establishments in SIC 3274, which are large generators and whose waste may include calcium oxide, and establishments in SIC 3292, whose operation is or will be regulated under other laws, the waste generated by the establishments in the subject SIC's are not considered hazardous. Process wastes from these SIC's are dust collected during various operations, and rejected or broken end products which consist mainly of cement, clay, shale and silica. Most plants recycle these back to the process. Some plants may dispose of waste lube oils and cleaning solvents. No data are available on the quantities of these wastes and the number of plants disposing of such wastes.

SUMMARY OF AVAILABLE DATA:

- The industry categories covered by the subject SIC's are: structural clay products (SIC 325), pottery and related products (SIC 326), lime (3274), gypsum products (3275), cut stone and stone products (SIC 3281), abrasive and miscellaneous nonmetallic mineral products (SIC 3291, 3295-7, and 3299) and asbestos products (SIC 3292).

SIC 3274, Lime

- Raw materials used are either limestone or oyster shell.
- During calcination and associated operations (crushing, grinding, cleaning, etc.) dusts containing calcium oxides are generated which are collected either by wet or dry air pollution control devices. The dust collected may be corrosive and are usually not salable. Amounts of dust collected ranges from 2 to 10% of raw input. In general, 1.79 tonne of raw material is required to produce 1 metric ton of product. Assuming a waste generation rate of 2%, any plant producing less than 1700 tonne/yr would be classified as small hazardous waste generator. Available data indicate that plants in the industry have capacities in excess of this (see below).

  In 1974, plants in SIC 3274 ranged in size from less than 10,000 tonne/yr to more than 350,000 tonne/yr. There were a total of 176 plants, 39 of which had capacities greater than 180,000 tonne/yr and produced 2/3 of the total industry output; the other 137 plants had a combined production of 6.5 million tonne with an average production rate of 50,000 tonne per plant. The trend in the industry has been toward closing the smaller plants and consolidation into larger facilities. It is unlikely that any plants would have a production capacity of less than 1700 tonne/yr, thus all the plants in this SIC would be considered large generators.

SIC 3292, Asbestos Products

- The use of asbestos products in the work place and the management of asbestos wastes are currently regulated under OSHA and the Clean Air Act; control of asbestos in the environment may also be covered under the Toxic Substances Control Act.

Other SIC's

- The raw materials used in the subject SIC's (except SIC 3274) include clay, shale, alumina, silica, alkalies, gypsum rocks and coloring agents (e.g., magnesium oxides and iron oxide).
- Typical processes used include crushing, grinding, mixing, extruding, drying and firing.
- Waste materials are mainly rejected or broken products and dust collected during various operations. These wastes would resemble the raw materials and would be nonhazardous. Three of the four companies contacted recycle all wastes back to the process; one company collects the wastes in a dumpster which is hauled away by a contractor.

SOURCES OF DATA USED:

- Industrial Process Profiles for Environmental Use: Chapter 17, The Gypsum and Wallboard Industry, NTIS PB-281-484
- Industrial Process Profiles for Environmental Use: Chapter 18, The Lime Industry, NTIS PB-281-485
- Industrial Profiles for Environmental Use: Chapter 19, The Clay Industry, NTIS PB-281-486

- Gypsum Association
- Three individual establishments

INDUSTRY: Concrete, Gypsum and Plaster Products SIC: 3271, 3272, 3273

ASSESSMENT SUMMARY:

Waste generated is not considered hazardous. At one large plant in SIC 3272 oil and grease is reportedly skimmed off from wastewater; it is not known whether such a waste would also be encountered at smaller plants.

SUMMARY OF AVAILABLE DATA:

- The industry subcategories covered by the subject SIC's are concrete block and brick (SIC 3271), concrete products, except block and brick (SIC 3272) and ready-mixed concrete (SIC 3273).
- Wastes generated include cement dust, waste concrete, scrap block and brick.
- Not all concrete pipe wet casting process plants generate oil and grease waste. There are a total of 390 plants in the concrete pipe industry (SIC 3272). EPA-Effluent Guidelines Division surveyed 153 plants (including visiting 9 plants and sampling 2 plants). One of the plants visited was identified as having oil and grease waste skimmed off from an API separator. The plants visited by Effluent Guidelines Division were the larger plants and it is not known whether oil and grease waste would be encountered at any of the smaller facilities in the industry.
- For the one plant visited by Effluent Guidelines Division, the quantity of oil and grease is estimated at 0.04 kg/tonne of product; for the 153 plants in the Effluent Guidelines Division survey, production rate ranged from 4,540 to 175,000 tonne of product/yr.

SOURCES OF INFORMATION USED:

- EPA-Effluent Guidelines Division Development Document: Concrete Product Point Source (EPA 440/1-78/090)
- American Concrete Pressure Pipe Association

INDUSTRY: Blast Furnaces (including coke ovens), Steel Works and Rolling Mills

SIC: 3312

ASSESSMENT SUMMARY:

All establishments in the subject SIC are reported to produce more than 5000 kg/mo of hazardous waste. Hazardous wastes generated include heavy metals, greases, oils, fluorides, cyanides, phenols and acids.

SUMMARY OF AVAILABLE DATA:

- This SIC covers establishments primarily engaged in manufacturing hot metal, pig iron, silvery pig iron, and ferroalloys from iron ore and iron and steel scrap; converting pig iron, scrap iron and scrap steel into steel; and in hot rolling iron and steel into basic shapes such as plates, sheets, strips, rods, bars, and tubing. Merchant blast furnaces and byproduct or beehive coke ovens are also included in this industry.
- A survey of all 158 iron and steel plants in the U.S. in 1974 found that all plants in SIC 3312 dispose of large volumes of hazardous waste.

SOURCES OF INFORMATION USED:

- Calspan Corporation, "Assessment of Industrial Hazardous Waste Practices in the Metal Smelting and Refining Industry," Vol. III, EPA Contract No. 68-01-2605, April 1977
- U.S. EPA/Office of Water and Hazardous Materials, "Development Document for Effluent Limitations Guidelines and New Source Performance Standards for the Hot Forming and Cold Finishing Segment of the Iron and Steel Manufacturing Point Source Category," August 1975
- U.S. Dept. of Interior, Bureau of Mines, "1974 Minerals Yearbook, Vol. I, Metals, Minerals, and Fuels," U.S. GPO, 1976
- Effluent Guidelines Division of EPA

INDUSTRY: Electrometallurgical Products SIC: 3313

ASSESSMENT SUMMARY:

There appears to be no establishments in this SIC which generate less than 5 MT per month of hazardous waste.

SUMMARY OF AVAILABLE DATA:

- Samples taken from plants representing 91% of this industry's production capacity indicate that all establishments generate no hazardous waste or large volumes of hazardous waste.
- Solid wastes from plants in this SIC include slags, baghouse dusts, scrubber sludges, and wastewater treatment sludges. Most of these wastes contain toxic heavy metals but do not release them in leaching tests. Waste oils are also reported by establishments in this SIC.
- Waste dusts are reported to be disposed of in on- or off-site landfills. Sludges are reported to be disposed of in lined and unlined lagoons.

SOURCES OF INFORMATION USED:

(1) National Commission on Water Quality, "Preliminary Report on Cost of Implementation and Capabilities of Available Technology to Comply with PL 92-500," Vol. II, February 3, 1975

(2) Calspan Corp., "Assessment of Industrial Hazardous Waste Practices in the Metal Smelting and Refining Industry. Vol. III. Ferrous Smelting and Refining," EPA Contract No. 68-01-2604

(3) Development Document for Interim Final Effluent Limitations Guidelines and Proposed New Source Performance Standards for the Electrolytic Ferroalloys Segment Ferroalloy Manufacturing Point Source Category

(4) State data base

INDUSTRY: Primary Smelting and Refinishing of Nonferrous Metals SIC: 333

ASSESSMENT SUMMARY:

All of the primary smelters and refiners of copper, lead, zinc, aluminum and other non-ferrous metals reportedly generate either large volumes of hazardous waste or no hazardous waste.

SUMMARY OF AVAILABLE DATA:

- This industry classification covers establishments primarily engaged in smelting and refining of copper (SIC 3331), lead (SIC 3332), zinc (SIC 3333), aluminum (SIC 3334) and nonferrous metals not elsewhere classified (SIC 3339).

- SIC 3331 - Copper. Smelting and fire refining of copper reportedly generates 172 kg of hazardous waste sludges and dusts per MT of product. Even the smallest smelting (4000 MT/yr) and fire refining (43000 MT/yr) operation would be expected to produce well over 5000 kg/mo of hazardous waste.

  Electrolytic refining of copper reportedly generates 2.4 kg of hazardous waste sludge per MT of product. The smallest electrolytic refining operation which is not at the same site as a fire refinining operation, has a capacity of 113,000 MT/yr. Thus, even the smallest electrolytic copper refinery would be expected to generate on the order of 22,000 KG/mo of hazardous waste sludge.

- SIC 3332 - Lead. There are 7 primary lead smelting and refining plants in the U.S. Two of these sites smelt but do not refine. Even these two plants are estimated to generate significantly greater than 5 MT/mo of hazardous waste.

- SIC 3333 - Zinc. Smelting and electrolytic refining of zinc reportedly generates an average of 26.1 kg of hazardous waste sludges (from acid plant blowdown and wastewater treatment) per MT of product. The smallest electrolytic zinc refiner reportedly disposed of approximately 40 MT of sludges per month in 1977.

- Pyrometallurgical smelting and refining of zinc also generates hazardous waste sludges. The estimated average waste generation rate is 122 kg/MT of product. The smallest pyrometallurgical refiner would be expected to generate approximately 480 MT/mo of hazardous waste sludges.

- SIC 3334 - Aluminum. Hazardous wastes from primary aluminum smelting and refining include sludges, spent potliners, skimmings from electrolytic cells and dusts. The total waste generation rates vary widely from plant-to-plant depending on such factors as production processes employed and level of scrubber water treatment. All primary aluminum plants generate well in excess of 5 MT/mo of hazardous waste.

- SIC 3339 - Nonferrous Metals, Not Elsewhere Classified. Based on data collected from 32 of the 81 plants in this SIC, it is estimated that all plants generate either non-hazardous wastes or large volumes of hazardous wastes. Solid wastes from this SIC include slags, baghouse dusts, scrubber sludges, wastewater treatment sludges, electrolytic sludges, and other miscellaneous wastes generated in smaller quantities. Many of these wastes contain toxic heavy metals and some release them when subjected to leaching tests. The most common disposal methods are open dumping and lagoons, although many plants also recycle much of their solid waste.

SOURCES OF INFORMATION USED:

- Calspan Corporation, "Assessment of Industrial Hazardous Waste Practices in the Metal Smelting and Refining Industry. Vol. II," EPA Contract No. 68-01-01-2604, April 1977

- Garrity-Sandage Associates, Inc., "Hazardous Substances and Pesticide Survey and Training Program. Vol I," EPA Contract No. 76-4300-01, April 1977

- PEDCo Environmental, Inc., "Preliminary Draft - Environmental Assessment of the Domestic Primary Copper, Lead, and Zinc Industries," EPA Contracts Nos. 68-02-1321, Task No. 38; 68-02-2535, Task No. 1, December 1977

- U.S. Department of Interior, Bureau of Mines, "1974 Minerals Yearbook, Vol. I, Metals Minerals and Fuels," U.S. EPA, 1976

- EPA/EGD, Draft Report on Effluent Limitations and Pretreatment Standards for Point Sources Within the Nonferrous Metals Manufacturing Point Source Category, Section III, 1979
- U.S. Dept. of Commerce, "1972 Census of Manufacturers"
- Battelle Columbus Laboratories, "Draft Final Report on Environmental Assessment of Primary Nonferrous Metals Industry Except Copper, Lead, and Zinc," February 1977

INDUSTRY: Water Transportation SIC: 44

ASSESSMENT SUMMARY:

The potentially hazardous waste generated by the water transportation industry are wastewaters from ship and barge interior cleaning which may contain oils, alkalis, or acids, cyanides, phenols and ammonia. Wastes are all cargo related. The cleaning wastes are brought to shore for treatment. Oily fractions are reprocessed in refineries; sludges are often disposed of onsite or taken to a landfill by a contract hauler, and remaining waters disposed of on land or returned to river/ocean. The volumes of wastes handled by a shore treatment installation and the amount of sludge produced in such an installation are very large (in excess of 5000 kg/mo).

SUMMARY OF AVAILABLE DATA:

- SIC 44 includes establishments that engage in freight and passenger transportation on the open seas or inland waters and establishments providing incidental support services.
- The potentially hazardous wastes from the waterborne shipping segment of the transportation industry are wastewaters from ship and barge interior cleaning, ballast and bilge waters.
- Depending on the cargo handled, hazardous constituents of the wastewaters are oily materials, acids, alkalis, cyanides, phenols, ammonia and miscellaneous organics and inorganics.
- Because the smallest cargo vessel produces more than 5000 kg/mo of wastewater and because wastewaters from at least several vessels are collected at a shore installation for treatment and disposal, neither the vessels nor the terminals serving them qualify as small volume hazardous waste generators.
- Small supportive vessels such as tugboats and towboats active in harbors and ports may produce bilgewater in quantities less than 5000 kg/mo. Based on data developed by EGD of the EPA, tugboats operating in the Port of New York and some towboats operating in line serivce produce 30-40 gallons of bilgewater per day (34oo to 4500 kg/mo).

Those wastewaters may contain oily materials and heavy metals (from engine or pump dripping) and detergents used in cleaning. The bilgewaters from tugboats and towboats are combined with wastewaters from other vessels at shore storage/treatment disposal facilities. Hence, the total waste handled at such facilities would be in excess of 5000 kg/mo.

- The following wastewater treatment methods are reported to be used at shore installations: flow equalization, gravity separation, emulsion breaking, coagulation, air flotation and clarification.
- Based on information obtained from the U.S. Coast Guard and the Harbor Departments of Long Beach and Los Angeles,on the Pacific Coast ship-generated oily wastes and wastewaters are handled as follows. Oily wastes and bilge and ballast wastewaters are pumped from ships at rates of 5000 barrels/hour to holding tanks in shore installations. As much as 25,000 to 40,000 barrels may be transferred in one pumping. Gravity settling or API separation yields oily and emulsion layers which are sent to refineries as rerun oil. Sludge which settles from the wastewaters is removed and disposed of in Class I and Class II landfills by contractors. Approximately 1000 bbl/yr (16,000 kg/mo) are generated at a typical installation on the west coast. The remaining wastewater is analyzed onsite, rated against water quality standards, and pumped to the ocean. No wastes or wastewaters are pumped to municipal sewers. According to the U.S. Coast Guard, this procedure is carried out at the ports of San Diego, Los Angeles, Long Beach, San Francisco, Portland, Seattle and Bellingham.
- Based on contacts with several state agencies and a barge cleaning contractor, the following information has been obtained for barge cleaning operations associated with commercial transportation on the Mississippi River. Wastewaters from barges and towboats are handled at privately owned cleaning and disposal facilities. Barge cargo space is steam cleaned and flushed with water to a settling tank or pit. Bilges are pumped to the same space. The oily layer is skimmed and sent to a reclamation facility where it may be converted to fuel oil. At one facility the wastewaters are allowed to flow through sand to an aerated

lagoon. Three separate lagoons and aeration steps are provided in series. The water from the third lagoon is dissipated by percolation and evaporation. This facility, which is claimed to be of medium size, generates approximately 3 million kg of oil/year.

SOURCES OF INFORMATION USED:

- U.S. Environmental Protection Agency, Office of Enforcement and General Counsel, Development Document for Proposed Effluent Limitations Guidelines and New Source Performance Standards for the Waterborne Shipping Segment of the Transportation Industry Point Source Category (Draft), USEPA, April 1974
- U.S. Coast Guard; 11th and 13th Districts
- U.S. Corps of Engineers
- Port of Los Angeles - Warden Division
- Environmental Protection Branch LA Harbor
- Environmental Analysis and Risk Management - Port of Long Beach
- Mississippi Department of Natural Resources
- Seven individual establishments involved in various aspects of water transportation

INDUSTRY: Services Incidental to Transportation, Not Elsewhere Classified — SIC: 4789

ASSESSMENT SUMMARY:

Wastes resulting from services incidental to transportation are for the most part of a nonhazardous nature. There are different kinds of establishments covered under this SIC in some very unrelated services. Of those establishments surveyed wastes are primarily paper, trash and some service specific waste such as manure at stockyards.

SUMMARY OF AVAILABLE DATA:

- Establishments covered under the subject SIC are primarily engaged in furnishing services incidental to transportation not elsewhere classified (e.g., cabs, horse drawn, for hire; sleeping car and other passenger car services, not performed by railroads; stockyards, not primarily for fattening or selling livestock; freight car loading and unloading, not truckers; etc.).
- A company that boxes and crates machinery for export was interviewed. Other than office paper and trash, the only other waste generated at this facility was wood and cardboard in small quantities. Wastes are disposed of via a private collection company.
- A company that is a stockyard, primarily for holding stock, was interviewed. Besides paper and trash, manure (from the stockyard) was also generated. The paper and trash is collected by the city, and the manure is picked up by local farmers for fertilizer.
- Two railroad transportation companies were contacted for information on freight car loading and unloading. The two companies indicated that the loading and unloading of freight cars are the responsibilities of companies which rent the freight cars and that these companies, unless they have their own capabilities, generally call upon the services of appropriate transport/loading-unloading firms for freight loading-unloading/transport. In the majority of cases, the transport/

loading-unloading firms operate a truck or fleet of trucks for this purpose. Maintenance service performed on these trucks would generate certain hazardous wastes (e.g., waste oil).* The trucking industry and the wastes generated from truck maintenance are addressed in connection with SIC 42 (see Appendix B).

SOURCES OF INFORMATION USED:

- Four individual establishments
- Two railroad companies

*One company, which specializes in loading-unloading and transport of heavy equipment, indicated that it performs maintenance service on a fleet of 40 company-owned trucks; the maintenance service results in the generation of about 150 kg/mo waste oil and hydraulic fluid.

INDUSTRY: Telephone Communication (wire or radio) SIC: 4811

ASSESSMENT SUMMARY:

The only identified hazardous waste generated by the subject industry is polychlorinated biphenyl(s) (PCB) resulting from damage/replacement of transforming equipment. The disposal of waste PCB is already subject to EPA regulations and the production and use of PCB is prohibited as of June 1, 1979.

SUMMARY OF AVAILABLE DATA:

- This SIC covers establishments primarily engaged in furnishing telephone communication service by placing the parties in vocal conversation with each other.
- Small quantities of wire scrap and other waste electrical supplies/ components are generated by the subject industry. These wastes are not considered hazardous. Often small quantity wastes are disposed of with urban refuse at the construction or work site.
- Polychlorinated biphenyls are used in some transformer and capacitors in telephone systems. The use of PCB's is being phased out and the disposal of such material is already covered by regulations developed under the Toxic Substances Control Act (43 CFR No. 34, Feb. 17, 1978).

SOURCES OF INFORMATION USED:

- National Communications Association
- North American Telephone Association
- 43 CFR No. 110, June 7, 1978, PCB's - Manufacturing, Processing, Distribution in Commerce and Use Bans
- 43 CFR No. 34, Feb. 17, 1978, PCB's - Disposal and Marketing

INDUSTRY: Automobiles and Other Motor Vehicles, Automotive Parts and Supplies, Tires and Tubes (Wholesale) SIC: 5012,5013, 5014

ASSESSMENT SUMMARY:

Wastes generated by the wholesale establishments covered under the subject SIC's are of a non-hazardous nature. Those businesses interviewed were chosen because of the possibility that some hazardous waste could be generated.

SUMMARY OF AVAILABLE DATA:

- The establishments covered under the subject SIC's are primarily engaged in the wholesale distribution of new and used autos, trucks, other motor vehicles (SIC 5012); automotive parts and supplies (SIC 5013); and tires and tubes (SIC 5014).
- For SIC 5012, establishments interviewed included a motor cycle wholesaler, a bus wholesaler, a truck wholesaler and a trailer wholesaler. The only wastes generated at these facilities consisted primarily of paper waste and trash which is disposed of via a private disposal company. None of the facilities performed maintenance on wholesaled vehicles so maintenance wastes were non-existent.
- For SIC 5013, wholesalers of batteries, auto supplies and test equipment were interviewed. Some of the battery wholesalers did some retail sales and installation as well. In these cases there were some old batteries that were disposed of by selling as scrap wherein the lead is recycled. However, in the wholesale part of the business no waste batteries were reported. Also, the auto supplier and test equipment supplier claimed to produce no waste other than some paper, cardboard and miscellaneous trash. This is disposed of via a private disposal company.
- For SIC 5014, wholesalers of tires and tubes were contacted. Some of these businesses also did retail sales in which case old tires, tubes, weights and shocks were scrapped. These wastes were all sold to an outside company for reclamation. However, the wholesale operations of these establishments did not produce these wastes since new tires, tubes, etc. were merely sold and not installed onsite. Resultant wastes from wholesale operations consisted mainly of paper waste and miscellaneous trash which is disposed of weekly via a private disposal company.

SOURCES OF INFORMATION USED:

- Ten individual establishments

INDUSTRY: Construction Materials, Not Elsewhere Classified (Wholesale) SIC: 5039

ASSESSMENT SUMMARY:

Some of the establishments included under the subject SIC handle products such as lime, cement and plaster which may be potentially hazardous. Waste may result from damage to containers/packages during shipment and handling; products in damaged packages, however, are usually either given away or sold at reduced prices. Other wastes that are generated include paper and miscellaneous other building materials of a nonhazardous nature.

SUMMARY OF AVAILABLE DATA:

- The establishments covered under SIC 5039 are primarily engaged in the wholesale distribution of building materials such as brick, building stone, cement, granite, gravel, lime, plaster, building glass, roofing materials, sand and tile. The establishments are located nationwide, but primarily in the urban areas.
- Three wholesale building materials establishments were interviewed. Of all of the various kinds of materials that were sold only those with lime content such as lime, cement and plaster were considered to be of a potentially hazardous nature. These items are only "disposed" of in the event of breakage of bags or damage to the product. This damage usually occurs during loading and unloading of the materials.
- The larege majority of damaged goods are either given away or sold at reduced prices. Very small amounts are disposed of with other wastes of a nonhazardous nature which is usually collected by a private disposal company.
- The quantities of wastes associated with the cases of damaged containers are highly variable dependent solely on handling care and procedure, as well as quantity of materials being handled by the individual company. One company estimated that the range of damaged bags could be from zero to as many as a dozen per shipment.

SOURCES OF INFORMATION USED:

- Three individual establishments

INDUSTRY: Sporting, Recreational, Photographic and Hobby Goods, Toys and Supplies　　SIC: 5041,5042,5043

ASSESSMENT SUMMARY:

As a result of this survey, it was found that no waste of a hazardous nature was generated at any of the establishments interviewed. Non-hazardous wastes are a result of normal business and general maintenance operations.

SUMMARY OF AVAILABLE DATA:

- This industry group covers establishments engaged in the wholesale distribution of sporting and recreational goods and supplies (SIC 5041), toys and hobby goods and supplies (SIC 5042), and photographic equipment and supplies (SIC 5043).
- Wastes generated at establishments under the subject SIC's are reportedly of a non-hazardous nature. Wastes are primarily paper, cardboard, other miscellaneous trash, and small amounts of common cleaning agents. Wastes are disposed of via municipal refuse collection or sewer. Broken or unusable products are generally sold at lower cost or returned to manufacturers.

SOURCES OF INFORMATION USED:

- Eight individual establishments

INDUSTRY: Metals and Minerals, Except Petroleum (wholesale) SIC: 505

ASSESSMENT SUMMARY:

Establishments covered under the subject SIC are not likely to generate hazardous wastes. Wastes produced by wholesale operations without warehouses include paper and miscellaneous trash. Warehouse wastes are very small in volume and are usually recycled or used.

SUMMARY OF AVAILABLE DATA:

- Included within the subject SIC are metal service centers and offices (SIC 5051) and coal and other minerals and ores (SIC 5052). Establishments in SIC 5051 are primarily engaged in marketing ferrous and non-ferrous metal semi-finished products. Establishments in this SIC may operate with warehouses (metal service centers) or without warehouses (metals sales offices). Establishments in SIC 5052 are primarily engaged in the wholesale distribution of coal and coke; copper, iron, lead, other metallic ores except precious and crude non-metallic minerals.
- Metals service centers under SIC 5051 produce waste in the form of damaged materials which are generally returned to the manufacturer or supplier for recycling. Other wastes from metals service centers and metals sales offices are paper and miscellaneous trash which are disposed of via municipal refuse or private disposal collection.
- Waste generated at wholesalers of coal and other minerals and ores is primarily paper waste and miscellaneous trash. Some wholesalers which also produce the product at the same site may produce hazardous waste as a result of the production operation; the production operation is covered under other SIC's.

SOURCES OF INFORMATION USED:

- Five individual establishments

INDUSTRY: Electrical Apparatus and Equipment, Wiring Supplies and Construction Materials (Wholesale) SIC: 5063

ASSESSMENT SUMMARY:

Establishments that are included under SIC 5063 are not likely to produce wastes of a hazardous nature. Wastes that are generated at these types of facilities are those resulting from the operation of the business.

SUMMARY OF AVAILABLE DATA:

- Establishments covered under the subject SIC are primarily engaged in the wholesale distribution of electrical power equipment for the generation, transmission or utilization of electric energy; and electrical construction materials for outside power transmission lines and for electrical systems.
- All of the establishments that were interviewed indicated that the only wastes generated consisted of paper and miscellaneous trash of a non-hazardous nature. No hazardous materials are handled by these businesses. Damaged products are returned to the manufacturer. All waste is disposed of via private disposal companies.

SOURCES OF INFORMATION USED:

- Three individual establishments

INDUSTRY: Professional Equipment and Supplies (Wholesale) SIC: 5086

ASSESSMENT SUMMARY:

The warehousing activities of this industry are not expected to generate hazardous waste. Damaged and malfunctioning equipment are generally returned to the manufacturers.

SUMMARY OF AVAILABLE DATA:

- This SIC covers establishments primarily engaged in the wholesale distribution of mechanical devices and other equipment used by architects, dentists, engineers, physicians, surgeons, veterinarians, optometrists, osteopaths, and other professional groups.
- Wastes from these businesses include boxes, packing paper, styrofoam and other packing materials. Damaged and malfunctioning equipment, some of which may contain hazardous chemical, are generally returned to the manufacturers. (Some suppliers also handle cleaning, disinfecting, and antifoaming chemicals which are covered under other SIC's. Container damage can be expected which will result in the disposal of some of these chemicals. The volume of damaged containers which are disposed of is very small.)
- The current practice is to dispose of packing material and any damaged containers along with other municipal refuse.
- Some suppliers have a captive vehicle service department for their delivery vehicles. This will be a source of waste crankcase oil, a hazardous waste. Generation rates and disposal practices of waste crankcase oil are addressed in connection with the transportation industry.

SOURCES OF INFORMATION USED:

- One individual establishment

INDUSTRY: Groceries and Related Products (wholesale) SIC: 514

ASSESSMENT SUMMARY:

Establishments covered under the subject SIC are not likely to produce hazardous wastes. Since they are engagedin the sale of foods and food products, hazardous substances are not utilized at these facilities. Only steam and very mild detergents are used for cleaning and disinfecting purposes. Wastes are generally miscellaneous trash with some industry specific wastes of a non-hazardous nature.

SUMMARY OF AVAILABLE DATA:

- The establishments covered under SIC 514 are primarily engaged in the wholesale distribution of fish and seafoods (SIC 5146), meats and meat products (SIC 5147), fresh fruits and vegetables (SIC 5148) and groceries and related products not elsewhere classified (SIC 5149).

- Wastes generated at fish and seafood wholesale operations may include fish heads and viscera when small quantities of fish are prepared for sale. Fish are not usually packaged at these establishments. Fish wastes are given to rendering companies; miscellaneous trash is disposed of via municipal or private collectors. No hazardous materials are permitted in these kinds of food "parking" establishments.

- Wastes generated at meat and meat product wholesale operations will include bones, suet and sometimes sump waste at packing operations. Bones and suet are sold, sump waste is pumped and disposed of via private disposal company. There is also some steam washdown waste resulting from washing of equipment. This is disposed of via public sewer. Paper and miscellaneous trash is disposed of via private collectors. No hazardous substances are utilized or permitted for use in these kinds of establishments as they are USDA inspected. The only chemical allowed for cleaning of machinery is a very mild detergent (only steam is used for washdown and disinfection).

- Wastes generated at establishments engaged in the wholesale of fruits and vegetables include product waste from damage and spoilage and miscellaneous trash. All waste is disposed of via private collector companies. No hazardous materials are utilized at these establishments.

- Wastes generated by establishments involved in the wholesale of groceries and grocery-related products, consist primarily of miscellaneous trash and paper. Damaged products are either sold cheaper or returned to supplier. Transh is disposed of via private collection companies.

SOURCES OF INFORMATION USED:

- Five individual establishments

INDUSTRY: Miscellaneous Personal Services SIC: 7299

ASSESSMENT SUMMARY:

The service establishments included under the subject SIC are not likely to produce hazardous waste. Wastes produced are primarily those associated with business operations including paper and miscellaneous trash.

SUMMARY OF AVAILABLE DATA:

- The establishments listed under the SIC 7299 are primarily engaged in providing personal services, "not elsewhere classified," such as steam baths, reducing salons, health clubs, clothing rental, locker rental, party service, marriage bureaus, tattoo parlors and photo copying services.
- Reducing salons, health spas and tattoo parlors were interviewed as representative business types in the subject SIC. Wastes generated at these establishments are reported to be primarily paper wastes and cleaning wastes of a nonhazardous nature.
- Tattoo parlors also generate contaminated needles used in the tattooing process.* Wastes needles are generally disposed of along with the rest of the establishment waste. Wastes are collected either by a private disposal service or municipal refuse collection. Waste needles are a minute fraction of the total refuse generated at tattoo parlors. A waste needle generation rate of 0.1 kg/mo/tattoo parlor has been estimated based on a reported production of 1000 needles per month at a tattoo parlor.
- Unlike during the 1940's and 1950's when tattoo parlors catered primarily to servicemen and hence were generally located near military bases and seaports, presently tattoo parlors attract a diversity of customers and are located in or near many larger cities throughout the U.S. An examination of a number of telephone directories for U.S. cities indicate the following numbers for tatoo parlor listings:

---

*The needles generated by tattoo parlors could be considered infectious; however, for the purpose of this study, infectious wastes are considered those originating from specific sources defined in the EPA December 18, 1978 proposed regulations. These sources are hospitals (SIC's 8062, 8069); medical laboratories (SIC 9071); noncommercial educational, scientific and research organizations (SIC 8922); and veterinary hospitals (SIC's 0741, 0742).

City	Number of Establishments Listed
Fresno, CA	1
San Francisco, CA	15
San Diego, CA	8
Sacramento, CA	3
Denver, CO	10
Washington, DC area	5
Spokane, WA	0
Wichita, KS	0
Boston, MA	2
Seattle, WA	1
Albuquerque, NM	3
Trenton, NJ	5
Las Vegas, NV	1
Omaha, NE	2
El Paso, TX	0
Tulsa, OK	0
Dayton, OH	1
Salt Lake City, UT	0

Based on the number of listings for these selected cities and assuming that tattoo parlors would be primarily located in cities with more than 100,000 population and that for such cities the number of tattoo parlors is proportional to population, the total number of tattoo parlors in the U.S. is estimated at 540. Tattoo parlors reportedly employ between 1 to 4 employees.

SOURCES OF INFORMATION USED:

- Six individual establishments
- Population data used are for 1976 as reported in 1978 "statistical abstracts"

INDUSTRY: Dance Halls, Studios and Schools SIC: 7911

ASSESSMENT SUMMARY:

The businesses covered by the subject SIC are not likely to be hazardous waste generators.

SUMMARY OF AVAILABLE DATA:

- SIC 7911 includes establishments primarily engaged in operating public dance halls or ballrooms and dance studios and schools.
- The major wastes generated at dance studios and schools would be paper waste associated with operation of the business. These wastes are disposed of via municipal refuse collection.
- At dance halls and ballrooms there may often be refreshment facilities which would generate a certain amount of refuse such a food/drink, paper cups, plates, etc., and associated cleanup and maintenance waste. These wastes are in addition to "business" wastes mentioned above. Wastes from refreshment facilities are disposed of in municipal sewer and municipal refuse receptacles.

SOURCES OF INFORMATION USED:

- Two individual establishments

INDUSTRY: Membership Sports and Recreation Clubs SIC: 7997

ASSESSMENT SUMMARY:

Wastes generated by establishments covered under the subject SIC are primarily of a nonhazardous nature, but certain facilities may generate some waste which may be considered hazardous. Of those covered under SIC 7997, the establishments that were interviewed were those judged to have some likelihood of producing hazardous waste. In most cases it was found that wastes were of the ordinary household variety. Where wastes of a possibly hazardous nature are produced, they are recycled in some way.

SUMMARY OF AVAILABLE DATA:

- Establishments under the subject SIC include sports and recreation clubs which are restricted to use by members and their guests.
- Three swim clubs were contacted. Wastes generated at these facilities included paper wastes, some snack bar waste, and general maintenance waste. Chemicals used in the pools come in re-usable containers and are picked up by the company that supplies the pool chemicals. The empty containers are usually rinsed with the pool water and the rinsate added to the pool. Other wastes are picked up weekly by a private disposal company.
- Under gun and shooting clubs, it was found that there are a couple of different kinds; those that shoot skeet (clay pigeons) mostly with shot guns, and those that shoot at targets with hand guns. Other than shooting waste the other wastes generated at these types of establishments include paper waste, miscellaneous trash and small quantities of common cleaning materials. Wastes associated with shooting are generally recycled particularly in the club setting. Shooting wastes at trap and skeet clubs include the lead shot, empty hulls, and clay pigeons. The shot is collected and sold to a reclaimer two to three times per year, depending on quantity available. The empty hulls are picked up and sold for reuse. Clay pigeons are generally left on the range until there is a large quantity. Sometimes these may be recycled and other times these are disposed of by an outside disposal company as are the paper and cleaning wastes. At handgun target clubs the shooting waste is also generally recycled.

This includes brass casings from the bullets and lead. These are collected and sold periodically.

- Various local riding clubs were also interviewed. Wastes resulting from these facilities are mostly paper waste, some refreshment waste, grain bags, etc. These wastes are collected by a private disposal company approximately once per week. Manure wastes are collected daily by an outside company and other individuals for use as fertilizer.

- Wastes generated at yacht clubs include paper waste, including paper cups, plates, some food waste, bottles and boxes. Cleaning materials are common household varieties. Wastes are picked up by a private disposal company 3-4 times per week.

SOURCES OF INFORMATION USED:

- Ten individual establishments.

INDUSTRY: Offices of Physicians SIC: 8011

ASSESSMENT SUMMARY:

Offices of physicians are not considered as generators of hazardous waste based on the information obtained.* Potentially hazardous fixer and developer solutions are reclaimed or disposed of in the sewer and therefore, they are not addressed as hazardous wastes in this report. Other non-hazardous wastes are discarded with general refuse.

SUMMARY OF AVAILABLE DATA:

- The industry consists of establishments of licensed practitioners having the degree of M.D. and engaged in the practice of general or specialized medicine and surgery. Establishments such as group clinics, in which a group of physicians are associated for the purpose of carrying out their profession, are included in this industry. Visits to a physicians's office can involve one or more of the following activities:
    - examination
    - generalized or minor treatment
    - minor surgery and other general office procedures

  More extensive medical procedures are relegated to hospitals.

- Physicians tend to be concentrated in metropolitan areas. The ratio of the number of active, non-Federal physicians engaged in patient care to the general population in the most populous metropolitan counties is six times as much as the corresponding ratio in the least populous rural counties. This imbalance is due to the preponderance of specialists in the urban areas. Physician-population ratios for physicians in general or family practice are 2.3 per 10,000 population outside of these more urbanized areas. However, the corresponding values for one quite prevalent specialty (internal medicine) in the urbanized and rural areas are 2.2 and 0.6 per 10,000 population, respectively.

- The census data on the distribution of the establishments in SIC 8011 by employment size category (and EPA region) indicate a total of

*Physicians' offices may generate wastes which could be considered potentially infectious; however, for the purpose of this study, infectious wastes are considered those originating from specific sources defined in the EPA December 18, 1978 proposed regulations. These sources are hospitals (SIC's 8062,8069); medical laboratories (SIC 9071); noncommercial educational, scientific and research organizations (SIC 8922); and veterinary hospitals (SIC's 0741,0742).

124,123 establishments with 73% and 91% of the establishments having less than 5 and 10 employees (physicians, nurses, clerks, etc.), respectively. Statistics for 1974 indicate that there are 205,955 active office-based physicians in the U.S. In light of the fact that there were 8485 group practices in the country (in 1975) with an overall average of 7.9 physicians per group (thus accounting for 67,106 doctors), it would appear that while group practices account for a significant number of physicians, most physicians (67%) are engaged in solo practices.

- Physicians' offices produce varying types and amounts of waste including paper from examination tables, disposable gowns, tongue depressors, needles, syringes, gauze, tape and unused drugs and their containers. Some of these materials will be contaminated with blood or sputum. There are also likely to be blood, urine and other types of specimens which may be examined and disposed of onsite. These wastes are currently not considered as infectious for regulation under RCRA. Some specialists (e.g., orthopedic surgeon and radiologists) systematically use X-ray photography for diagnoses/ treatments and thus generate X-ray wastes (primarily fixer and developer solutsion).

- There are generally no special treatment/storage/disposal methods used in offices of physicians. Possible exceptions are those offices which destroy used syringes and dispose of expired drugs (primarily to prevent reuse). Excretory samples are generally discharged to the municipal sewer, other bodily fluids (e.g., blood) are often discarded along with normal trash. Used disposal syringes are also disposed of with the office trash. Some physicians contacted in this study indicated that they dispose of most outdated drugs in the sewers; whereas others indicated disposal with office refuse. The office trash is generally collected by municipal or commercial waste haulers and taken to the community waste disposal facilities.

  For larger quantities of fixer solutions (e.g., produced in offices of radiologist and orthopedic surgeons), such solutions are sent to commercial silver reclamation facilities; developer solutions are generally disposed of in the sewer.

- Based on discussion with several physicians, it is estimated that about 1.5 lb of waste is produced per patient visiting a doctor's office. This quantity of waste represents all wastes (including regular office refuse) produced at a doctor's office. Data from the American Medical Association indicate an average of 88 office visits per week per practice, or 17.6 patients/day (assuming a 5-day work week and no revisits by the same patient in the same week).

  Based on a waste generation of 0.7 kg/patient-visit (1.5 lb/patient-visit) and a visitation rate of 17.6 patients/day/physician, the waste generation rate of 260 kg/mo/physician can be expected. Assuming that in solo or group practice, each physician requires two support personnel (e.g., a nurse and a receptionist for solo practice and nurses, receptionists, medical technicians and business personnel for group practice), a per employee waste generation rate of 87 kg/mo would be expected for establishments in SIC 8011.

SOURCES OF INFORMATION USED:

- U.S. Department of Health Education and Welfare, Health, United States, 1976-1977, pp 50, 307
- Goodman, L. J., E. H. Bennet and R. J. Odem, Group Medical Practice in the U.S.: 1975, American Medical Association

INDUSTRY: Offices of Dentists SIC: 8021

ASSESSMENT SUMMARY:

Even though materials which may be considered hazardous are handled in a dentist's office, it appears that very little of these materials end up in solid waste streams. Most of the potentially hazardous wastes are discharged to the sewer system.

SUMMARY OF AVAILABLE DATA:

- The wastes produced within a dentist's office include mercury containing amalgams, X-ray developing and fixing solutions, disposal syringes and hypodermic needles, disinfectant solutions, extracted teeth, sulfuric and other etching acids, cloth and paper products contaminated with blood and saliva, other paper and general trash. (If dentures are made on site, some asbestos and beryllium metal waste may also be produced.)
- The extent to which a dentist produces any one of these materials will depend on:
  - The dentist's own speciality of practice within the field of dentistry (e.g., general dentistry, orthodontics, periodontics, etc.)
  - Whether crown and bridge, partial dentures or other prosthodontic devices are made (a) by the dentist, (b) by lab personnel working in the office, or (c) sent out to a professional dental lab.
- Normal operations in a dentist's office usually do not produce enough fixer solutions (from X-ray machine) to make Ag reclamation worthwhile, and these solutions are usually discharged to the sewer.
- Because the main constituents of most dental amalgams (Ag and Hg) are valuable, dentists plan their use so that there are little, if any, waste generated. Furthermore, the Ag- and Hg-containing particles produced during the grinding out of fillings are usually collected via aspirator vacuum suction systems (placed in the patient's mouth) and discharged to the sewer. In the Armed Forces, the dentists are required to reclaim and recycle all valuable waste materials, including waste amalgam; it appears that this practice is also used in the offices of some non-military dentists.

- In general, there is usually no special handling associated with the disposal of wastes from a dentist's office. Liquid wastes are discharged to the sewer along with large quantities of water. Solid wastes are generally deposited in the trash and handled as normal refuse.
- Some of the wastes listed above (e.g., asbestos and beryllium) are produced within a dentist's office only if prosthodontic work is done onsite. ADA staff personnel have indicated that the greatest proportion of dentists send their work out to professional dental labs (SIC 8072). The next largest group are those dentists which hire dental lab technicians to do prosthodontic work onsite. The smallest group are those dentists who personally do all of their own prosthodontic lab work. Data on the numerical breakdowns of these three groups are not available.
- The use of asbestos within a dentist's office is only inferred here based on the facts that (a) in some dentists' offices dentures are made onsite and (b) it is known that some dental labs (SIC 8072, the major industry involved in the production of dentures) use very small amounts of asbestos (0.5 lb/yr) as a part of their operation. Due to the occupational hazard posed by asbestos, its use for this purpose is being phased out. One would expect this situation to also be true for those dentist offices where prosthodontic work is done onsite.
- Beryllium was mentioned as a material also associated with the production of dentures, but not much more information was available. It appears that beryllium is a constituent of the metal frames used in the production of prosthodontics. Since these frames are designed for long exposure in the human mouth, it is unlikely that the beryllium (or other metal) is in a form that may present a health hazard.

SOURCES OF INFORMATION USED:

- American Dental Association
- Three dentists in private practice

INDUSTRY: Offices of Osteopathic Physicians SIC: 8031

ASSESSMENT SUMMARY:

Even though the doctor of osteopathy (O.D.) can perform the same procedures performed by an M.D., the emphasis of osteopathy is manipulative work involving the spine, overall skeletal system and musculature. For this reason, the offices of osteopathic physicians are not generally expected to be generators of hazardous wastes.

SUMMARY OF AVAILABLE DATA:

- Osteopathic physicians receive the same type of training as do medical doctors, but they receive extra instruction on the musculature and skeletal systems. Specific emphasis is directed towards the back, spine and the associated nerve structures.
- Even though the major emphasis within the profession is on manipulative work, the group of osteopathic physicians have as wide a range of specialties as do medical doctors. This range includes areas such as surgery, obstetrics-gynecology, pediatrics, and internal medicine. However, the large majority of osteopathic physicians are involved in general practice.
- Most offices of osteopathic physicians are involved in either solo practices or have a 2-person partnership.
- The state of Michigan has the largest number of osteopathic physicians

SOURCES OF INFORMATION:

- Osteopathic physicians and surgeons of California
- American Osteopathic Association
- One individual facility

INDUSTRY: Offices of Chiropractors SIC: 8041

ASSESSMENT SUMMARY:

Any potentially hazardous wastes normally generated by offices of chiropractors are expected to be recycled or discharged to the sewer and therefore, chiropractors are not considered as hazardous waste generators in this report.

SUMMARY OF AVAILABLE DATA:

- This industry consists of establishments of licensed practitioners engaged in the practice of chiropractics.

- The census data on the number of and distribution of establishments in SIC 8041 by employment size category indicate a total of 6502 chiropractic establishments in the U.S. of which 94% employ less than 5 people. According to the American Chiropractic Association, there are 24,000 registered chiropractors in the U.S.; data on the number of practicing chiropractors and the percentages of chiropractors engaged in various size group practices.

- Waste developer and fixer solutions resulting from diagnostic X-rays are the most prevalent potentially hazardous material produced by normal operations in most chiropractic offices. About 90% of the offices have onsite X-ray facilities and about 75% of new patients receive X-rays. Other wastes generated by chiropractic offices include disposable garments, tongue depressors and rubber gloves. These materials are not likely to be hazardous.

- Based on discussions with a staff member of the American Chiropractic (ACA), most chiropractors dispose of developer and fixer solutions through private collection firms which remove the solutions, clean the tanks and service the X-ray film processing equipment. The fixer is probably taken offsite for silver reclamation. Waste developer is probably discharged to the sewer.

- Two companies that service X-ray machines in doctor's offices estimate a waste generation rate of 23 kg/mo per employee. Based on this rate, the total amount of hazardous waste generated by this SIC is estimated at 274,000 kg/mo, or an average rate of 42 kg/mo per establishment.

SOURCES OF INFORMATION USED:

- American Chiropractic Association
- Two companies which service X-ray machines at doctor's offices
- Census data

INDUSTRY: Offices of Optometrists* SIC: 8042

ASSESSMENT SUMMARY:

It appears that activities normally performed in optometrist offices do not generate hazardous wastes.

SUMMARY OF AVAILABLE DATA:

- This SIC covers establishments of licensed practitioners engaged in the practice of optometry.
- There are about 21,000 licensed practicing optometrist in the United States. They are distributed throughout the 50 states.
- Optometrists provide eye examinations and prescribe corrective lenses when needed. If the eye examination uncovers a pathological condition (e.g., requiring surgery or other medical attention), then the patient is referred to an opthalmologist.
- It appears that normal office activities of an optometrist do not generate hazardous wastes. In general, there are no disposable materials associated with the examination and lens prescription processes.
- In some cases, an unspecified chemical is used to dilate the pupils in order to facilitate the exam. However, the chemical is purchased in 1/2-ounce (15-ml) bottles and has a six-month shelf life. Upon expiration, the material which remains is washed down the sink, the bottle rinsed and thrown away. In light of its direct use on a relatively sensitive organ, and the quantity of this chemical sent to disposal, it is unlikely that it can be considered hazardous.
- One doctor indicated that his office wastes consist primarily of envelopes and "junk" mail.
- Opticians take blank glass and plastic lenses (which are often a 1/2" by 3" or 1.2 cm by 7.6 cm biscuit shape), and grind and polish these lenses in accordance with the specifications prescribed by the optometrist.

---

*Information also provided for opticians; SIC code unknown.

- The coolant used during the grinding operation is water. It is filtered and recycled. The waste generated consists of ground glass and plastic of relatively small particle diameter. This ground material is harmless.
- Jewelers rouge (a paste composed primarily of highly refined iron oxide) is used for polishing.
- No X-rays are required by either optometrists or opticians, and no solvent or other chemical is used.

SOURCES OF INFORMATION USED:

- American Optometric Association
- One practicing optometrist

INDUSTRY: Nursing and Personal Care Facilities SIC: 805

ASSESSMENT SUMMARY:

Based on the information obtained, it appears that nursing and personal care facilities should not be considered hazardous waste generators.*

SUMMARY OF AVAILABLE DATA:

- The establishments in this industry are primarily engaged in providing nursing and health-related personal care, with inpatient beds. It includes establishments providing continuous health care but not hospital services such as nursing homes and extended care facilities; and establishments which provide some nursing and care but not continuous nursing services such as rest homes and convalescent homes.
- The census data on the distribution of establishments in SIC 805 by employment size category (and EPA region) indicate a total of 11,790 establishments of which 75% employing more than 20 persons. However, statistics for 1973 published by the Department of Health, Education and Welfare indicate that there are 21,834 nursing and personal care facilities in the U.S.
- The type of wastes generated by facilities in this SIC are generally the same as those produced in acute care hospital units, and include dressings, bandages, syringes, contaminated gauze and cotton, paper goods containing nasal and sputum discharges, examination drapes, disposal masks, catheters, ampules, and outdated drugs. Waste streams from these facilities do not generally include highly infectious wastes which are encountered in certain hospital care units (e.g., general surgery, burns, obstetrics, orthopedics, intensive care and recovery or isolation units).
- Based on discussions with trade associations and individual establishments, some wastes are separated from general refuse and sent to offsite disposal facilities via commercial waste haulers. Other wastes are disposed of with regular refuse.

*Nursing and personal care facilities may generate wastes which could be considered infectious; however, for the purpose of this study, infectious wastes are considered those originating from specific sources defined in the EPA December 18, 1978 proposed regulations. These sources are hospitals (SIC's 8062,8069); medical laboratories (SIC 9071); noncommercial educational, scientific and research organizations (SIC 8922); and veterinary hospitals (SIC's 0741,0742).

SOURCES OF INFORMATION USED:

- National Center for Health Statistics: Health Resources Statistics: Health Manpower and Health Facilities, 1975. DHEW Publication No. (HRA) 76-1609, Health Resources Administration, Washington, U.S. Government Printing Office, 1976.

- California Nursing Home Association
- National Nursing Home Association
- Two individual establishments

INDUSTRY: Dental Laboratories SIC: 8072

ASSESSMENT SUMMARY:

Based on the information obtained, it appears that dental labs should not be considered hazardous waste generators.

SUMMARY OF AVAILABLE DATA:

- Dental laboratories are establishments engaged in making dentures and artifical teeth to order for the dental profession. Specifically, this group includes: dental laboratories; dentures, made in dental laboratories to order for the dental profession; and teeth, artifical made in dental laboratories to order for the profession. Items produced include dental plates, bridges, crowns and other prosthodontic devices.

- Most of the wastes generated by dental labs consist of bulk pieces, grindings from plaster, stone, hardened acrylic resins and also waste polishing compounds.

- While potentially hazardous materials are used within a dental laboratory, available information indicates that these materials generally do not end up as wastes. One of the plastics used in making dentures is methyl methacrylate. Both heat cure and cold cure formulations are used. In each case the methyl methacrylate powder is mixed with an organic liquid (cross linking methyl methacrylate liquid compound) to initiate the polymerization. The powder comes in a cardboard container while the liquid is supplied in metal cans. The liquid is flammable, an irritant to skin and eyes and also has toxic effects if inhaled in large quantities. Only the amounts of this liquid which may remain as residue in waste containers will be discarded.

- Once the methacrylate has hardened it is presumably harmless as evidenced by the fact that it is the same material that is kept in the mouth for extended periods of time. Other materials used for the construction of prosthodontic devices (e.g., metals used for frames) must also be considered nonhazardous because they too are designed to be situated inside the mouth and apparently cause no harm.

- Solvent is applied to cotton swabs and is used to remove wax from the dentures, but the solvent which remains on the swab evaporates and thereby precluding a solid/liquid waste problem. Acid solutions are produced but they are reportedly dilute and dumped down the sink.
- Information received from a person at the American Dental Association (ADA) and certain lab personnel indicate that asbestos is frequently used in the production of dental devices. However, it appears that the use of this material is being discouraged and another less harmful material is being used in its place. In two of the labs contacted, asbestos was not used at all. Furthermore, the amount used in the third lab was quite small; a one-pound bag of asbestos was considered to be a 2-year supply.
- All wastes produced are disposed of together via normal trash removal services. Most contacts would not venture an estimate of the quantity of waste generated but in one lab, which produces from 30-40 denture units per week (including some relines of already prepared dentures), total solid wastes generated was estimated at 99 kg/mo. This corresponds to between 0.05 to 0.06 kg per denture.

SOURCES OF INFORMATION USED:

- American Dental Association
- Employees at three dental labs in the Los Angeles area

INDUSTRY: Outpatient Care Facilities SIC: 8081

ASSESSMENT SUMMARY:

Based on the information obtained, outpatient care facilities are not considered as generators of hazardous wastes.* Potentially hazardous wastes generated such as fixer and developer solutions are reclaimed or disposed of in the sewer and therefore are not addressed as hazardous wastes in this report.

SUMMARY OF AVAILABLE DATA:

- The establishments in the outpatient care industry are primarily engaged in providing outpatient care with permanent facilities and medical staff to provide diagnosis and treatment for ambulatory patients not requiring inpatient care. The types of facilities in this industry include dispensaries, clinics, group health associations, health maintenance organizations, outpatient clinics for alcoholism and drugs, rehabilitation centers and speech defect clinics.
- Most ambulatory health care occurs within the context of the patient visiting the physician's office. About 30% to 40% of all ambulatory patient-physician "contacts" are made in outpatient care facilities.
- The 1976 census data indicate a total of 5419 outpatient care facilities nationwide. These facilities are generally small establishments with about 61% and 78% having less than 10 and 20 employees, respectively.
- Outpatient care facilities will generate a variety of wastes including paper from examination tables, disposable gowns, tongue depressors, needles, syringes, gauze, tape and unusued drugs and their containers. Some of these materials will be contaminated with blood or sputum. There are also likely to be blood, urine and other types of specimens which may be examined and disposed of onsite. Some facilities systematically use X-ray photography for diagnosis/treatment and thus generate X-ray wastes (primarily fixer and developer

*Outpatient care facilities may generate wastes which could be considered infectious; however, for the purpose of this study, infectious wastes are considered those originating from specific sources defined in the EPA December 18, 1978 proposed regulations. These sources are hospitals (SIC's 8062,8069); medical laboratories (SIC 9071); noncommercial educational, scientific and research organizations (SIC 8922); and veterinary hospitals (SIC's 0741,0742).

solutions). In general, outpatient care facilities will not generate the kinds and varieties of wastes associated with heavy care units in hospitals, such as surgery rooms, burn wards, maternity and newborn units, and intensive care and isolation wards.

- Spent developer from outpatient care facilities is discharged to the sewer; fixer is reclaimed. Some wastes may be segregated from general refuse and disposed of by contractors. The majority of the waste is taken to community waste disposal facilities.

SOURCES OF INFORMATION USED:

- U.S. Department of Health, Education and Welfare, Health, United States 1976-1977.
- Census data

INDUSTRY: Health and Allied Services, Not Elsewhere Classified   SIC: 8091

ASSESSMENT SUMMARY:

Establishments in the subject SIC are not considered as generators of hazardous waste.* The majority of wastes are discharged to the sewer or disposed of with general refuse.

SUMMARY OF AVAILABLE DATA:

- This industry consists of establishments engaged in rendering health and allied services which have not been classified under other specific SIC codes. Included in this category are the following types of facilities:
  - blood banks
  - blood donor stations
  - medical photography and art
  - oxygen tent service
  - visiting nurse associations
- Blood banks and blood donor stations are involved in the collection of blood from human volunteers. Blood banks generally have facilities for the testing, classification and storage of blood. Collected blood is used for transfusions or as a raw material for the manufacture of varied blood products such as serum albumin and other blood proteins. (The manufacture of blood protein products is a subgroup of SIC 283.)
- The types of wastes produced by blood banks and blood donor stations fall into four categories:
  - contaminated needle and attached vinyl tubing (about 2 feet long
  - red blood cells from blood which has not been used within 21 days after donation
  - blood contaminated with hepatitis B virus
  - materials resulting from the radioimmuno-assay for hepatitis B virus
- To lessen the opportunity for transmittal of viruses (particularly to laboratory personnel), blood is handled as a bio-hazardous material.

---

*Health and allied services may generate wastes which could be considered infectious; however, for the purpose of this study, infectious wastes are considered those originating from specific sources defined in the EPA December 18, 1978 proposed regulations. Thses sources are hospitals (SIC's 8062,8069); medical laboratories (SIC 9071); noncommercial educational, scientific and research organizations (SIC 8922); and veterinary hospitals (SIC's 0741,0742).

- Contaminated needles and attached vinyl tubing are often incinerated at centralized locations. (In certain areas, e.g., Los Angeles County, air pollution regulations preclude this method of disposal.) In Los Angeles County these materials are ground and discharged to the municipal sewer. This practice has not been completely successful due to the clogging of the grinders by vinyl tubing. The disposal of contaminated needles and attached tubing still remains a problem for blood banks in this area, and these materials sometimes end up in regular refuse.
- If whole blood is not transferred to a recipient within 21 days after donation, it is unacceptable for transfusion. In this case the red blood cells are separated, treated with Clorox and discharged to the sewer. The recovered blood plasma is sent to other facilities for the isolation of blood proteins.
- Blood which has been shown to contain hepatitis B virus is autoclaved to sterility and discharged to the sewer.
- The assay for hepatitis B virus involves the use of radioactive materials. An approved protocol for the disposal of these materials involves bagging, labeling and autoclaving.
- Blood banks and blood donor stations are licensed and regulated by the Food and Drug Administration's Bureau of Biologics (BoB). While the handling of wastes are not specifically covered by these regulations, the BoB is aware of the potential environmental impacts of inappropriate disposal methods. Informal guidelines concerning waste disposal methods can be conveyed to blood bank and blood donor station personnel during licensing procedures. Furthermore, standards and directives (including how wastes should be handled) have been established by the Red Cross (document entitled "Blood Service Directives"), Blood Services of Arizona (the largest center within the Council of Community Blood Banks, CCBB) and the American Association of Blood Banks (AABB). Based on this information and comments from personnel in the industry, it would appear that wastes are not handled in a uniform manner across the country.

- Medical photography and art establishments are involved entirely with the production of photographic or graphic interpretations of medical specimens. The major potentially hazardous wastes produced by medical photography and art facilities are waste developer and fixer solutions from photographic operations. Most facilities discharge waste fixer and developer to the sewer. Larger facilities may reclaim silver from the fixer solution prior to disposal. Pathological specimens which are photographed are returned to the person requesting the photographs.
- Oxygen tent services are establishments involved in the renting or dispersal of oxygen tents. The method usually employed for the administration of oxygen to adults is via oxygen masks or nasal catheter or cannula. Thus, oxygen tents are not currently used for adults. However, they are used for small children but usually within a hospital setting. Most tents are disposable and made of polyvinyl chloride. There are no identifiable hazardous wastes associated with the service of providing oxygen tents either via commercial establishments or in hospitals.
- The major function of visiting nurse associations is to match requests for home nursing services with available qualified personnel. Thus, the wastes produced by these associations consist of general office refuse and are not considered hazardous. Visiting nurses do administer limited medications by injection (e.g., Vitamin B-12 or antibiotics). In these cases the syringe is made inoperative and disposed of at the patients home (with normal trash). All other wastes produced as a result of nursing activities (bandages, cotton swabs, etc.) are also disposed of via appropriate means at the patients home.

SOURCES OF INFORMATION USED:

- American Red Cross
- Council of Community Blood Centers
- American Association of Blood Banks
- Individual facilities from each type of establishment

APPENDIX B

ASSESSMENT SUMMARIES FOR SIC'S CONTAINING SMALL GENERATORS OF HAZARDOUS OR POTENTIALLY HAZARDOUS WASTES

INDUSTRY: Horticultural Specialties SIC: 018

DESCRIPTION OF THE INDUSTRY:

Establishments in the subject industry are engaged in the growing of and wholesale trade in ornamental and food crops grown under cover and other nursery products.

The horticultural specialties industry tends to be dominanted by small firms. Of the reported 5015 wholesale nurseries in the United States in 1975, 2800 had sales of less than $100,000/year and less than 16 employees; only 95 had sales of greater than $1,000,000 and more than 125 employees(1). The industry is quite diverse both geographically and in the types of products grown. In addition, employment and sales tend to have seasonal peaks for firms in most areas of the U.S.

CHARACTERISTICS OF HAZARDOUS WASTES PRODUCED:

Potentially hazardous wastes generated by firms in the industry are pesticide containers and pesticide-contaminated materials resulting from spills. A wide variety of insecticides, herbicides, soil fumigants and fungicides are used since the diverse types of flowers, ornamentals, and trees have special pest control requirements. Expenditures by nurseries on pesticides as a percent of total sales is reported to be in the range of 1.5 to 2.6%(1). The following table presents waste generation estimates for empty insecticide/herbicide/fungicide containers requiring disposal for nurseries of various sizes. Based on these estimates, most nurseries would generate about 2 kg/mo of empty containers, with an average waste generation rate per nursery of 5 kg/mo. Based on the average rate of 5 kg/mo/establishment, the total waste generation for the industry is estimated at 23,000 kg/mo (see Industry Profile). It may be noted that pesticide use is highly seasonal in the industry and that most of the empty containers may be generated over a one- to three-month period. Based on the waste generation range of 2 to 65 kg/mo/establishment for nurseries of various sizes, even if the waste is generated only over a 1-3 month period, only a very few establishments would generate more than 100 kg/mo during peak months.

Summary of Nursery Industry Employment, Sales and Estimated Empty Pesticide Container Generation

Company Sales, 1975 $/yr	25-100K	100-300K	300-500K	500-1000K	>1000K
No. Firms in U.S.	2800	1700	280	140	95
No. Employees					
Average	6.7	13.8	24	42	124
Peak	20	26.7	53	81	228
Expenditures per firm, $/yr					
Insecticides	489	1085	2408	4588	18,313
Herbicides	346	504	1249	3067	8,083
Fungicides	530	1164	1949	3495	14,939
Total	1365	2753	5606	11,150	41,335
Est. No. of 5-gal containers per year*	17	34	70	144	517
Amt. of pesticides contained in empty 5-gal containers† (kg)	1.7	3.4	7.0	14.4	51.7
Total weight of containers plus residue‡ (kg/mo)	2	4	9	18	65

*Assuming average pesticide cost of $2/lb and that pesticides are purchased in 5-gallon containers[2]
†Assuming 100 grams residue per container
‡Assuming a container's weight of 1.5 kg

WASTE TREATMENT, STORAGE, AND DISPOSAL PRACTICES:

Most firms are believed to dispose of empty pesticide containers along with other wastes without special precautions[3]. Although some "restricted use" pesticides are used by nurseries, the quantities used are usually less than the amounts which would mandate user restriction under most state programs. Hence, empty container disposal requirements which would apply to larger pesticide users are generally not applicable to most nurseries. Nonetheless, at least one nursery contacted[4] indicated that its empty containers are rinsed prior to disposal in a sanitary landfill.

CURRENT DISPOSAL COSTS:

Since empty containers are commonly disposed of with other larger volume refuse, little or no additional disposal costs are incurred by nurseries for container disposal.

ALTERNATIVE DISPOSAL METHODS:

Rinsing of empty containers prior to disposal and use of rinsings "in house" for pest control (e.g., in preparation of new batches of sprays), which is reportedly practiced by some large firms, would be an environmentally acceptable alternative to direct disposal of unrinsed containers.

INDUSTRY PROFILE:

(See table)

ASSESSMENT OF THE QUALITY OF THE DATA BASE:

The estimated total amount of pesticides used in 1975 by nurseries based upon the pesticides expenditures and cost data presented above is 3.6×10^6 kg/yr (8×10^6 lbs/yr). This constitutes about 0.50% of the total U.S. pesticide use, a percentage consistent with at least one other estimate of pesticide use by the nursery industry (~1%)[5].

It is likely that the estimate of about 5000 establishments in the U.S. is low, since many nurseries are small operations and reported statistics tend to underestimate the number of such establishments[2].

SOURCES OF DATA USED AND EXPLANATORY NOTES:

(1) Research Summary - Scope III of the Nursery Industry, Horticultural Research Institute, 1977

(2) Based upon listed retail prices of several commonly used insecticides and herbicides in 1979, corrected to 1975 dollars (for which year sales data are shown in table)

(3) Information provided by the American Association of Nurserymen

(4) One medium/large size mid-western nursery

(5) US EPA Office of Pesticide Programs

11/27/79. 08.43.27.

INDUSTRY PROFILE SIC: 180 NATION

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN
VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	5015	100.0	25075.	100.0
100-200	0	0.0	0.	0.0
200-300	0	0.0	0.	0.0
300-400	0	0.0	0.	0.0
400-500	0	0.0	0.	0.0
500-600	0	0.0	0.	0.0
600-700	0	0.0	0.	0.0
700-800	0	0.0	0.	0.0
800-900	0	0.0	0.	0.0
900-1000	0	0.0	0.	0.0
1000-2000	0	0.0	0.	0.0
2000-5000	0	0.0	0.	0.0
> 5000	0	0.0	0.	0.0
TOTAL	5015	100.0	25075.	100.0

INDUSTRY: Soil Preparation and Crop Services SIC: 0711,0721, 0729

DESCRIPTION OF INDUSTRY:

The subject industry consists of firms which provide soil preparation services (SIC 0711); crop planting, cultivating and protection services (SIC 0721); and general crop services (SIC 0729). These services, which are provided to firms on a contract or fee basis, are very diverse and include chemical treatment of soil, plowing, aerial dusting and spraying, pruning of orchard trees and vines, hoeing, citrus grove cultivation, crop dusting, weed control after planting, etc.

From the standpoint of hazardous waste generation, the soil preparation and crop services involving pesticide application is the most important activity in the subject industry. There are an estimated 5300 establishments in the subject industry providing pesticide application services(1). These establishments can be subdivided into three groups as follows(1):

Type of Agricultural Service Establishment	Estimated Number of Establishments in U.S. (1978) which apply pesticides
Soil preparation and miscellaneous crop protection	1000
Aerial pesticide applicators	3800
Ground pesticide applicators	500
U.S. Total	5300

As would be expected, crop services firms tend to be found in the largest number in major agricultural states such as California, Florida, Illinois, Texas and New York. The breakdown of pesticides applied to farmland by class is approximately as follows: herbicides 52%, insecticides 46% and fungicides 2%(2). About 65% of the firms in the subject SIC's employ less than 4 persons according to census data.

CHARACTERISTICS OF HAZARDOUS WASTES PRODUCED:

Hazardous wastes generated by firms in SIC 072 are (a) empty pesticide containers containing residues, (b) waste pesticides and (c) dilute pesticide solutions from rinsing of tanks and containers. An "average" firm generates around 50 kg/mo of empty containers, 200 kg/mo of waste pesticides, and 11,000 kg/mo of dilute pesticide solutions(1).* However, the relative hazards presented

*Large seasonal variations can occur in waste generation since pesticide application needs are seasonal.

by the waste pesticides and empty containers is greater than the dilute pesticide solutions since the former wastes are more concentrated. Also, the toxicity of pesticide wastes vary widely with the specific substance(s) used on crops. Generally herbicide wastes are less toxic to mammals than insecticide wastes.

Based on the industry profile developed in this study, it is estimated that about 29% of the firms in the U.S. generate less than 100 kg/mo of waste, while 39% generate more than 5000 kg/mo. The total amount of waste generated is estimated at 54 million kg/mo, a quantity which agrees well with a previous estimate for the crop services industry of 58 million kg/mo(1).

WASTE TREATMENT, STORAGE AND DISPOSAL PRACTICES:

Based on data for 28 firms in California, all unrinsed containers are reportedly disposed to secure landfill. Waste pesticides and/or dilute pesticide solutions are reportedly disposed as follows:

lagoon/pond	14%
landspreading	45%
landfill	32%
municipal sewer	5%
incineration	5%

Limited data on disposal practices are available from other states. One survey in Illinois found that 18% of the firms were triple-rinsing containers prior to disposal and 43% were rinsing at least once(3). Containers were then disposed to sanitary landfill or burned (primarily paper containers).

Pesticide solutions generated from rinsing of application tanks are reportedly disposed by relatively uncontrolled methods; such as dumping directly on the ground at rinse site, collection and application to small land areas near mixing site, and collection in a settling pond with eventual seepage into the soil(1).

CURRENT DISPOSAL COSTS:

No data are currently available on disposal costs from actual operating firms in the industry.

ALTERNATIVE DISPOSAL METHODS:

The environmentally more acceptable alternative to current practice of landfill disposal of unrinsed containers is triple rinsing with use of rinsate for preparation of new batches of pesticide solution or disposal on cropland. Waste pesticides and pesticide solutions are preferably disposed of by proper incineration, by application to cropland, or by use of "soil mounds" disposal system[4].

INDUSTRY PROFILE:

(See table)

ASSESSMENT OF THE QUALITY OF THE DATA BASE:

The industry profile and the breakdown of disposal practices developed here are based upon data for 28 firms in California. Although a variety of firm sizes of both ground and aerial applicators are represented by these data, the 28 firms in California may not be representative of all firms in the U.S. California does have fairly stringent requirements for container disposal compared to other states, and thus the disposal practices reported by the California firms for containers may not be representative of firms in other states. As mentioned previously, the estimated total waste quantity of 54 million kg/mo for the industry agrees well with a reported estimate of 58 million kg/mo[1].

SOURCES OF DATA USED AND EXPLANATORY NOTES:

(1) Energy Resources Co., Economic Impact Analysis of Hazardous Waste Management Regulations on Selected Generating Industries, Office of Solid Waste, U.S. EPA, December 1978

(2) U.S. Dept. of Agriculture, Quantities of Pesticides Used by Farmers in 1971 Economic Research Service, 1974

(3) Leasure, J. K., Pesticide Container Disposal in Illinois, Illinois EPA, October 1978

(4) SCS Engineers, Disposal of Dilute Pesticide Solutions - A State of the Art Report, Draft Report to EPA, October 1978

(5) Based on state data base for 28 establishments in California

11/27/79. 08.43.27.

INDUSTRY PROFILE(5) SIC: 711 721 729 NATION

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	1520	28.7	7600.	.0
100-200	365	6.9	54750.	.1
200-300	214	4.0	53500.	.1
300-400	149	2.8	52150.	.1
400-500	112	2.1	50400.	.1
500-600	89	1.7	48950.	.1
600-700	73	1.4	47450.	.1
700-800	62	1.2	46500.	.1
800-900	53	1.0	45050.	.1
900-1000	46	.9	43700.	.1
1000-2000	274	5.2	411000.	.8
2000-5000	278	5.2	973000.	1.8
> 5000	2067	39.0	52501800.	96.6
TOTAL	5302	100.0	54335850.	100.0

INDUSTRY: Veterinary Services SIC: 0741,0742

DESCRIPTION OF INDUSTRY:

This SIC includes establishments of licensed practitioners primarily engaged in the practice of veterinary services for livestock (SIC 0741) and veterinary services for animal specialties (SIC 0742). There are approximately 32,000 practicing veterinarians in the U.S. (1977). It is estimated that 74% are in private (small) practice. Veterinary distribution is roughly in proportion to the general population, although states with large numbers of farm animals have a disproportionately high number of veterinarians.[1] Census data indicate a total of 8,252 establishments for this SIC, with 89% employing less than 10 persons.

CHARACTERISTICS OF HAZARDOUS WASTE PRODUCED:

Based on state survey data[2] the types of waste typically generated by veterinary facilities include biological cultures, excised tissue, carcasses, bandages, insecticides, vaccines and other drugs, and some organic solvents. Empty drug vials, syringes, needles, and bedding material such as straw, sawdust, and paper contaminated with feces and urine may also be generated. Some of these wastes may contain pathogens with the potential for transmission of disease from animals to humans.

The estimated amount of hazardous waste generated by the subject SIC is 1.7 million kg/mo. Based on state data, 89% of the generators produce infectious waste and the infectious waste accounts for 93% of the total waste quantity reported.

WASTE TREATMENT, STORAGE AND DISPOSAL PRACTICES:

The majority of waste from veterinary hospitals is treated as general waste and disposed of with other non-hazardous wastes. Certain wastes including cadavers, tissues, organs, etc. may be refrigerated or frozen prior to pickup by municipal or private disposal companies. Contaminated laboratory wastes such as culture plates and wastes known to contain pathogens are sometimes autoclaved prior to disposal. Animal bodies and tissues may be sent to rendering plants, incinerated onsite, or incinerated offsite[3].

Disposal methods vary among facilities and depend, to a great extent, on applicable state and/or local regulations. Based on state survey data from Iowa, 47% of the veterinary facilities reported disposal of some wastes including cultures, carcasses, surgical waste, vaccines, solvents, pesticides and drugs by landfill; 42% indicated that some of their wastes were hauled by contractors but the disposal method was unknown; 26% disposed of some wastes including animal tissues, carcasses, surgical dressings and vaccines by incineration. 10% of the facilities reported disposal of outdated drugs to the sewer.

CURRENT DISPOSAL COST:

ALTERNATIVE DISPOSAL METHODS:

Sterilization of infectious wastes prior to disposal would eliminate the need for special handling of these wastes. Disinfection of some wastes prior to disposal may be adequate. Separation of pathological and surgical materials from general waste for disposal by incineration or sanitary landfill would decrease the quantity of waste considered hazardous.

INDUSTRY PROFILE:

(See tables)

ASSESSMENT OF QUALITY OF DATA BASE:

Except for the survey data from Iowa which were acquired and used in this assessment, no quantitative data could be identified elsewhere on hazardous waste generation in the subject SIC's. The data for Iowa, however, may not be a very accurate representation of the national picture. The definition of "pathological" waste used in the Iowa survey also appears somewhat narrower than the definition of "infectious" waste proposed by EPA.

None of the waste in the Iowa study was reported to be rendered. Other sources of information indicate that rendering is a common practice in some locales. If rendering is considered to be a recycling method, then the amount of waste which is generated should be actually less than the estimate shown since "recyclers" would not be considered "generators" for the purposes of this study.

SOURCES OF DATA USED AND EXPLANATORY NOTES:

(1) Arthur D. LIttle Inc., "Veterinary Supply and Demand in the United States," a report to the American Veterinary Medical Association, July 1978.

(2) State survey data including 19 surveys from Iowa

(3) Enviro Control, Inc., Evaluation of Treatment, Storage and Disposal Methods for Infectious Waste, report submitted to EPA, Washinqton, D.C., May 1979

(4) American Veterinary Medical Association

(5) Based on Iowa state data for 19 establishments in Iowa census data; the state data indicates that 93% of the hazardous waste is infectious.

(6) Based on the state data, approximately 11% of the hazardous waste generators in this SIC do not generate infectious waste.

INDUSTRY PROFILE: ESTIMATED NUMBER OF PLANTS AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION RANGE CATEGORIES[5]

Waste Generation Ranges (kg/mo)	Establishments		Waste Quantity	
	Number	% Total	kg/mo	% Total
less than 100	6,406	78	320,000	19
100 - 200	635	7.7	95,000	5.7
200 - 300	297	3.6	74,000	4.5
300 - 400	173	2.1	61,000	3.6
400 - 500	124	1.5	56,000	3.3
500 - 600	82	1.0	45,000	2.7
600 - 700	66	0.8	43,000	2.6
700 - 800	49	0.6	37,000	2.2
800 - 900	41	0.5	35,000	2.1
900 - 1000	33	0.4	31,000	1.9
1000 - 2000	173	2.1	260,000	16
2000 - 5000	173	2.1	607,000	36
more than 5000	0	0	0	0
U.S. Total	8,252[6]	100	1,664,000	100

INDUSTRY: Landscape and Horticultural Services, Arboreta, Botanical and Zoological Gardens — SIC: 078,8421

DESCRIPTION OF THE INDUSTRY:

An estimated 50,000 establishments/businesses are included in the subject industries, with the majority involved in lawn/garden care services in the residential and commercial market[1]. Most of the firms are small and many are one- or two-person operations. The number of arboreta, botanical and zoological gardens in the U.S. are estimated at 200 to 500[2,3].

CHARACTERISTICS OF HAZARDOUS WASTES GENERATED:

Potentially hazardous wastes generated in the subject industries are empty pesticide containers and pesticide contaminated materials resulting from spills. Only about one-quarter of the 50,000 firms (or 12,500 firms) are estimated to use any pesticides[1]. Quantities used range from about 1 5-gallon container per month for the great majority of establishments[1] to over 100 5-gallon containers per month by some larger establishments (especially during peak season). The total waste generated by the establishments in the subject SIC is estimated at 19,000 kg/mo (see Industry Profile).

WASTE TREATMENT, STORAGE AND DISPOSAL PRACTICES:

Although little is known about waste disposal practices in the industries, it is believed that most firms dispose of empty containers with municipal refuse. In many cases such disposal is at the customer's site rather than at the firm's office or place of business. Industry sources indicate that some firms, particularly larger ones, may rinse their containers prior to disposal[2].

CURRENT DISPOSAL COST:

No additional disposal cost is incurred by firms in the subject industries over that for general refuse.

ALTERNATE DISPOSAL METHODS:

Containers may be rinsed prior to disposal, with rinsings used to prepare the next batch of pesticide solution for application.

INDUSTRY PROFILE:

(See table)

ASSESSMENT OF THE QUALITY OF THE DATA BASE:

Reliable statistics are not available on the number of firms covered by SIC;s 078 and 8421, on the fraction of the firms using pesticides and on waste generation quantities. The estimated data shown in the industry profile table are probably accurate within a factor of two or three based on discussions with industry representatives[1,2,3]. Despite uncertainties in the number of firms and waste generation rates in the subject industry, considerably less uncertainty is associated with the conclusion that essentially nearly all firms would generate an average of less than 100 kg/mo of waste containers.

SOURCES OF DATA USED AND EXPLANATORY NOTES:

(1) Lawn & Garden Distributors Assn.

(2) Am. Soc. Zoological Parks and Aquariums

(3) Am. Assn. of Botanical Gardens & Arboreta

(4) Based on an assumed container generation rate of container/mo/establishment and a container weight of 1.5 kg

11/27/79. 08.43.27.

INDUSTRY PROFILE[4] SIC: 780 NATION
8421

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	12500	100.0	18750.	100.0
100-200	0	0.0	0.	0.0
200-300	0	0.0	0.	0.0
300-400	0	0.0	0.	0.0
400-500	0	0.0	0.	0.0
500-600	0	0.0	0.	0.0
600-700	0	0.0	0.	0.0
700-800	0	0.0	0.	0.0
800-900	0	0.0	0.	0.0
900-1000	0	0.0	0.	0.0
1000-2000	0	0.0	0.	0.0
2000-5000	0	0.0	0.	0.0
> 5000	0	0.0	0.	0.0
TOTAL	12500[1]	100.0	18750.	100.0

INDUSTRY: Construction - Special Trade Contractors SIC: 1700

DESCRIPTION OF INDUSTRY:

The subject SIC includes special trade contractors who undertake special ized activities such as plumbing, painting, plastering, carpentering, etc. Establishments that have the potential to produce hazardous wastes are plumbing, heating and air conditioning (SIC 1711), painting, paper hanging and decorating (SIC 1721), plastering, drywall, acoustical and insulation work (SIC 1742), carpentering and flooring (SIC's 1751 and 1752), roofing and sheet metal work (SIC 1761), wrecking and demolition work (SIC 1795), and miscellaneous special trade (SIC 1799) including epoxy application, glazing of concrete surfaces, insulation of pipes and boilers and lead burning. The establishments in SIC 1700 are generally small in size (e.g., in SIC 1721 78% are in the 1-4 employee size range; see census data computer printout for number distribution of establishments by EPA region and employment size) and are distributed throughout the country in approximate proportion to population[1].

CHARACTERISTICS OF HAZARDOUS WASTES PRODUCED:

The specific special trades producing hazardous wastes and the types of wastes generated are as follows:

SIC	Industry Subcategory	Type of Potentially Hazardous Wastes Generated
1711	Plumbing, heating and air conditioning	Solvents, asbestos, and miscellaneous waste (e.g., contaminated rags, empty containers of supply materials)
1721	Painting, paper hanging and decorating	Paint, solvents, glues and miscellaneous wastes
1742	Plastering, drywall, acoustical and insulation work	Waste insulation materials, adhesives, solvents and miscellaneous wastes
1751, 1752	Carpentering and flooring	Solvents, lacquers, paints, glues and miscellaneous wastes
1761	Roofing and sheet metal work	Tars, sealants and miscellaneous wastes
1795	Wrecking and demolition work	Demolition waste which may contain asbestos, chemicals, etc. (depending on the nature of operation)
1799	Misc. special trade including epoxy application, glazing of concrete surfaces, insulation of pipes and boilers, and lead burning	Epoxy waste, solvents, asbestos and miscellaneous wastes

The amounts of hazardous wastes generated by individual special trades establishments vary. However, in the majority of cases the amounts are expected to be less than 100 kg/mo. The total amount of hazardous waste generated by the subject SIC is estimated 2.2×10^6 kg/mo. Painting contractors (SIC 1721) account for approximately 44% (9.7×10^5 kg/mo) of this total (see Industry Profile), with an average rate of 35 kg/mo per generator. Other hazardous waste generating establishments account of the remaining 56% (or 1.25×10^6 kg/mo) based on an assumed waste generation rate of 10 kg/mo/establishment.

WASTE TREATMENT, STORAGE AND DISPOSAL PRACTICES:

Generally, all special trades contractors are required by contract (and some state laws) to properly dispose of all their own wastes, including the hazardous wastes, which are produced at a construction site[2]. These contractors, however, usually deposit all their wastes (hazardous and nonhazardous) into roll-offs, dumsters or dump trucks which are placed at the construction site by the general contractor for the disposal of nonhazardous wastes. Other methods of disposal used by the special trades contractors are land burying or land spreading at the construction site[2]. Some large generators of hazardous wastes dispose of wastes (primarily paint sludges) at hazardous waste disposal facilities.

CURRENT DISPOSAL COST:

Due to the majority of establishments disposing waste with nonhazardous construction refuse, disposal costs attributed to hazardous wastes are expected to be minimal.

ALTERNATIVE DISPOSAL METHODS:

Environmentally more acceptable waste disposal methods for the subject SIC include: storage and disposal of waste solvents via solvent reclaimers; segregation and separate disposal (e.g., via commercial waste disposal services) of other hazardous wastes from regular refuse; where appropriate cleaning of the empty containers for recycling or co-disposal with regular refuse.

INDUSTRY PROFILE:

(See tables)

ASSESSMENT OF QUALITY OF DATA BASE:

From the standpoint of hazardous waste generation, the subject industry has been one of the least studied industries. Except for limited state data for the painting contractors in SIC 1721, very little data are available on waste quantities generated and disposal practices employed. In this program information requests submitted to some 20 establishments produced only one response. Although the data on the number of establishments are considered reliable, there is considerable uncertainty in the estimated waste generation rates. Since not all establishments in each of the SIC subcategories considered as potential hazardous waste generators would produce such wastes (at least on a routine basis), the total number of generators may have been overestimated here. However, this overestimation is probably compensated by the contractors in SIC 15 (building construction - general contractors and operative builders) and SIC 16 (construction other than building construction - general contractors) which were not separately inventoried.

SOURCES OF DATA USED AND EXPLANATORY NOTES:

(1) Based on comparison of number distribution of establishments by EPA region (census data) versus populations distribution of EPA regions compiled from the Statistical Abstract, 1978

(2) Based on discussions with the National Association of Home Builders

(3) Based on state data for SIC 1721

(4) Based on number of establishments from reference (5) and waste generation factor based on number of employees and waste generation obtained from industry contacts and state data

(5) Census data

(6) Based on an assumed waste generation rate of 10 kg/mo for all generators in SIC's 1711, 1742, 1751, 1752, 1761, 1795 and 1799 and the number of establishments from reference (5)

11/27/79. 08.43.27.

INDUSTRY PROFILE[6]

SIC: 1711,1742, 1751, 1752, 1761 1795, 1799

NATION

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	125201	100.0	1252010.	100.0
100-200	0	0.0	0.	0.0
200-300	0	0.0	0.	0.0
300-400	0	0.0	0.	0.0
400-500	0	0.0	0.	0.0
500-600	0	0.0	0.	0.0
600-700	0	0.0	0.	0.0
700-800	0	0.0	0.	0.0
800-900	0	0.0	0.	0.0
900-1000	0	0.0	0.	0.0
1000-2000	0	0.0	0.	0.0
2000-5000	0	0.0	0.	0.0
> 5000	0	0.0	0.	0.0
TOTAL	125201[5]	100.0	1252010.	100.0

11/27/79.   08.43.27.

INDUSTRY PROFILE(4)   SIC: 1721   NATION

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	26276	96.4	131380.	13.5
100-200	274	1.0	41100.	4.2
200-300	137	.5	34250.	3.5
300-400	137	.5	47950.	4.9
400-500	55	.2	24750.	2.5
500-600	27	.1	14850.	1.5
600-700	27	.1	17550.	1.8
700-800	27	.1	20250.	2.1
800-900	27	.1	22950.	2.4
900-1000	27	.1	25650.	2.6
1000-2000	137	.5	205500.	21.2
2000-5000	110	.4	385000.	39.6
> 5000	0	0.0	0.	0.0
TOTAL	27261(5)	100.0	971180.	100.0

11/29/79.   13.49.57.

BREAKDOWN OF PLANTS IN EMPLOYMENT SIZE CATEGORIES BY EPA REGION IN SIC 1721

NUMBER OF PLANTS IN EACH CATEGORY

REGION	TOTAL	1-4	5-9	10-19	20-49	50-99	100-249	250-499	500-999	>1000
I	1839	1601	158	57	20	2	1	0	0	0
II	2551	2136	252	95	49	15	3	1	0	0
III	2904	2250	389	157	82	19	7	0	0	0
IV	3608	2622	615	226	115	23	7	0	0	0
V	4343	3510	483	217	100	27	5	1	0	0
VI	2692	1906	438	230	84	26	4	4	0	0
VII	1353	1075	184	62	29	1	2	0	0	0
VIII	836	666	111	45	10	4	0	0	0	0
IX	2794	2155	357	174	82	21	5	0	0	0
X	825	680	94	37	12	2	0	0	0	0
NATION	23745	18601	3081	1300	583	140	34	6	0	0

INDUSTRY: Shortening, Table Oils, Margarine and Other Edible Fats and Oils, Not Elsewhere Classified SIC: 2079

DESCRIPTION OF INDUSTRY:

Establishments in the subject SIC are engaged in manufacturing of shortening, table oils, and other edible fats and oils, not elsewhere classified, by further processing of purchased animal and vegetable oils. The only potential hazardous wastes generated from the industry is the metallic catalyst (mainly nickel) used in the hydrogenation process. According to a 1975 survey[1] there are a total of 96 edible oil refineries in the U.S., 49 of which use the hydrogenation process and have an annual total production capacity of 3.9 billion kg. The largest refineries (refineries with capacities in the range of 160 to 340 million kg/yr) account for 46% of the total capacity, while the smallest refineries (with capacities in the 11 to 56 million kg/yr range) account for only 3% of the total capacity. The geographical distribution of these refineries is as follows[2]:

EPA Region	No. of Refineries
I	0
II	6
III	0
IV	9
V	17
VI	7
VII	3
VIII	0
IX	7
X	0

CHARACTERISTICS OF HAZARDOUS WASTES PRODUCED:

Waste of a potentially hazardous nature generated is spent catalyst (about 30% reduced nickel; 70% nickel oxides) from the hydrogenation process for refining edible oil. Based on data provided by one establishment and one trade association, the amount of spent nickel catalyst generated is estimated at 0.02% to 0.03% of the refined oil.

WASTE TREATMENT, STORAGE AND DISPOSAL PRACTICES:

Currently it is estimated[3,4] that 40% of the spent catalyst is handled by recycling onsite; sales (from nickel recovery) and disposal to hazardous management facilities" account for the other 60%.

SIC: 2079

CURRENT DISPOSAL COST:

ALTERNATIVE DISPOSAL METHOD

INDUSTRY PROFILE:

(See table)

SOURCES OF DATA USED:

(1) George W. Kramer and S. A. Gazelle, U.S. Edible Fats and Oils Refining Capacities, 1975, U.S. Dept. of Agriculture, FOS-281, Feb. 1976

(2) The Edible Oil Industry in the United States, 1975 Directory

(3) Institute of Shortening and Edible Oils

(4) Contact with one refinery

(5) Assuming 50% of the plants (i.e., 23 plants) dispose of their spent catalyst using methods other than recycling; also assuming the hydrogenation capacity in each refinery is proportional to its total oil refinery capacity

11/27/79.   08.43.27.

INDUSTRY PROFILE[5]   SIC: 2079   NATION

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN
VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	0	0.0	0.	0.0
100-200	0	0.0	0.	0.0
200-300	1	4.3	250.	.5
300-400	0	0.0	0.	0.0
400-500	1	4.3	450.	.8
500-600	0	0.0	0.	0.0
600-700	1	4.3	650.	1.2
700-800	0	0.0	0.	0.0
800-900	1	4.3	850.	1.6
900-1000	1	4.3	950.	1.8
1000-2000	6	26.1	9000.	16.6
2000-5000	12	52.2	42000.	77.6
> 5000	0	0.0	0.	0.0
TOTAL	23	100.0	54150.	100.0

INDUSTRY: Textile Mill Products SIC: 2211,2221 2241,228,229

DESCRIPTION OF INDUSTRY:

Establishments covered include weaving mills, cotton (SIC 2211); weaving mills, synthetics (SIC 2221); narrow fabric mills (SIC 2241); yarn and thread mills (SIC 228); and mills engaged in the production of miscellaneous textile goods such as felt and lace goods, padding and upholstry filling, processed waste and recovered fabrics and flock, tire cord and fabric, cordage and twine, etc. (SIC 229). Based on the census data there are 303 establishments in SIC 2211, 422 establishments in SIC 2221, 335 establishments in SIC 2241, 742 establishments in SIC 228 and 986 establishments in SIC 229. Of the total of 2788 establishments in the subject SIC's, 409 (or 15%) and 666 (or 24%) establishments have less than 5 and 10 employees, respectively.

CHARACTERISTICS OF HAZARDOUS WASTES:

The majority of plants in the subject SIC's which report producing hazardous wastes generate waste solvents. These solvents are used for both cleaning purposes and in various finishing and coating operations. Other potentially hazardous wastes reported are latex wastes, spinning aid compounds, waste coating materials, and printing inks. Based on hazardous waste surveys in New York, Iowa, Mass. and Rhode Island, about 70% (or 1952) of the 2788 mills generate one or more of the above types of wastes. Based on the waste generation profiles developed here (see Industry Profile), establishments in the subject SIC's generate a total of 1.5 million kg/mo of hazardous waste with an overall average waste generation rate of 1840 kg/mo/waste generating mill.

WASTE TREATMENT, STORAGE AND DISPOSAL PRACTICES:

About one half of the mills generating solvent wastes indicate that solvents are reclaimed offsite. The remaining solvents and other wastes are disposed to lagoons or to municipal sewer. No mills which report disposal methods indicate landfill as a disposal method.

CURRENT DISPOSAL COST:

No data are currently available on cost of waste disposal specific to the subject SIC's.

ALTERNATIVE DISPOSAL METHODS:

The recovery or incineration of waste solvents would be environmentally more acceptable than disposal to lagoons or municipal sewer as is practiced by some mills at present.

ASSESSMENT OF THE QUALITY OF THE DATA BASE

No other estimates of the waste generation quantities in the subject SIC's are currently available for comparison purposes. A previous study of the textile industry(1) excluded the subject SIC's from consideration as hazardous waste generators, and considered only those mills involved in the dyeing and finishing of fabrics as hazardous waste generators (SIC's 2231, 225, 226, 2272). The total amount of hazardous waste generated by the dyeing and finishing mills (148 million kg/mo, see Industry Assessment - Dyeing and Finishing of Textiles) far exceeds the estimated waste quantity of 1.5 million kg/mo produced by the mills in the subject SIC's.

SOURCES OF DATA USED AND EXPLANATORY NOTES:

(1) Abrams, E. F., et al, "Assessment of Industrial Hazardous Waste Practices, Textile Industry," Office of Solid Waste, U.S. EPA, June 1976

(2) Based on the census data, adjusted for the "zero" generators

(3) Based on waste quantity data in the state data base for 2 establishments

(4) Based on waste quantity data in the state data base for 4 establishments

(5) Based on waste quantity data in the state data base for 2 establishments

(6) Based on waste quantity data in the state data base for 2 establishments

11/27/79. 08.43.27.

INDUSTRY PROFILE(3) SIC: 2211 NATION
2221

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	10	6.0	500.	.2
100-200	14	8.4	2100.	.9
200-300	13	7.8	3250.	1.5
300-400	11	6.6	3850.	1.7
400-500	10	6.0	4500.	2.0
500-600	9	5.4	4950.	2.2
600-700	8	4.8	5200.	2.3
700-800	7	4.2	5250.	2.3
800-900	6	3.6	5100.	2.3
900-1000	6	3.6	5700.	2.5
1000-2000	36	21.6	54000.	24.1
2000-5000	37	22.2	129500.	57.8
> 5000	0	0.0	0.	0.0
TOTAL	167(2)	100.0	223900.	100.0

11/27/79. 08.43.27.

INDUSTRY PROFILE[4] SIC: 2241 NATION
228
229 (except 2291, 2295)

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	PERCENT	WASTE QUANTITY KG/MO	PERCENT
0-100	58	13.7	2900.	.6
100-200	12	2.8	1800.	.4
200-300	13	3.1	3250.	.7
300-400	15	3.5	5250.	1.1
400-500	17	4.0	7650.	1.5
500-600	18	4.3	9900.	2.0
600-700	19	4.5	12350.	2.5
700-800	20	4.7	15000.	3.0
800-900	21	5.0	17850.	3.6
900-1000	21	5.0	19950.	4.0
1000-2000	164	38.8	246000.	49.3
2000-5000	45	10.6	157500.	31.5
> 5000	0	0.0	0.	0.0
TOTAL	423[2]	100.0	499400.	100.0

INDUSTRY PROFILE(5) SIC: 2291 NATION

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN
VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	7	15.2	350.	.7
100-200	5	10.9	750.	1.4
200-300	4	8.7	1000.	1.9
300-400	3	6.5	1050.	2.0
400-500	2	4.3	900.	1.7
500-600	2	4.3	1100.	2.1
600-700	2	4.3	1300.	2.4
700-800	2	4.3	1500.	2.8
800-900	1	2.2	850.	1.6
900-1000	1	2.2	950.	1.8
1000-2000	8	17.4	12000.	22.5
2000-5000	9	19.6	31500.	59.2
> 5000	0	0.0	0.	0.0
TOTAL	46	100.0	53250.	100.0

11/27/79. 08.43.27.

INDUSTRY PROFILE(1) SIC: 2295 NATION

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	14	7.9	700.	.1
100-200	16	9.0	2400.	.3
200-300	13	7.3	3250.	.5
300-400	11	6.2	3850.	.5
400-500	9	5.1	4050.	.6
500-600	8	4.5	4400.	.6
600-700	7	4.0	4550.	.6
700-800	6	3.4	4500.	.6
800-900	5	2.8	4250.	.6
900-1000	5	2.8	4750.	.7
1000-2000	28	15.8	42000.	5.9
2000-5000	25	14.1	87500.	12.4
> 5000	30	16.9	540000.	76.5
TOTAL	177	100.0	706200.	100.0

11/29/79.   13.55.57.

BREAKDOWN OF PLANTS IN EMPLOYMENT SIZE CATEGORIES BY EPA REGION IN SICS 2211 and 2221

NUMBER OF PLANTS IN EACH CATEGORY

REGION	TOTAL	1-4	5-9	10-19	20-49	50-99	100-249	250-499	500-999	>1000
I	67	9	1	5	15	12	14	6	3	2
II	74	29	6	13	11	5	9	1	0	0
III	74	9	6	5	9	11	13	11	8	2
IV	425	22	8	9	16	22	48	128	116	56
V	20	8	4	3	3	1	1	0	0	0
VI	21	2	3	1	3	3	2	4	2	1
VII	7	3	1	1	2	0	0	0	0	0
VIII	4	3	0	0	0	1	0	0	0	0
IX	30	13	3	7	7	0	0	0	0	0
X	3	2	0	0	0	0	1	0	0	0
NATION	725	100	32	44	66	55	88	150	129	61

11/29/79. 13.49.57.

BREAKDOWN OF PLANTS IN EMPLOYMENT SIZE CATEGORIES BY EPA REGION IN SIC 2291

NUMBER OF PLANTS IN EACH CATEGORY

REGION	TOTAL	1-4	5-9	10-19	20-49	50-99	100-249	250-499	500-999	>1000
I	11	1	1	2	2	2	1	2	0	0
II	7	0	0	0	4	0	2	0	1	0
III	4	0	0	1	1	1	1	0	0	0
IV	8	1	2	0	2	0	1	2	0	0
V	5	0	1	2	1	0	1	0	0	0
VI	5	1	1	1	1	1	0	0	0	0
VII	1	0	1	0	0	0	0	0	0	0
VIII	0	0	0	0	0	0	0	0	0	0
IX	4	2	0	0	0	0	2	0	0	0
X	1	0	0	0	0	1	0	0	0	0
NATION	46	5	6	6	11	5	8	4	1	0

11/29/79. 13.49.57.

BREAKDOWN OF PLANTS IN EMPLOYMENT SIZE CATEGORIES BY EPA REGION IN SIC 2295

NUMBER OF PLANTS IN EACH CATEGORY

REGION	TOTAL	1-4	5-9	10-19	20-49	50-99	100-249	250-499	500-999	>1000
I	32	3	1	4	5	6	8	4	1	0
II	49	2	8	10	16	3	8	2	0	0
III	14	0	1	2	4	4	2	1	0	0
IV	20	3	1	3	6	1	2	3	1	0
V	35	6	4	5	9	2	3	3	3	0
VI	5	1	1	1	1	1	0	0	0	0
VII	3	1	1	0	1	0	0	0	0	0
VIII	3	0	1	1	1	0	0	0	0	0
IX	18	5	2	1	6	3	1	0	0	0
X	0	0	0	0	0	0	0	0	0	0
NATION	179	21	20	27	49	20	24	13	5	0

INDUSTRY: Dyeing and Finishing of Textiles SIC: 2231,225, 226,2272

DESCRIPTION OF THE INDUSTRY:

Establishments in the subject SIC's are engaged in the dyeing and finishing of wool, woven or knit fabrics or carpets. It is estimated that approximately 2000 of the 5400 textile mills in the U.S. conduct dyeing operations[1]. The textile industry is heavily concentrated in the eastern U.S. with over one half of all mills located in EPA Region IV.

CHARACTERISTICS OF HAZARDOUS WASTES PRODUCED:

Three major types of hazardous wastes are identified for the subject industry. These are (a) empty dye/chemical containers, (b) spent solvents and (c) wastewater treatment sludges containing heavy metals/dye residues. An "average" textile mill is estimated to generate about 250 kg/mo of waste containers[2] and about 100 kg/mo of waste solvent[3]. Only 15% of all textile mills have wastewater treatment systems; the remainder discharge their wastewater to POTW's[4]. Of the total 300 dyeing and finishing mills which generate WWT sludges, only 40 mills are estimated to generate less than 5000 kg/mo of WWT sludge[4].

It is estimated that about 27% of the mills generate less than 100 kg/mo of waste and 19% more than 5000 kg/mo (see Industry Profile); the total hazardous waste generation in the industry is estimated at 1.48×10^8 kg/mo, with over 97% of this quantity consisting of WWT sludges from large textile mills.

The distribution of hazardous waste generation by size category may be altered in the future if regulations for wastewater pretreatment are promulgated by EPA Effluent Guidelines Division. The pretreatment of mill wastewaters would result in the production of WWT sludges and hence, a significant increase in the total waste quantities produced; under such circumstances it would be likely that many mills would generate less than 1000 kg/mo, and perhaps only 10% of all mills would fall into the 1000 to 5000 kg/mo hazardous waste generation rate category.

WASTE TREATMENT, STORAGE AND DISPOSAL PRACTICES[1]:

Most mills currently dispose of containers offsite in sanitary landfills. About 5% of the mills reportedly rinse containers prior to disposal. Solvents are commonly recovered either onsite or offsite via a contract hauler, with distillation residues disposed to landfills. WWT sludges are commonly lagooned onsite, with periodic disposal of settled or dewatered sludge in landfills or dumps, or by landspreading.

CURRENT DISPOSAL COST:

Contract hauling disposal costs for empty containers for the industry is estimated at around $15 (1975 dollars) per 1000 kg of waste[1]. A similar cost is estimated for landfill disposal of solvent recovery residues. (The cost of solvent recovery is generally offset by the value of recovered solvent.)

ALTERNATIVE DISPOSAL METHODS:

The major alternative to direct landfill disposal for empty containers is rinsing prior to disposal to render them nonhazardous. Rinsing is estimated to add about $70 (1975 dollars) per 1000 kg to the disposal cost[1]. Rinsing would also add a small amount of raw waste to wastewater load but should not significantly affect the cost of WWT.

The current practice of solvent reclamation is environmentally more acceptable than other disposal methods. Distillation residues could be disposed to approved landfills.

WWT sludges disposal alternatives include storage in lined lagoons, disposal of excess sludge in approved landfills, and incineration plus ash disposal in approved landfills.

INDUSTRY PROFILE:

(See table)

ASSESSMENT OF THE QUALITY OF DATA BASE:

The estimated number of mills and waste quantities in the greater than 1000 kg/mo waste generation range are based upon a combination of the state data, raw data collected in connection with the Reference 1 study and the comprehensive Effluent Guidelines Division survey of operating mills. The data base for the estimation of the number and waste quantity distributions for plants in the less than 1000 kg/mo category range, however, is based on a less comprehensive data base, namely the state data and the information collected in connection with the Reference 1 study. Therefore, a greater level of confidence would be assigned to the estimation shown in the Industry Profile table for mills in the greater than 1000 kg/mo waste generation rate.

SOURCES OF DATA USED:

(1) Abrams, E. F., et al, "Assessment of Industrial Hazardous Waste Practices Textiles Industry," U.S. EPA Office of Solid Waste Management program, 1976

(2) Based on waste container quantities reported for 17 mills in a survey in connection with the Reference 1 study

(3) Based on 25 mills reporting hazardous wastes in the state data base

(4) Based on Effluent Guidelines Division survey of the textile industry (approximately 350 mills out of an industry total of 5000 mills).

11/27/79.   08.43.27.

INDUSTRY PROFILE(2,3,4)   SIC: 2231   NATION
225, 226, 2272

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	560	27.0	28000.	.0
100-200	268	12.9	40200.	.0
200-300	176	8.5	44000.	.0
300-400	93	4.5	32550.	.0
400-500	109	5.3	49050.	.0
500-600	69	3.3	37950.	.0
600-700	41	2.0	26650.	.0
700-800	54	2.6	40500.	.0
800-900	39	1.9	33150.	.0
900-1000	34	1.6	32300.	.0
1000-2000	146	7.0	219000.	.1
2000-5000	100	4.8	350000.	.2
> 5000	387	18.6	147060000.	99.4
TOTAL	2076	100.0	147993350.	100.0

INDUSTRY: Sawmills and Planing Mills SIC: 2421

DESCRIPTION OF THE INDUSTRY:

Establishments in the subject industry are primarily involved in producing soft- and hardwood lumber for general commerce. There are an estimated 16,000 mills in the U.S. with about 1500 of the mills accounting for 95% of total lumber production (about 4×10^9 board-feet per year)[1]. About 18% of the total lumber is treated for "sap stain" control[2] (only the "green" or wet wood which is subject to sap stain problems is treated); both "dip" and "spray" treatment methods are used[2]. The most common treating chemical used is pentachlorophenol. Sap stain control treatment is practiced by mills of all sizes, although larger mills with kilns tend to do less (or no) treating.

The census data indicate a total of 6785 establishments in SIC 2421 of which 76% have less than 20 employees. Based on the census data, most of the mills are located in EPA Regions IV (32%), III (18%) and V (12%).

CHARACTERISTICS OF HAZARDOUS WASTES:

The two types of wastes generated by the treatment for sap stain control process are wood residues (sawdust, chips, etc.) saturated with treating chemicals and empty treating chemical containers. The former type of waste is that which accumulates in dip tanks or spray drip tanks[2]. Although no data are available on the amounts of such waste generated by sawmills, similar wastes generated by pressure treating of wood (in SIC 2491) range from 0.3 to 4 kg residue per 1000 ft^3 of wood treated[3]. Based on this generation factor, the small sawmills (the estimated 95% of the mills) would generate less than 1 kg/mo of waste and the large mills would generate from 60 to 800 kg/mo of waste. Of the 11 sawmills contacted in this study, only one indicated that it treated wood for sap stain control[4]. Using this information (i.e., only about 9% of the mills treat wood) and assuming that sap stain treatment is practiced equally by large and small mills, the waste generation estimates shown in the industry profile table have been calculated. Of the estimated 1500 U.S. mills (i.e., 9% of the 16,000) which employ sap stain treatment, about 1300 (i.e., 90%) would generate less than 100 kg/mo of waste. The total waste generation for the industry is estimated at 36,000 kg/mo. The quantity of empty treating chemical containers produced by saw mills is estimated at 0.2 kg/mo for small mills and 50 kg/mo for a very large mill[5]. Compared to the process waste (treating residue) quantities, waste container quantities are very small and do not significantly impact the estimated waste quantities shown in the Industry Profile table.

WASTE TREATMENT, STORAGE AND DISPOSAL PRACTICES[2]:

Little is known about disposal practices for treating residues. It is believed that most mills would have such wastes contract hauled to landfills along with other mill wastes. Some mills probably burn treating residues onsite along with bulk wood wastes (an increasing number of medium to large mills employ incineration with heat recovery for the disposal of waste woods. The practice of open burning of wood wastes in "tee-pee" type incinerators is on the decline due to air pollution restrictions. Open burning and improperly designed and operated incinerators would be ineffective in destroying halogenated organics such as pentachlorophenol contained in the wood treating waste.

CURRENT DISPOSAL COSTS:

Although no data are currently available on disposal cost for treating residues, it is not likely that any additional costs are incurred at present over the cost for bulk waste disposal at sawmills.

ALTERNATIVE DISPOSAL METHODS:

The major alternative to the current prevalent landfill disposal method is use of properly designed and operated incinerators.

INDUSTRY PROFILE:

(See table)

ASSESSMENT OF THE QUALITY OF DATA BASE:

Since very little actual data appear to exist on the number of mills which treat wood for sap stain control and on waste generation quantities and disposal methods, the estimates presented here are subject to some uncertainty stemming from the limited nature of the data base.

SOURCES OF DATA USED AND EXPLANATORY NOTES:

(1) Statistic Abstract of the United States, U.S. Dept. of Commerce, Bureau of the Census, 1976

(2) Information provided by a major supplier of chemicals to sawmills for sap stain control

(3) Data obtained from a limited survey of pressure wood treaters, 1978. See SIC 2491

(4) Telephone discussions with 11 establishments; the establishments were selected from those listed in the Dun and Bradstreet Middle Market Directory, 1975

(5) Assuming that about 0.4 lbs of treating chemical is used per 1000 board feet of wood needed (Reference 2 above) and that treating chemicals are purchased in 5-gallon containers weighing 1.3 kg empty

(6) The distribution of number of plants producing more than 100 kg/mo of wastes assumes that waste produced by a mill is proportional to the number of employees at the mill. The relative distribution of plants by employment size category is that contained in the census data.

11/27/79. 08.43.27.

INDUSTRY PROFILE(6) SIC: 2421 NATION

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	1336	90.5	2672.	7.4
100-200	75	5.1	11250.	31.1
200-300	35	2.4	8750.	24.2
300-400	15	1.0	5250.	14.5
400-500	10	.7	4500.	12.5
500-600	3	.2	1650.	4.6
600-700	2	.1	1300.	3.6
700-800	1	.1	750.	2.1
800-900	0	0.0	0.	0.0
900-1000	0	0.0	0.	0.0
1000-2000	0	0.0	0.	0.0
2000-5000	0	0.0	0.	0.0
> 5000	0	0.0	0.	0.0
TOTAL	1477	100.0	36122.	100.0

11/29/79.   13.49.57.

BREAKDOWN OF PLANTS IN EMPLOYMENT SIZE CATEGORIES BY EPA REGION IN SIC 2421

NUMBER OF PLANTS IN EACH CATEGORY

REGION	TOTAL	1-4	5-9	10-19	20-49	50-99	100-249	250-499	500-999	>1000
I	360	192	55	67	26	11	9	0	0	0
II	210	101	50	35	20	4	0	0	0	0
III	1196	504	290	231	136	29	6	0	0	0
IV	2167	774	505	372	301	140	69	4	2	0
V	843	406	168	152	93	19	5	0	0	0
VI	568	192	90	94	94	53	36	4	4	1
VII	297	145	86	44	17	3	2	0	0	0
VIII	215	87	29	27	28	30	12	1	1	0
IX	284	82	22	39	42	44	39	12	3	1
X	644	166	66	72	108	101	96	24	8	3
NATION	6784	2649	1361	1133	865	434	274	45	18	5

INDUSTRY: Wood Preserving SIC: 2491

DESCRIPTION OF THE INDUSTRY[1,2]:

Plants in SIC 2491 are primarily engaged in pressure treating of wood using one or more of three major types of treating chemicals - creosote, pentachlorophenol, and inorganic salts (primarily pentavalent arsenic salts). Of the 415 plants operating in the U.S., 295 treat with creosote or pentachlorophenol and the other 120 treat with inorganic salts. Over three quarters of the plants are located in either the Southern Pines region (Texas to Maryland) or the Douglas Fir/Western Red Cedar region (Washington to Northern California).

The census data indicate 385 establishments for the subject SIC (compared to 417 establishments used here based on data from References 1 and 2); the three EPA regions with the largest percentages of establishments are Regions IV (34%), VI (18%) and X (9.6%). Most of the establishments in this SIC are small in terms of number of employees, with 56% having less than 20 employees.

CHARACTERISTICS OF HAZARDOUS WASTES:

Two general types of potentially hazardous wastes generated by wood preserving plants are waste water treatment sludges and tank clean-out residues. The former types of waste is generated by plants which use creosote or pentachlorophenol (PCP). Moisture removed from wood during the treating process is subsequently condensed, producing a wastewater containing some creosote or PCP. Resulting WWT sludges are generated in approximate proportion to volume of wood treated. Reported WWT sludge generation rates range from 50 to 23,000 kg/mo per plant[3]. Inorganic salt treating does not result in the generation of wastewater containing treating chemicals since the salts are not volatile and hence, a moisture removal step is not needed (indeed, water is the solvent for salt treating).

All wood preserving plants generate small amounts of wastes from tank cleaning. These wastes consist of sawdust, wood chips, and sludge containing treating chemicals. Reported quantities range from 50 to 450 kg/mo per plant[4]. A typical creosote or PCP treater generates about 400 kg/mo of WWT sludge[3]. A typical treater generates about 250 kg/mo of tank clean-out residues[4]. Twenty-one percent of all wood preservers are estimated to generate less than 100 kg/mo of waste; 13% generate more than 5000 kg/mo (see Industry Profile).

The total quantity of hazardous wastes generated by the industry is estimated at 1.2×10^6 kg/mo.

WASTE TREATMENT, STORAGE, AND DISPOSAL PRACTICES[3]:

WWT sludges generated by the creosote and PCP treaters are disposed of onsite by 41% of the plants, contract hauled to offsite landfills by 41%, used for road stabilization by 15% and burned in boilers onsite by 4%. Of those plants indicating contract hauling, one-third indicate "toxic chemical landfill" as the disposal site. Little is known about disposal practices for tank clean-out wastes, although it is believed that such wastes would be handled in a manner similar to that used for WWT sludges at most plants.

Since treating wastes tend to be relatively small in volume, most plants arrange for waste hauling on a periodic basis, in some cases only once every few years.

CURRENT COST OF DISPOSAL:

Reported disposal costs for WWT sludges range from $100 to $2000/year (1976 dollars), or $100 to $1000/tonne of waste[3]. The relatively high unit cost for disposal probably reflects costs for dredging of ponds as well as hauling for these wastes. No data are available for tank clean-out waste disposal costs.

ALTERNATIVE WASTE DISPOSAL METHODS:

Incineration could prove effective for creosote/PCP wastes if conducted under sufficiently severe conditions to insure destruction of treating chemical residues. Incineration is not environmentally acceptable for inorganic salt containing wastes, due to the presence of arsenic and or chrome in the wastes.

INDUSTRY PROFILE:

(See table)

ASSESSMENT OF THE QUALITY OF THE DATA BASE:

The estimates of WWT sludge quantities for the industry are based upon data supplied to EGD by 38 wood preserving plants representing a range of plant sizes from various parts of the country. These data are thought to be a reasonably good representation of the industries sludge waste[3].

The data for tank clean-out wastes are from three plants. The accuracy or representativeness of these data are not known. Since tank wastes are the only hazardous waste for the 120 inorganic salt treaters, and most of these treaters (85%) are estimated to generate less than 1000 kg/mo, there is some uncertainty in the number of small volume generators in the "less than 1000 kg/mo" generating categories. This uncertainty, however, does not dramatically affect the distribution of small volume generators in the industry since the inorganic salt treaters account for less than one-third of the total plants.

It should be mentioned that a distribution similar to that presented in the Industry Profile table is obtained when state survey data alone are used to estimate the industry profile[5]. Since the state data, TRW survey data, and EGD data represent independent sources, the similarity of the distribution based on state data to that in the Industry Profile table indicates that the profile is probably representative of the industry.

SOURCES OF DATA USED AND EXPLANATORY NOTES:

(1) Maloney and Pagliai, Wood Preservation Statistics 1977, American Wood Preservers Association, September 1978

(2) Revised Technical Review of the best available technology, best demonstrated technology for the timber products processing point source category, Environmental Science and Engineering Inc. for Effluent Guidelines Division of EPA, Project No. 78-052, October 15, 1978

(3) Data provided by Effluent Guidelines Division of EPA for 38 plants

(4) Data obtained for 3 pressure wood treaters by TRW, 1979

(5) Based upon data provided by EPA/EGD on WWT sludges from 38 creosote and PCP treating plants and data obtained in this study from 3 plants on tank clean-out residues, the EGD data on distribution of WWT waste quantities is applied to 295 creosote and PCP treaters; the data on clean-out residue wastes applied to all plants including 120 inorganic salt treaters which generate only clean-out residue wastes. Creosote and PCP treaters are assumed to have both WWT sludges and clean-out residues, while inorganic salt treaters are assumed to have only clean-out residues.

(6) Based upon state survey data for 8 plants

11/27/79. 08.43.27.

INDUSTRY PROFILE[3,4] SIC: 2491 NATION

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	88	21.1	3872.	.3
100-200	42	10.1	6300.	.5
200-300	36	8.6	9000.	.7
300-400	36	8.6	12600.	1.0
400-500	24	5.8	10800.	.9
500-600	16	3.8	8800.	.7
600-700	12	2.9	7800.	.6
700-800	13	3.1	9750.	.8
800-900	4	1.0	3400.	.3
900-1000	5	1.2	4750.	.4
1000-2000	45	10.8	67500.	5.4
2000-5000	44	10.6	154000.	12.3
> 5000	52	12.5	951600.	76.1
TOTAL	417[1]	100.0	1250172.	100.0

11/29/79. 13.49.57.

BREAKDOWN OF PLANTS IN EMPLOYMENT SIZE CATEGORIES BY EPA REGION IN SIC 2491

NUMBER OF PLANTS IN EACH CATEGORY

REGION	TOTAL	1-4	5-9	10-19	20-49	50-99	100-249	250-499	500-999	>1000
I	6	2	0	0	4	0	0	0	0	0
II	5	1	2	0	2	0	0	0	0	0
III	35	8	5	6	11	4	1	0	0	0
IV	133	19	23	26	35	23	7	0	0	0
V	36	8	2	11	10	4	1	0	0	0
VI	70	16	13	11	22	6	2	0	0	0
VII	21	6	5	4	4	2	0	0	0	0
VIII	19	5	5	2	6	1	0	0	0	0
IX	24	5	3	8	6	2	0	0	0	0
X	37	8	8	3	12	3	3	0	0	0
NATION	386	78	66	71	112	45	14	0	0	0

INDUSTRY: Miscellaneous Wood Products SIC: 2499

DESCRIPTION OF THE INDUSTRY:

Firms in the subject industry are engaged in the production of a variety of wood products including veneer, cork, hardboard paneling, picture frames and fencing. Many of these and other products are finished with paint, lacquer, varnish or other coating materials. Based on the census data there are 2792 establishments in the U.S. in SIC 2499; about 39% employ less than 5 persons. Unlike firms in many other wood products industry segments, SIC 2499 is not heavily concentrated in the wood producing areas of the country. Three EPA regions with the largest percentages of the establishments in SIC 2499 are Regions V (22%), IV (15%) and IX (14%).

CHARACTERISTICS OF HAZARDOUS WASTES PRODUCED:

The hazardous wastes generated in the subject industry are from painting and related operations and include paint sludges, solvents, empty paint containers, and clean-up wastes from coating/glueing operations. Based on data from solid/hazardous waste surveys in 4 states (New York, Iowa, Mass., and Rhode Island), about 36% of the firms (or 1003 plants) in SIC 2499 generate hazardous wastes. An estimated 11% of the firms generate more than 5000 kg/mo of waste while only 13% generate less than 100 kg/mo (see Industry Profile); the average amount of waste generated per generator is about 3400 kg/mo.

WASTE TREATMENT, STORAGE AND DISPOSAL PRACTICES:

All plants which report waste disposal methods indicate that non-solvent wastes are disposed to landfill or to lagoon onsite (one case), and that solvents are sent to offsite reclamation[1].

CURRENT DISPOSAL COST:

Two plants which dispose to landfill indicate a disposal cost of about $250/ton. The one plant which indicated onsite lagooning reports about $10,000/ton. No cost data are reported for solvent disposal/reclamation.

ALTERNATIVE DISPOSAL METHODS:

SIC: 2499

INDUSTRY PROFILE:

(See table)

ASSESSMENT OF QUALITY OF THE DATA BASE:

SOURCES OF DATA USED:

(1) Based on state survey data for 7 plants

(2) Census data, adjusted for the "zero" generators (estimated at 64%)

11/27/79. 08.43.27.

INDUSTRY PROFILE[1] SIC: 2499 NATION

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	358	35.7	17900.	.5
100-200	77	7.7	11550.	.3
200-300	43	4.3	10750.	.3
300-400	30	3.0	10500.	.3
400-500	23	2.3	10350.	.3
500-600	18	1.8	9900.	.3
600-700	14	1.4	9100.	.3
700-800	11	1.1	8250.	.2
800-900	9	.9	7650.	.2
900-1000	9	.9	8550.	.2
1000-2000	52	5.2	78000.	2.3
2000-5000	50	5.0	175000.	5.1
> 5000	309	30.8	3090000.	89.6
TOTAL	1003[2]	100.0	3447500.	100.0

11/29/79. 13.49.57.

BREAKDOWN OF PLANTS IN EMPLOYMENT SIZE CATEGORIES BY EPA REGION IN SIC 2499

NUMBER OF PLANTS IN EACH CATEGORY

REGION	TOTAL	1-4	5-9	10-19	20-49	50-99	100-249	250-499	500-999	>1000
I	286	104	56	43	46	16	17	4	0	0
II	307	117	77	50	37	20	5	1	0	0
III	239	91	57	44	27	9	9	0	2	0
IV	409	148	66	80	64	28	18	3	1	1
V	626	240	116	119	81	38	23	6	3	0
VI	206	78	52	31	27	11	6	1	0	0
VII	137	45	25	29	26	7	2	1	0	0
VIII	55	35	10	5	2	2	1	0	0	0
IX	385	170	73	60	50	21	6	5	0	0
X	142	66	28	18	17	6	7	0	0	0
NATION	2792	1094	560	479	379	158	94	21	6	1

INDUSTRY: Furniture and Fixtures SIC: 25

DESCRIPTION OF THE INDUSTRY:

Firms in SIC 25 are engaged in the manufacture of household, office, public building and restaurant furniture and office and store fixtures. Many of these firms conduct painting/varnishing/lacquering operations in the finishing of their products. Based on the census data, there are 8630 establishments in SIC 25 with about 46% of these employing less than 10 persons.

CHARACTERISTICS OF HAZARDOUS WASTES PRODUCED:

The hazardous wastes generated by firms in SIC 25 are primarily paint sludges, solvents, empty paint containers and similar wastes from application of lacquers, varnishes and other coatings. Many firms which manufacture metal furniture also conduct degreasing operations prior to painting and thus generate a waste degreasing solvent or solvent recovery sludge. Wastes from painting/coating operations are estimated to constitute about 90% of the total hazardous waste in SIC 25, degreasing waste about 10%[1]. Based on data from solid/hazardous waste surveys in 4 states (New York, Iowa, Mass. and Rhode Island) about 70% (or 6062) of the establishments in SIC 25 are estimated to generate hazardous wastes. About 25% of the generators are estimated to produce less than 100 kg/mo of waste and no plants generate more than 5000 kg/mo of waste (see Industry Profile); an average plant would generate about 700 kg/mo of waste.

WASTE TREATMENT, STORAGE, AND DISPOSAL PRACTICES:

Offiste landfill via contract hauling is reported for disposal of non-solvent wastes by all plants which indicate a disposal method. Solvents are reportedly recovered either onsite or offsite by all plants which indicate a disposal method.

CURRENT DISPOSAL COST:

Two plants which indicate offsite landfill via contract hauling for waste disposal report costs of $750 for disposal of 2 tons/year of waste and $500 for disposal of 6 tons/year of waste.

ALTERNATIVE DISPOSAL METHODS:

INDUSTRY PROFILE:

(See table)

ASSESSMENT OF THE QUALITY OF THE DATA BASE:

SOURCES OF DATA USED AND EXPLANATORY NOTES:

(1) Based on data from state surveys for 11 plants in SIC 25

(2) Census data, adjusted for the estimated "zero" generators (30% of establishments)

INDUSTRY PROFILE[1] SIC: 2500 NATION

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	1485	24.5	74250.	1.7
100-200	936	15.4	140400.	3.2
200-300	619	10.2	154750.	3.5
300-400	443	7.3	155050.	3.5
400-500	341	5.6	153450.	3.5
500-600	271	4.5	149050.	3.4
600-700	220	3.6	143000.	3.3
700-800	183	3.0	137250.	3.1
800-900	154	2.5	130900.	3.0
900-1000	132	2.2	125400.	2.9
1000-2000	721	11.9	1081500.	24.6
2000-5000	557	9.2	1949500.	44.4
> 5000	0	0.0	0.	0.0
TOTAL	6062[2]	100.0	4394500.	100.0

12/06/79.   12.30.54.

BREAKDOWN OF PLANTS IN EMPLOYMENT SIZE CATEGORIES BY EPA REGION IN SIC 2500

NUMBER OF PLANTS IN EACH CATEGORY

REGION	TOTAL	1-4	5-9	10-19	20-49	50-99	100-249	250-499	500-999	>1000
I	485	152	85	93	65	40	37	10	3	0
II	1219	427	248	213	178	81	58	9	5	0
III	708	195	101	104	128	72	62	26	16	4
IV	1824	445	249	273	326	193	181	104	43	10
V	1452	372	224	234	269	144	133	51	17	8
VI	689	216	118	108	117	61	47	15	5	2
VII	327	87	68	51	46	38	26	7	4	0
VIII	160	67	24	25	25	15	4	0	0	0
IX	1531	518	247	263	273	128	86	14	2	0
X	235	88	45	39	35	20	6	1	1	0
NATION	8630	2567	1409	1403	1462	792	640	237	96	24

INDUSTRY: Production of Coated and Glazed Paper SIC: 2641

DESCRIPTION OF THE INDUSTRY:

Firms in SIC 2641 are primarily engaged in the manufacture of coated, glazed or varnished paper from purchased paper or pulp. Coating/finishing operations are usually conducted using larger continuous machines to apply inks, dyes, waxes or other coatings. Based on the census data there are 429 plants in the U.S. in SIC 2641; 52% of the plants employ less than 20 persons. The majority of plants are located in EPA Regions V (30%), II (18%), I (14%) and IX (13%).

CHARACTERISTICS OF HAZARDOUS WASTES PRODUCED:

Hazardous waste generated by plants in SIC 2641 are primarily from cleanup or "end of run" operations and consist of inks, dyes, solvents, latex and adhesives. Based on data from state surveys[1] and information supplied by industry sources[2], essentially all mills in SIC 2641 are expected to produce one or more of the above types of wastes. Based on the estimates developed here (see Industry Profile), over 40% of the establishments in SIC 2641 generate more than 5000 kg/mo of waste and only two plants generate less than 100 kg/mo of waste. An average plant is estimated to generate about 44,000 kg/mo of hazardous wastes.

WASTE TREATMENT, STORAGE AND DISPOSAL PRACTICES:

All plants which report information on waste disposal indicate that they dispose of non-solvent wastes to landfill, usually via contract hauling. One plant indicates on-site chemical treatment of acidic wastes prior to disposal. Of the two plants which provide information about solvent disposal, one indicates offsite recovery and the other indicates onsite incineration.

CURRENT DISPOSAL COSTS:

No data are currently available from plants in SIC 2641 pertaining to disposal costs for hazardous wastes.

ALTERNATIVE DISPOSAL METHODS:

ASSESSMENT OF THE QUALITY OF THE DATA BASE:

SOURCES OF DATA USED AND EXPLANATORY NOTES:

(1) Based on state data for 9 establishments

(2) National Council of the Paper Industry for Air and Stream Improvement

(3) Census data

11/27/79.   08.43.27.

INDUSTRY PROFILE(1)   SIC: 2641   NATION

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	2	.5	100.	.0
100-200	11	2.6	1650.	.0
200-300	17	4.0	4250.	.0
300-400	19	4.4	6650.	.0
400-500	19	4.4	8550.	.0
500-600	18	4.2	9900.	.1
600-700	16	3.7	10400.	.1
700-800	15	3.5	11250.	.1
800-900	13	3.0	11050.	.1
900-1000	11	2.6	10450.	.1
1000-2000	63	14.7	94500.	.5
2000-5000	36	8.4	126000.	.7
> 5000	189	44.1	18900000.	98.5
TOTAL	429(3)	100.0	19194750.	100.0

11/30/79.   10.02.17.

BREAKDOWN OF PLANTS IN EMPLOYMENT SIZE CATEGORIES BY EPA REGION IN SIC 2641

NUMBER OF PLANTS IN EACH CATEGORY

REGION	TOTAL	1-4	5-9	10-19	20-49	50-99	100-249	250-499	500-999	>1000
I	61	8	9	13	11	8	8	2	1	1
II	77	14	8	20	16	9	6	3	1	0
III	28	6	4	5	5	3	3	1	1	0
IV	38	4	6	5	2	9	8	4	0	0
V	130	17	19	23	16	18	18	8	7	4
VI	17	3	2	4	3	2	3	0	0	0
VII	13	2	1	3	1	2	3	1	0	0
VIII	5	1	0	2	2	0	0	0	0	0
IX	56	16	10	13	8	4	4	1	0	0
X	4	0	2	1	0	0	0	0	1	0
NATION	429	71	61	89	64	55	53	20	11	5

INDUSTRY: Printing, Publishing, and Allied Industries SIC: 27

DESCRIPTION OF INDUSTRY:

The establishments in this industry are engaged in printing by processes such as letterpress, lithography, gravure, or screen or in performing services for the printing trade such as bookbinding, typesetting, engraving, photoengraving and electrotyping. This SIC also includes establishments engaged in publishing newspapers, books, and periodicals. The establishments are distributed throughout the country roughly in proportion to regional population. The census data indicate a total of 41,877 establishments for this SIC of which 64% employ less than 10 persons (see census data computer printout for a breakdown of the number of establishments by EPA region and employment size category).

CHARACTERISTICS OF HAZARDOUS WASTES PRODUCED:

Based on state survey data which includes more than 200 establishments in SIC 27, the primary hazardous wastes generated by this industry are flammable and toxic wastes including solvents, dyes, inks, oils and other organic compounds and photographic chemicals (fixers, developers, stabilizers) which are toxic or corrosive. Many establishments, especially those engaged in photoprocessing, will also generate empty containers which may contain hazardous wastes[(1)]. The total waste quantity generated by establishments in this SIC is estimated at 41 million kg/mo, or an average rate of 1300 kg/mo per generator;* almost 65% of the firms generate less than 100 kg/mo of hazardous waste (see Industry Profile).

WASTE TREATMENT, STORAGE AND DISPOSAL PRACTICES:

State survey data indicate that about 75% of the establishments which generate photographic chemical wastes dispose of them to sewers. Some firms indicate that the wastes are neutralized prior to disposal. Of the establishments which do not dispose to sewers, about 56% indicate recycling of some photographic chemicals, and 28% indicate disposal to landfill; these chemicals are usually hauled offsite by contractors. Other disposal methods include onsite land burial and onsite landspreading.

*These estimated quantities do not include wastes discharged to sewers.

The disposal practices for solvents, inks and organics are as follows:*

- Over 40% of the establishments use landfills for disposal of solvents, inks, and organics
- 13% dispose of inks, organics (primarily alcohols) and solvents to the sewer
- 13% recycle some of their wastes
- Over 20% of the establishments indicate other disposal methods including incineration (for solvents), onsite evaporation (for solvents), deep well injection (for solvents, inks, organics), onsite burial (for solvents and organics), onsite lagoons and disposal on open ground (for solvents).
- Over 20% of the establishments indicated that their disposal methods were unknown.

CURRENT DISPOSAL COST:

ALTERNATIVE DISPOSAL METHODS:

Waste disposal of inks, organic compounds and solvents in Subtitle C facilities is environmentally more acceptable than disposal methods currently used by some generators (for example, disposal on open ground). Increased recycling of some wastes (e.g., solvents) would reduce the need to dispose of hazardous wastes by other methods.

INDUSTRY PROFILE:

See table.

ASSESSMENT OF QUALITY OF DATA BASE:

State data may be biased toward establishments in the industry which perform photoprocessing. About 57% of the firms in the state data reported having photographic chemical wastes. However, based on telephone communication with one technical expert with the Graphic Arts Technical Foundation, this figure is probably too high. According to this expert, about 50% of all printers and suppliers to publishers will probably have photographic wastes, but publishers

*The total for the percentages shown exceed 100% because some establishments report employing more than one disposal method.

will have none. In this study it is assumed that the number of establishments producing photographic wastes account for about 40% of all establishments in SIC 27.

SOURCES OF DATA USED AND EXPLANATORY NOTES:

(1) See assessment summary sheet for SIC's 7221, 7333, 7395 and 7819

(2) Based on state survey data for over 200 establishments and on personal communication with Graphic Arts Technical Foundation

(3)Census data, adjusted for the estimated "zero" generators

11/27/79.   08.43.27.

INDUSTRY PROFILE[2]   SIC: 2700   NATION

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	20518	65.3	1025900.	2.5
100-200	1884	6.0	282600.	.7
200-300	1038	3.3	259500.	.6
300-400	684	2.2	239400.	.6
400-500	532	1.7	239400.	.6
500-600	418	1.3	229900.	.6
600-700	376	1.2	244400.	.6
700-800	221	.7	165750.	.4
800-900	376	1.2	319600.	.8
900-1000	334	1.1	317300.	.8
1000-2000	885	2.8	1327500.	3.2
2000-5000	794	2.5	2779000.	6.8
> 5000	3350	10.7	33500000.	81.8
TOTAL	31410[3]	100.0	40930250.	100.0

11/29/79.   13.49.57.

BREAKDOWN OF PLANTS IN EMPLOYMENT SIZE CATEGORIES BY EPA REGION IN SIC 2700

NUMBER OF PLANTS IN EACH CATEGORY

REGION	TOTAL	1-4	5-9	10-19	20-49	50-99	100-249	250-499	500-999	>1000
I	2683	1082	535	435	348	147	88	28	15	5
II	7142	3178	1412	1137	823	306	185	48	35	18
III	3812	1438	793	635	494	203	165	51	22	11
IV	5216	2385	1120	725	584	216	112	45	17	12
V	9870	3513	1750	1489	1147	503	303	104	33	28
VI	3702	1776	725	555	388	138	80	23	13	4
VII	2679	1115	567	421	343	124	70	22	10	7
VIII	1310	605	302	173	147	38	33	9	2	1
IX	5253	2593	998	753	540	190	128	29	17	5
X	1210	576	250	168	138	36	30	8	3	1
NATION	41877	18261	8452	6491	4952	1901	1194	367	167	92

INDUSTRY: Industrial Inorganic Chemicals SIC: 281

DESCRIPTION OF INDUSTRY:

SIC 281 covers establishments involved in the production of alkalies and chlorine (SIC 2812), industrial gases (SIC 2813), inorganic pigments (SIC 2816) and industrial inorganic chemicals, not elsewhere classified (SIC 2819). Over 200 chemicals are included in the subject SIC's. The raw materials and production processes used differ from chemical to chemical, thus a spectrum of waste characteristics and quantities are encountered. Most plants produce more than one chemical; some produce chemicals that fall into other SIC's.

Based on the information in the SRI Directory of Chemical Producers[1], it is estimated that there are 81 plants in SIC 2812, 443 plants in SIC 2813, 59 plants in SIC 2816, and 479 plants in SIC 2819[2].

The size of plants range from 1-4 employees to more than 1000 employees with more than 50% of the plants employing less than 20 employees. The majority (62%) of these smaller plants are in SIC 2813.

CHARACTERISTICS OF HAZARDOUS WASTES PRODUCED:

SIC 2812. Only hazardous wastes identified in this SIC are mercury- and asbestos-bearing wastes which are produced in the production of chlorine by the "mercury cell" and the "diaphragm cell" processes, respectively. Asbestos waste disposal is currently regulated. In 1972 the smallest mercury cell plant produced more than 9 metric ton/day of chlorine[3,4]. At an estimated waste generation rate of 20 kg/metric[4] ton of chlorine, the smallest plant would generate more than 5000 kg/mo of mercury waste.

Wastes generated from other chemical production processes are mainly brine mud (magnesium hydroxide and calcium carbonate from brine purification) and wastewaters containing dissolved carbonates and chlorides of sodium and potassium.

The total wastes generated by all establishments in the SIC is estimated at 9.1 million kg/mo.

SIC 2813. No hazardous wastes are generated from plants producing acetylene, nitrogen, oxygen, noble gases and nitrous oxide (a total of 255 plants). Plants producing other gases (CO, CO_2, H_2, etc.) may generate spent catalyst containing chromium, copper and other metals. Waste generation rate is estimated at 0.5 kg of spent catalyst per 1000 kg of product[5]. Based on this estimate, nearly all plants engaged in the production of these other gases generate less than 5000 kg/mo of waste. Some plants covered in the state data base also report disposing of lube oil and solvents. The total quantity of waste generated by establishments in SIC 2813 is estimated at 275,000 kg/mo, with an average of 1460 kg/mo/plant[6].

SIC 2816. Plants in SIC 2816 generate sludges which may be corrosive and may contain chromium, cadmium, lead and other metals. Five plants have been identified as potential small volume hazardous waste generators. Based on the information obtained from two of these five plants, the average waste generation rate is estimated at 510 kg/mo/plant. The total wastes generated by all establishments in SIC 2816 is estimated at 38 million kg/mo[4].

SIC 2819. Hazardous wastes generated by the establishments in this SIC include water and wastewater treatment sludges, sludges from purification of raw materials or products, rejected chemicals, spills and cleanup wastes, dust collected by air pollution control devices, etc. These wastes may be highly acidic or alkaline and may contain toxic metals, fluorides, cyanides and sulfide. Total wastes generated by all establishments in this SIC is estimated at 280 million kg/mo[4].

WASTE TREATMENT, STORAGE AND DISPOSAL PRACTICES:

Some establishments in SIC 2813 reclaim all their waste (mainly spent catalysts). It is not known how many establishments practice waste reclamation; the profile table for this SIC assumes that all establishments dispose of catalyst waste.

The following distribution of waste quantities and generators by disposal is estimated for SIC 2819 based on the state data:

Disposal Method	Waste Quantity	Generator
Landfill	19%	31%
Recycle	18%	13%
Others	2%	6%
Contract hauling (no ultimate disposal method specified)	61%	50%

CURRENT DISPOSAL COST:

ALTERNATIVE DISPOSAL METHODS:

INDUSTRY PROFILE:

(See tables)

ASSESSMENT OF QUALITY OF DATA BASE:

SOURCES OF DATA USED AND EXPLANATORY NOTES:

(1) 1977 Directory of Chemical Producers, Stanford Research Institute

(2) In many plants wastes generated from different operations are combined; thus even though the production of a specific chemical may produce a "small" quantity of hazardous waste, the plant as a whole may be large generators due to waste contribution from the production of other chemicals. Since data on total waste quantities and characteristics do not currently exist for all plants in the subject industry, the identification of "small generators" in the industry require other approaches. The following "product-by-product" analysis approach (see Fig. 1), which has been used in a large number of previous EPA industry studies, has been used in the preparation of this assessment.

a) Using the Stanford Research Institute (SRI) 1977 Directory of Chemical Producers,(1) all individual plants producing SIC 281 chemicals were identified. (A total of 1324 plants were identified as producers of SIC 281 chemicals.)

b) The producers of SIC 281 chemicals were further screened and those producers for whom the SIC 281 chemicals were listed as only a very minor fraction of the total chemical production (in terms of the number of chemicals produced, e.g., one or two SIC 281 chemicals from a total of 10 or more chemicals listed for a plant site) were eliminated from further consideration. (A total of 262 plants were eliminated in this fashion.)

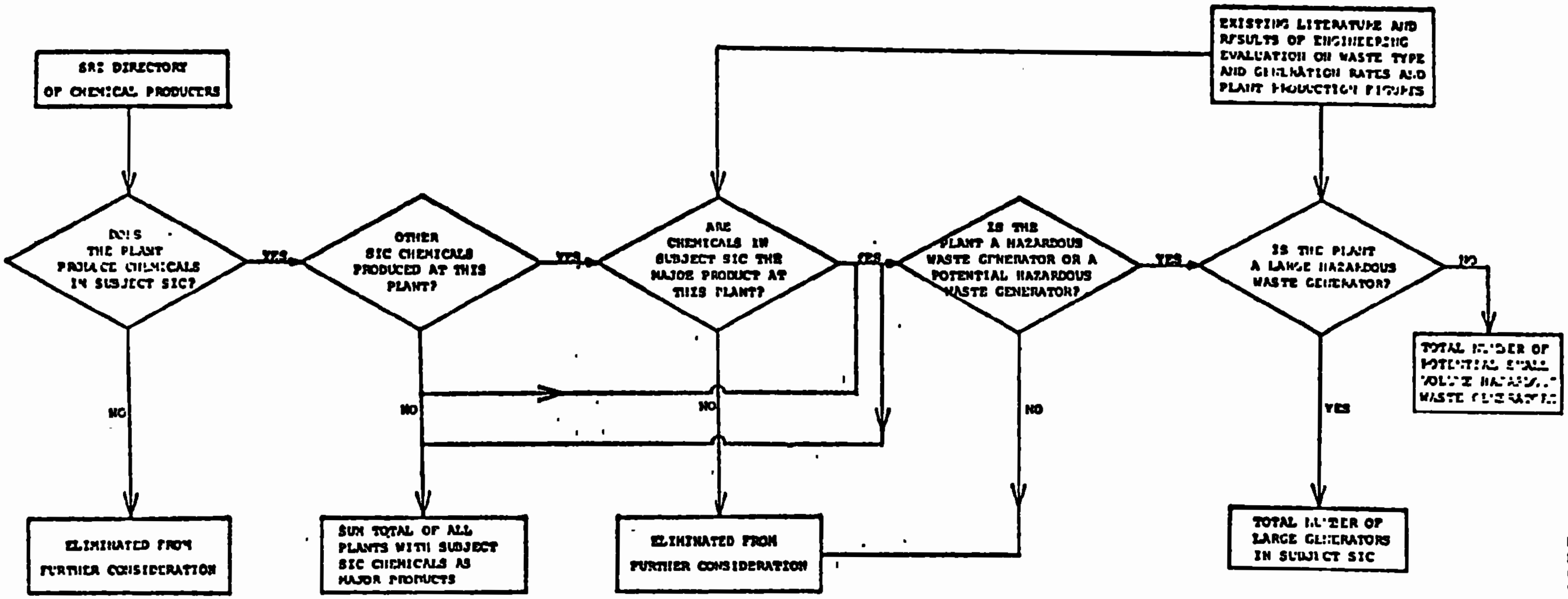


Figure 1. Schematics of the Step-by-step Procedure for the Identification of Small Volume Hazardous Waste Generators

c) The producers of SIC 281 chemicals were then examined in the light of data which have been reported on hazardous waste generation quantities associated with the production of certain specific chemicals or plants producing such chemicals. Those plants which could be definitely identified as large generators (based on the production of a single chemical) or nonhazardous waste generators (based on all chemicals produced) were eliminated from further consideration.

d) The output from step (c) was the identification of 248 plants as potentially small hazardous waste generators. Based on published production and waste generation rate data and information obtained via telephone from selected plants, the "small generators" classification was confirmed for 185 of the 248 plant sites; the classification of the other 63 plants require acquisition of data from additional plants.

(3) EPA/EGD Pretreatment Development Document: Inorganic Chemicals Manufacturing, EPA-400/1-77/087

(4) "Assessment of Industrial Hazardous Waste Practices, Inorganic Chemicals Industry," Versar Inc., NTIS Report PB-244-832, March 1975

(5) Versar (EPA/OSW contractor)

(6) Based on state data for nine small generators for SIC 2813

(7) Based on state data for 11 small generators for SIC 2819

(8) EPA/EGD Development Document: Inorganic Chemicals Manufacturing, EPA-400/1-74-007a

(9) EPA/EGD Development Document: Significant Inorganic Products, EPA-400/1-75/037

(10) "Assessment of Solid Waste Management Problems and Practices in the Inorganic Chemicals Industry," Versar Inc., EPA Contract No. 68-03-2604

(11) EPA/EGD

(12) Contact with six individual establishments

11/27/79. 08.43.27.

INDUSTRY PROFILE[6] SIC: 2813 NATION

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	19	10.1	950.	.3
100-200	17	9.0	2550.	.9
200-300	13	6.9	3250.	1.2
300-400	13	6.9	4550.	1.7
400-500	9	4.8	4050.	1.5
500-600	9	4.8	4950.	1.8
600-700	7	3.7	4550.	1.7
700-800	6	3.2	4500.	1.6
800-900	6	3.2	5100.	1.9
900-1000	6	3.2	5700.	2.1
1000-2000	28	14.9	42000.	15.3
2000-5000	55	29.3	192500.	70.1
> 5000	0	0.0	0.	0.0
TOTAL	188	100.0	274650.	100.0

11/27/79.   08.43.27.

INDUSTRY PROFILE[4,7]   SIC: 2819   NATION

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	4	2.7	200.	.0
100-200	7	4.7	1050.	.0
200-300	6	4.0	1500.	.0
300-400	5	3.3	1750.	.0
400-500	4	2.7	1800.	.0
500-600	4	2.7	2200.	.0
600-700	3	2.0	1950.	.0
700-800	3	2.0	2250.	.0
800-900	2	1.3	1700.	.0
900-1000	2	1.3	1900.	.0
1000-2000	11	7.3	16500.	.0
2000-5000	9	6.0	31500.	.0
> 5000	90	60.0	279000000.[4]	100.0
TOTAL	150	100.0	279064300.	100.0

INDUSTRY: Plastic Materials and Synthetic Resins, Synthetic Rubber, Synthetic and Other Man-made Fibers, Except Glass — SIC: 282

DESCRIPTION OF INDUSTRY:

This group includes chemical establishments primarily engaged in manufacturing plastics materials and synthetic resins, synthetic rubbers, and cellulosic and man-made organic fibres. Establishments primarily engaged in the manufacture of rubber products, and those primarily engaged in the compounding of purchased resins or the fabrication of plastics sheets, rods, and miscellaneous plastics products, are classified in Major Group 30; and textile mills primarily engaged in throwing, spinning, weaving, or knitting textile products from manufactured fibers are classified in Major Group 22.

Of the 597 plants in this group, 21% have fewer than 10 employees, 66% have fewer than 100 employees, and 87% have fewer than 500 employees[1].

CHARACTERISTICS OF HAZARDOUS WASTES PRODUCED:

The wastes reported by the 46 plants in the state data base and the percent of plants reporting each waste are shown below.

Waste	% of Plants Reporting*
Solvents	52
Oils	30
Miscellaneous organics (e.g., phenols, resins)	30
Paint wastes	11
Inorganics	11
Cyanides	9
Alkali	4
Acid	4
Metal containing compounds	4

Based on the state survey data, solvents generated by establishments in SIC 282 include methyl ethyl ketone, toluene, acetone, methylene chloride, trichloroethylene, cyclohexanone, tetrahydrofuran, and benzoyl peroxide. Toluene diisocyanate is also generated. Some of the metal-containing wastes produced contain lead, cadmium and chromium. Other wastes include resins, phenol, buffing powder, grinding dust, monomers, filters, and polymers.

*Column sums to more than 100% since some plants report generating more than one waste stream.

A previous EPA-sponsored study of the hazardous wastes from SIC 282 identified the wastes listed in the table on the next page as potentially hazardous. Some of the waste streams shown in the table were not reported in the state data base.

WASTE TREATMENT, STORAGE AND DISPOSAL PRACTICES:

The disposal practices for the 46 plants in the state data base and the percent of plants employing each disposal method are shown below.

Disposal Method	% of Plants*
Landfill	35
Recycling	9
Incineration	7
Composting	2
Onsite storage	2
"Other" methods	9
Unknown	46

Over 35% of the establishments reporting solvent wastes use landfills for their disposal; 20% recycle or incinerate their solvent wastes. More than 50% of those with solvent wastes report that the disposal method is unknown although most of these report solvents hauled away by contractors. Other wastes disposed to landfills include oil, alkaline slurries, resins, compounds containing lead, cadmium, and chromium, general laboratory wastes, organics and monomers. Oils are also recycled or incinerated by some plants. Composting is used by one plant for disposal of solid filter aid.

A previous EPA sponsored study of this industry found that lagoons are a frequently employed disposal technology for plants in this SIC, although no significant amount of potentially hazardous waste appeared to be disposed of by this technique[2].

CURRENT DISPOSAL COST:

*Column sums to more than 100% since some multiple-waste stream plants report using more than one disposal method.

POTENTIALLY HAZARDOUS WASTES FROM SIC 282[2]

SIC 2821 Plastic Resins	SIC 2822 Synthetic Rubber	SIC 2823 Cellulosic Manmade Fibers	SIC 2824 Non-Cellulosic Manmade Fibers
- Wastes from phenolic resin production - Amino resin waste streams - Still bottoms from solvent or monomer recovery in: ABS-SAN resins Polystyrene Polypropylene Silicone - Warehouse dusts from alkyd production	- Still bottoms from solvent or monomer recovery in: SBR via the solution process Polybutadiene rubber Neoprene rubber	- Diamine and dithiocarbamate dusts and powders from rayon production - Wastewater treatment sludges from rayon production	- zinc containing sludges from the spinning or acrylics and modacrylics - Antimony and manganese catalyst waste from polyester production

ALTERNATIVE DISPOSAL METHODS:

INDUSTRY PROFILE:

(See table)

ASSESSMENT OF QUALITY OF DATA BASE:

The previous EPA-sponsored study of SIC 282 estimated an annual generation of potentially hazardous waste of 0.9 million metric ton per year. This study estimates an annual hazardous waste generation of 1.3 million metric ton per year. These two estimates, however, are based on different data bases and approaches. The previous study estimated that the SIC 282 products are produced at 1100 production sites and that a correlation exists between waste generation and production rate. At many of the sites, however, the production of SIC 282 products is not a major activity for the plant and such plants would have a different SIC as their primary SIC. The present estimate uses census data which indicates a total of 597 plants having SIC 282 as their primary SIC, and uses reported total waste quantity for plant sites having SIC 282 as their primary SIC as the basis for estimating waste generation profiles.

SOURCES OF DATA USED AND EXPLANATORY NOTES:

(1) Census data

(2) Foster D. Snell, Inc., "Assessment of Industrial Hazardous Waste Practices, Rubber and Plastics Industry Plastic Materials and Synthetics Industry," March 1978, NTIS PB-282-071.

(3) The estimate of the relative percentage of non-, small, and large generators is based on 50 plants reporting from New York and Massachusetts. The distribution of small generators among the waste generation ranges indicated in the industry profile is based on 37 data points.

(4) The mean hazardous waste generation rate for large generators is based on 23 plants reporting from New York and Massachusetts.

(5) Census data adjusted for "zero" generators.

11/27/79. 08.43.27.

INDUSTRY PROFILE[3] SIC: 2820 NATION

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	62	12.5	3100.	.0
100-200	30	6.1	4500.	.0
200-300	19	3.8	4750.	.0
300-400	14	2.8	4900.	.0
400-500	11	2.2	4950.	.0
500-600	9	1.8	4950.	.0
600-700	7	1.4	4550.	.0
700-800	6	1.2	4500.	.0
800-900	5	1.0	4250.	.0
900-1000	4	.8	3800.	.0
1000-2000	25	5.1	37500.	.0
2000-5000	22	4.4	77000.	.1
> 5000	281	56.8	112400000.[4]	99.9
TOTAL	495[5]	100.0	112558750.	100.0

11/29/79. 13.49.57.

BREAKDOWN OF PLANTS IN EMPLOYMENT SIZE CATEGORIES BY EPA REGION IN SIC 2820

NUMBER OF PLANTS IN EACH CATEGORY

REGION	TOTAL	1-4	5-9	10-19	20-49	50-99	100-249	250-499	500-999	>1000
I	50	6	8	6	5	12	8	1	3	1
II	76	14	5	6	18	12	16	2	2	1
III	61	4	5	5	11	10	5	5	5	11
IV	122	12	6	10	21	18	12	6	12	25
V	120	19	10	13	20	16	26	9	6	1
VI	70	5	6	6	12	9	11	10	9	2
VII	12	1	2	1	4	1	1	2	0	0
VIII	6	0	3	3	0	0	0	0	0	0
IX	72	12	7	18	20	8	6	1	0	0
X	8	0	1	4	2	0	1	0	0	0
NATION	597	73	53	72	113	86	86	36	37	41

INDUSTRY: Drugs and Pharmaceuticals SIC: 283

DESCRIPTION OF INDUSTRY:

The establishments in this industry are primarily engaged in manufacturing, fabricating or processing medicinal chemicals and pharmaceutical products. Also included are establishments engaged in the grading, grinding, and milling of botanical drugs and herbs. Almost 50% of all the plants are located in five states - New York, California, New Jersey, Illinois, and Pennsylvania. The plants in these states are also the largest in the industry[1]. Census data indicate a total of 1056 establishments for this SIC of which 56% employ less than 20 persons.

CHARACTERISTICS OF HAZARDOUS WASTES PRODUCED:

The primary types of hazardous wastes generated by the subject SIC include haolgenated and non-halogenated solvents, organic chemical residues (still bottoms, sludges, tars), heavy metals, test animals, returned pharmaceuticals, low level radioactive wastes, and inert solids such as filters which may be contaminated with hazardous substances[1]. Based on state survey data, about 40% of all establishments have solvents and returned pharmaceuticals as waste. Over 20% of the establishments have animal tissues and carcasses and process residues or sludge wastes. About 8% produce low level radioactive wastes.

The total amount of hazardous waste generated by the subject SIC is estimated at 296 million kg/mo or an average rate of 380,000 kg/mo per generator (see Industry Profile).

WASTE TREATMENT, STORAGE, AND DISPOSAL PRACTICES:

State survey data indicate that 52% of the establishments dispose of some or all of their hazardous wastes including test animals, radioactive wastes, solvents, and rejected pharmaceuticals by contract hauling. More than 80% of the firms using contract hauling indicate that they are unaware of the final disposal method used at the ultimate disposal site. However, based on one report on treatment and disposal practices in the industry[1], many of these wastes, particularly the solvents and animal tissues, are likely to be incinerated; other wastes are probably landfilled.

About 17% of the establishments report incineration for disposal of animal carcasses and organic compounds; 13% report landfill disposal for solvents. Other disposal methods include sewers (for acid and for bacterial and viral cultures), recycling (for solvents), and onsite lagoons (for solvents).

CURRENT DISPOSAL COST:

INDUSTRY PROFILE:

(See table)

ASSESSMENT OF QUALITY OF DATA BASE:

Estimates of the waste quantity generated by this SIC is based upon 23 establishments in the state survey data. Data from New York was used to determine the relative percentage of large generators. The sales data for facilities in SIC 283[1] indicate that the percentages of facilities in various sales volume categories (including large sales volume categories) for New York is roughly the same as those for the nation. If it is assumed that the waste quantity is roughly proportional to the sales volume, New York can be considered representative of the nation in terms of the percentage of plants in the large waste generation rate category.

A previous study of the hazardous waste generation in the pharmaceutical industry[1] places the estimate of the hazardous waste produced by the industry in 1973 at 5.4 million kg/mo. This estimate is considerably lower than the estimated 300 million kg/mo obtained in this study. This large difference is primarily due to the differences in the methodology used in arriving at the estimate. The 5.4 million kg/mo estimate is based on the data obtained from some 14 facilities, projected to the national level using the following three methods:

(1) Production of a given pharmaceutical product at the plants visited compared to total industry production in the U.S.;

(2) Value of production of pharmaceutical product at the plants visited as a percentage of annual total value of that product in the U.S.; and

(3) Generation of a given waste as related to total value of production or number of production employees.

Although production data for representative plants can provide a reasonable basis for estimating the national waste quantities (method 1 above), estimates based on sales and employment data may not provide accurate estimates. In the present study, the use of a per-employee waste generation factor for estimating total national waste quantities was found to yield low results for certain manufacturing industries examined (see Volume 1, Section 6).

SOURCES OF DATA USED AND EXPLANATORY NOTES:

(1) Hazardous Waste Generation, Treatment and Disposal in the Pharmaceutical Industry. Prepared for the Environmental Protection Agency, Office of Solid Waste Management Programs by Arthur D. Little, Inc., Contract No. 68-01-2684, July 1975

(2) Based on state survey data for 23 establishments

(3) Census data, adjusted for the estimated number of "zero" generators (25%)

INDUSTRY PROFILE[2] SIC: 2830 NATION

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN
VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	164	20.7	8200.	.0
100-200	40	5.1	6000.	.0
200-300	23	2.9	5750.	.0
300-400	16	2.0	5600.	.0
400-500	12	1.5	5400.	.0
500-600	9	1.1	4950.	.0
600-700	7	.9	4550.	.0
700-800	6	.8	4500.	.0
800-900	5	.6	4250.	.0
900-1000	5	.6	4750.	.0
1000-2000	26	3.3	39000.	.0
2000-5000	25	3.2	87500.	.0
> 5000	453	57.3	296262000.	99.9
TOTAL	791[3]	100.0	296442450.	100.0

11/29/79.   13.49.57.

BREAKDOWN OF PLANTS IN EMPLOYMENT SIZE CATEGORIES BY EPA REGION IN SIC 2830

NUMBER OF PLANTS IN EACH CATEGORY

REGION	TOTAL	1-4	5-9	10-19	20-49	50-99	100-249	250-499	500-999	>1000
I	53	20	11	7	7	3	2	0	2	1
II	229	51	20	34	42	17	26	17	9	13
III	113	27	20	11	21	9	6	11	4	4
IV	112	41	15	17	13	5	8	4	5	4
V	193	51	22	22	39	19	17	10	5	8
VI	72	23	15	18	11	0	2	2	1	0
VII	94	25	11	14	15	10	9	6	3	1
VIII	26	12	3	3	3	1	3	1	0	0
IX	143	41	21	24	23	15	10	4	4	1
X	19	4	2	5	6	1	1	0	0	0
NATION	1054	295	140	155	180	80	84	55	33	32

INDUSTRY: Soap, Detergents, and Cleaning Preparations, Perfumes, Cosmetics, and Other Toilet Preparations — SIC: 284

DESCRIPTION OF INDUSTRY:

The establishments in this industry are primarily engaged in manufacturing (a) glycerin (from vegetable and animal fats and oils) and soap and detergents (SIC 2841); (b) specialty cleaning, polishing, and sanitation preparations including waxes, disinfectants, deodorants, bleaches, and dry cleaning preparations (SIC 2842); (c) surface active preparations used as emulsifiers, wetting agents, and finishing agents including sulfonated oils (SIC 2843); and (d) perfumes, cosmetics, and other toilet preparations (SIC 2844).

The census data (see computer printout) indicate a total of 2270 establishments for this SIC of which 70% are located within EPA regions V, II, IX, and IV. 51% of the establishments employ less than 10 persons.

CHARACTERISTICS OF HAZARDOUS WASTES PRODUCED:

A variety of hazardous wastes are produced due to the heterogeneity of the industry. Based on state survey data and telephone communication with establishments in the subject SIC, waste types include sludges containing compounds which are flammable, toxic, or corrosive such as phenol and other organic and inorganic compounds; aromatic, aliphatic and chlorinated solvent wastes which are flammable or toxic; corrosive acids and alkalis; and empty drums and containers with traces of flammable, toxic, or corrosive chemicals such as KOH, NaOH, HCl, phosphoric acid, dichloroisocyanurate salts, Na_2CO_3, and miscellaneous organic-based compounds. The data collected in this study (via mailing of information request forms) from five establishments (two in SIC 2841/2842, one in SIC 2842, one in SIC 2842/2844, and one in SIC 2844) indicate that empty drum and container wastes account for the largest proportion of the wastes generated; in addition, several firms contacted by telephone indicated that 99% of the raw materials used go into the product itself, thus few wastes other than containers are generated.

Based on state survey data and assuming that all establishments in this SIC have empty containers which may contain residues of hazardous compounds, it is estimated that the amount of hazardous waste generated by the industry is 4.3 million kg/mo, or an average rate of 1900 kg/mo per establishment (see Industry Profile). More than 30% of the establishments generate less than 100 kg/mo of hazardous waste, and 90% generate less than 5000 kg/mo of hazardous waste.

WASTE TREATMENT, STORAGE AND DISPOSAL PRACTICES:

Based on state data and the additional data collected in this study, via contact with several individual establishments, about 50% of the establishments surveyed use landfills to dispose of some or all of their hazardous wastes. Over 20% of the firms indicate that their disposal methods were "unknown," although half of these establishments indicated that the wastes were hauled offsite by a contractor. Other disposal methods include lagoons (for caustics, phenol, and sludge) and sewer disposal (for acids, alkalis, and detergents). For those establishments which indicate drum and container wastes, recycling is the most common method of disposal; some containers are disposed of with the general refuse.

CURRENT DISPOSAL COST:

Actual costs reported by five establishments contacted in this study are as follows:

SIC	Disposal Method	Annual Cost	Waste, kg/mo
2844	Unknown	$800 (1976)	204
2841/ 2842	Unknown, sewer	Capital cost of treatment $3000 (1978); operating cost of treatment $15,000; operating cost of disposal, excluding sewerage $1200	1,193+
2844	Hauled to offsite recycling	$4000 (1978)	140
2842/ 2844	Offsite landfill	$2040 (1978)	12,375
2841/ 2842	Hauled for recycling	$2140 (1978)	1,362+

ALTERNATIVE DISPOSAL METHODS:

INDUSTRIAL PROFILE:

(See table)

ASSESSMENT OF QUALITY OF DATA BASE:

SOURCES OF DATA USED AND EXPLANATORY NOTES:

(1) State data base for 34 establishments including 18 surveys from the New Jersey data

(2) Responses received from five establishments to whom information requests were mailed in this study

(3) Telephone communications with Soap and Detergent Association and Cosmetic, Toiletry and Fragrance Association

(4) Telephone discussions with 10 individual establishments

(5) Census data

(6) Based on state data for 34 establishments and data obtained in this study for five establishments (References 1 and 2 above) and the census data

11/27/79.   08.43.27.

INDUSTRY PROFILE[6]   SIC: 2840   NATION

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	728	32.4	36400.	.9
100-200	30	1.3	4500.	.1
200-300	30	1.3	7500.	.2
300-400	40	1.8	14000.	.3
400-500	20	.9	9000.	.2
500-600	40	1.8	22000.	.5
600-700	30	1.3	19500.	.5
700-800	30	1.3	22500.	.5
800-900	40	1.8	34000.	.8
900-1000	30	1.3	28500.	.7
1000-2000	374	16.6	561000.	13.1
2000-5000	630	28.0	2205000.	51.7
> 5000	225	10.0	1305000.	30.6
TOTAL	2247[5]	100.0	4268900.	100.0

11/29/79. 13.49.57.

BREAKDOWN OF PLANTS IN EMPLOYMENT SIZE CATEGORIES BY EPA REGION IN SIC 2840

NUMBER OF PLANTS IN EACH CATEGORY

REGION	TOTAL	1-4	5-9	10-19	20-49	50-99	100-249	250-499	500-999	>1000
I	159	44	34	32	30	2	11	2	3	1
II	467	153	74	62	86	31	31	13	14	3
III	169	59	29	26	27	14	8	1	5	0
IV	288	118	40	35	44	27	17	5	2	0
V	487	150	90	78	74	38	23	20	10	4
VI	175	82	23	33	21	8	5	2	1	0
VII	120	40	17	24	13	12	6	4	4	0
VIII	31	14	6	5	3	3	0	0	0	0
IX	348	125	61	48	71	21	10	6	5	1
X	26	8	7	8	3	0	0	0	0	0
NATION	2270	793	381	351	372	156	111	53	44	9

INDUSTRY: Paints, Varnishes, Lacquers, Enamels, and Allied Products SIC: 2851

DESCRIPTION OF INDUSTRY:

Establishments in the subject SIC are engaged primarily in manufacturing paints (in paste and ready mixed forms); varnishes; lacquers, enamels and shellac; putties, wood fillers and sealers; paint and varnish removers; paint brush cleaners and allied paint products. These products are basically produced in batch processes which consist of mixing or blending various raw materials such as pigments, solvents, diluents, resins, etc.

Based on the census data there are a total of 1464 establishments in SIC 2851, with more than 63% in the greater than 9 employee size category. The majority of establishments are located in larger urban areas (close to the customers).

CHARACTERISTICS OF HAZARDOUS WASTE PRODUCED[1,2]:

Wastes of a hazardous nature generated by the establishments are mainly sludges which may contain toxic metals, and toxic and ignitable solvents. These wastes originate from one or more of the following sources: raw materials packaging; cleaning of blending tanks, thinning tanks, and other process equipments; dust from air pollution control equipment; and waste finished products. It is estimated that the industry generates a total of 1.9 million kg/mo of hazardous wastes, with more than 95% of the wastes generated by the large generators (i.e., generators generating more than 5000 kg/mo).

WASTE TREATMENT, STORAGE AND DISPOSAL PRACTICES:

Based on the state data, the current distributions of small generators and waste quantities by disposal method are as follows:

Disposal Method	% of Generator	% of Waste
Landfill	63	40
Recycle	21	35
Incineration	8	24
Lagoon	8	1

CURRENT DISPOSAL COST:

ALTERNATIVE DISPOSAL METHODS:

INDUSTRY PROFILE:

(See table)

SOURCES OF DATA USED AND EXPLANATORY NOTES:

(1) Assessment of Industrial Hazardous Waste Practices: Paint and Allied Products Industry, Contract Solvent Reclaiming Operations, and Factory Application of Coatings, U.S. EPA Contract No. 68-01-2656, 1976

(2) Based on state data base for 47 establishments

(3) Census data, adjusted for the estimated number of "zero" generators

11/27/79. 08.43.27.

INDUSTRY PROFILE[2] SIC: 2851 NATION

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	62	5.9	3100.	.0
100-200	7	.7	1050.	.0
200-300	8	.8	2000.	.0
300-400	8	.8	2800.	.0
400-500	8	.8	3600.	.0
500-600	9	.9	4950.	.0
600-700	9	.9	5850.	.0
700-800	10	.9	7500.	.0
800-900	10	.9	8500.	.0
900-1000	11	1.0	10450.	.1
1000-2000	120	11.4	180000.	1.0
2000-5000	191	18.1	668500.	3.5
> 5000	600	57.0	18000000.	95.2
TOTAL	1053[3]	100.0	18898300.	100.0

11/29/79.   13.49.57.

BREAKDOWN OF PLANTS IN EMPLOYMENT SIZE CATEGORIES BY EPA REGION IN SIC 2851

NUMBER OF PLANTS IN EACH CATEGORY

REGION	TOTAL	1-4	5-9	10-19	20-49	50-99	100-249	250-499	500-999	>1000
I	76	14	18	16	20	7	1	0	0	0
II	271	64	52	54	53	27	13	8	0	0
III	107	17	13	19	32	16	6	3	1	0
IV	193	45	31	37	39	23	15	3	0	0
V	363	69	49	64	80	49	30	18	4	0
VI	111	20	17	21	26	17	9	1	0	0
VII	74	13	14	15	14	11	5	1	1	0
VIII	17	3	4	1	6	2	1	C	0	0
IX	208	46	31	40	49	26	14	1	1	0
X	44	11	7	8	12	5	1	0	0	0
NATION	1464	302	236	275	331	183	95	35	7	0

INDUSTRY: INDUSTRIAL ORGANIC CHEMICALS

SIC: 286

DESCRIPTION OF INDUSTRY:

According to the census data, SIC 286 covers 773 establishments. These establishments are located in all ten EPA regions and range in size from those employing less than 4 persons (about 19% of the establishments) to those with more than 1000 employees (about 4% of establishments; see census data computer printout for number distribution of establishments by EPA region and employment size category).

There are over 700 chemicals produced by more than 30 processes in the subject SIC. The major classes of chemicals covered include: non-cyclic organic chemicals; solvents; polyhydric alcohols; synthetic perfume and flavoring materials; rubber production chemicals; cyclic and acyclic plasticizers; synthetic tanning agents; chemical warfare gases; cyclic crudes and intermediates; natural gum and wood chemicals; esters, amines, etc. of polyhydric alcolids and fatty and other acids; and cyclic dyes and organic pigments. Due to the adaptability of much of the organic chemical process equipment and unit operations, in many cases the same equipment is used at a manufacturing site to produce different chemicals.

CHARACTERISTICS OF HAZARDOUS WASTES PRODUCED:

Wastes of a hazardous nature generated include still bottoms, wastewater treatment sludges, and various toxic and ignitable solvents and organic compounds. The major sources of wastes include spills, clean-ups, purification of raw materials, wastewater treatment, reject products and process residue. The total waste quantity generated by the establishments in SIC 286 is estimated at 5.3×10^8 kg/mo, with less than 0.1% of the waste generated by the estimated 256 establishments which generate less than 5000 kg/mo (see Industry Profile).

WASTE TREATMENT, STORAGE AND DISPOSAL PRACTICE:

Based on the state data and a recent industry study[1,2], the estimated relative quantities of waste disposed by the establishments generating less than 5000 kg/mo of waste is as follows:

Disposal Method	% of waste handled
Landfill	58
Incineration	20
Others (e.g., onsite storage, municipal sewer, lagoon)	22

Properly carried out, incineration and landfilling are considered environmentally adequate for disposal of most wastes generated by the subject industry. Disposal by other methods presents potential problems (e.g., due to possible corrosion of steel storage tanks and seepage from unlined lagoons).

CURRENT DISPOSAL COST:

INDUSTRY PROFILE:

Based on the state data, it is estimated that 6% of the establishments would not generate any hazardous waste, 60% of the establishments would generate more than 5000 kg/mo/establishment and 34% of the establishments would generate less than 5000 kg/mo of hazardous waste (see table).

ASSESSMENT OF QUALITY OF DATA BASE:

The total hazardous wastes generated by the subject SIC is estimated at 5.3×10^8 kg/mo. This is in very good agreement with the 5.1×10^8 kg/mo figure estimated by one previous study[(2)] which used the chemical-by-chemical production data as the basis for estimating waste quantity. Based on the census data the total number of plants in SIC 286 is 773 which is only 40% of the number estimated by the previous study[(2)]. This discrepancy is probably due to the fact that a chemical-by-chemical production approach would allow for multiple counting of some larger plants which produce more than one chemical.

SOURCES OF DATA USED AND EXPLANATORY NOTES:

(1) Based on state data for 20 small generators in SIC 286

(2) Assessment of Industrial Hazardous Wastes Practices, Organic Chemicals, Pesticides and Explosives Industries, NTIS Report PB

(3) Census data, adjusted for estimated "zero" generator (6%)

11/27/79.   08.43.27.

INDUSTRY PROFILE[1]   SIC: 2860   NATION

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	32	4.4	1600.	.0
100-200	33	4.5	4950.	.0
200-300	26	3.6	6500.	.0
300-400	20	2.7	7000.	.0
400-500	17	2.3	7650.	.0
500-600	14	1.9	7700.	.0
600-700	12	1.6	7800.	.0
700-800	10	1.4	7500.	.0
800-900	9	1.2	7650.	.0
900-1000	7	1.0	6650.	.0
1000-2000	42	5.8	63000.	.0
2000-5000	34	4.7	119000.	.0
> 5000	472	64.8	529584000.	100.0
TOTAL	728[3]	100.0	529831000.	100.0

11/29/79.   13.49.57.

BREAKDOWN OF PLANTS IN EMPLOYMENT SIZE CATEGORIES BY EPA REGION IN SIC 2860

NUMBER OF PLANTS IN EACH CATEGORY

REGION	TOTAL	1-4	5-9	10-19	20-49	50-99	100-249	250-499	500-999	>1000
I	45	7	5	11	8	5	4	2	2	1
II	160	26	13	17	29	25	32	6	7	5
III	76	8	7	6	12	10	10	8	7	8
IV	131	18	11	16	27	20	23	10	5	1
V	122	25	16	10	19	17	20	8	4	3
VI	130	27	9	8	15	18	20	12	9	12
VII	47	15	8	10	6	2	3	2	0	1
VIII	4	1	1	0	0	0	2	0	0	0
IX	44	13	7	3	4	6	8	2	1	0
X	14	5	1	1	1	4	2	0	0	0
NATION	773	145	78	82	121	107	124	50	35	31

INDUSTRY: Nitrogenous Fertilizers SIC: 2873

DESCRIPTION OF INDUSTRY:

Firms in this SIC primarily manufacture nitrogenous fertilizer material or mixed fertilizers from nitrogenous materials produced in the same establishment. Included are ammonia fertilizer compounds and anhydrous ammonia, nitric acid, ammonium nitrate, ammonium sulfate and nitrogen solutions, urea, and natural organic fertilizers (except compost) and mixtures.

According to the census data there are a total of 110 establishments in this industry. The majority of the establishments are medium to large in size, with 69% employing more than 20 employees and 30% employing more than 100 employees.

CHARACTERISTICS OF HAZARDOUS WASTES PRODUCED:

Solid waste of a hazardous nature generated is spent catalyst containing chromium, copper and other metals associated with ammonia production. Based on state data for one plant and the corresponding production capacity data obtained from the SRI Directory(1) for that plant, the waste generation rate is estimated at 0.034 kg of spent catalyst per 1000 kg of product. Based on this estimate and the available production capacity data from the SRI Directory, all establishments in SIC 2873 would generate less than 5000 kg/mo.

WASTE TREATMENT, STORAGE AND DISPOSAL PRACTICES:

Some establishments reclaim their spent catalyst. It is not known how many establishments practice reclamation; the profile table for this SIC assumes that all establishments dispose of spent catalyst.

CURRENT DISPOSAL COST:

ALTERNATIVE DISPOSAL COST:

INDUSTRY PROFILE:

(See table)

ASSESSMENT OF QUALITY OF DATA BASE:

Because of lack of data, the estimated hazardous waste generation rate of 0.034 kg per 1000 kg of product is based on the data for only one plant and hence may not be representative of all plants in the SIC.

SOURCES OF DATA USED AND EXPLANATORY NOTES:

(1) 1977 Directory of Chemical Producers, Stanford Research Institute

(2) It is assumed that all establishments in the industry produce ammonia either for captive or merchant purposes. This is a reasonable assumption because ammonia is either the end product or the feedstock for production of nitrogeneous fertilizers.

(3) State data

(4) Census data

(5) The waste generation profile was estimated as follows: the 110 plants in this SIC (based on census data) were assumed to have a production capacity distribution identical to that for the 97 plants for which production capacity data are given in the SRI directory. The estimated waste generation rate of 0.034 kg/1000 kg of product was then applied to the production capacity profile for the 110 plants to obtain the waste generation profile.

11/27/79.   08.43.27.

INDUSTRY PROFILE[5]   SIC: 2873   NATION

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	6	5.5	300.	.3
100-200	7	6.4	1050.	1.1
200-300	8	7.3	2000.	2.1
300-400	9	8.2	3150.	3.3
400-500	10	9.1	4500.	4.7
500-600	13	11.8	7150.	7.4
600-700	12	10.9	7800.	8.1
700-800	5	4.5	3750.	3.9
800-900	5	4.5	4250.	4.4
900-1000	4	3.6	3800.	3.9
1000-2000	25	22.7	37500.	39.0
2000-5000	6	5.5	21000.	21.8
> 5000	0	0.0	0.	0.0
TOTAL	110[4]	100.0	96250.	100.0

11/29/79.   13.49.57.

BREAKDOWN OF PLANTS IN EMPLOYMENT SIZE CATEGORIES BY EPA REGION IN SIC 2873

NUMBER OF PLANTS IN EACH CATEGORY

REGION	TOTAL	1-4	5-9	10-19	20-49	50-99	100-249	250-499	500-999	>1000
I	2	1	0	0	1	0	0	0	0	0
II	4	1	0	1	1	1	0	0	0	0
III	5	0	2	1	2	0	0	0	0	0
IV	22	4	4	1	6	1	3	2	1	0
V	12	4	1	0	2	2	1	2	0	0
VI	28	5	0	1	5	6	7	2	2	0
VII	14	0	0	0	3	4	4	3	0	0
VIII	5	1	0	2	1	0	1	0	0	0
IX	12	0	1	2	2	4	3	0	0	0
X	6	0	1	1	0	2	2	0	0	0
NATION	110	16	9	9	23	20	21	9	3	0

INDUSTRY: Fertilizers, Mixing Only SIC: 2875

DESCRIPTION OF INDUSTRY:

Establishments in the subject SIC are primarily engaged in mixing fertilizers (compost, potting soil and fertilizer chemicals) from purchased materials. Pesticides are also included in some fertilizer formulations. Based on the census data there are 563 establishments in this SIC with close to 50% employing less than ten employees. Most of the larger firms (with more than 50 employees) are located in Regions III, IV and V (see census data computer printout for breakdown of the establishments by employment size category and EPA region).

CHARACTERISTICS OF HAZARDOUS WASTES PRODUCED:

The hazardous wastes generated are mainly pesticide and other chemical containers and spill and reject chemicals. Based on the state data it is estimated that 88% of the establishments generate hazardous waste, and that these establishments are all in the less than 5000 kg/mo category; the estimated total waste quantity is 279,000 kg/mo with an average waste generation rate of 560 kg/mo/establishment.

Based on the state data, it is estimated that 71% of the establishments dispose of wastes to landfills, 14% recycle wastes, and 15% dispose of waste by other methods such as lagooning.

CURRENT DISPOSAL COST:

ALTERNATE DISPOSAL METHODS:

Rinsing of empty containers prior to disposal would be an environmentally preferred alternative to the direct disposal of unrinsed containers.

SOURCES OF DATA USED AND EXPLANATORY NOTES:

(1) Based on state data for 17 small generators

(2) Census data, adjusted for the estimated zero generators

11/27/79. 08.43.27.

INDUSTRY PROFILE[1] SIC: 2875 NATION

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	121	24.4	6050.	2.2
100-200	93	18.7	13950.	5.0
200-300	60	12.1	15000.	5.4
300-400	42	8.5	14700.	5.3
400-500	31	6.2	13950.	5.0
500-600	23	4.6	12650.	4.5
600-700	18	3.6	11700.	4.2
700-800	14	2.8	10500.	3.8
800-900	11	2.2	9350.	3.4
900-1000	10	2.0	9500.	3.4
1000-2000	47	9.5	70500.	25.3
2000-5000	26	5.2	91000.	32.6
> 5000	0	0.0	0.	0.0
TOTAL	496[2]	100.0	278850.	100.0

11/29/79.   13.49.57.

BREAKDOWN OF PLANTS IN EMPLOYMENT SIZE CATEGORIES BY EPA REGION IN SIC 2875

NUMBER OF PLANTS IN EACH CATEGORY

REGION	TOTAL	1-4	5-9	10-19	20-49	50-99	100-249	250-499	500-999	>1000
I	13	4	3	3	3	0	0	0	0	0
II	28	5	1	11	10	1	0	0	0	0
III	58	7	8	18	13	9	3	0	0	0
IV	168	26	30	31	53	25	3	0	0	0
V	142	49	32	27	16	13	4	1	0	0
VI	73	27	23	12	5	3	3	0	0	0
VII	34	11	13	3	5	2	0	0	0	0
VIII	7	3	2	1	1	0	0	0	0	0
IX	26	10	6	4	3	1	2	0	0	0
X	14	4	7	2	1	0	0	0	0	0
NATION	563	146	125	112	110	54	15	1	0	0

INDUSTRY: Pesticides and Agricultural Chemicals, Not Elsewhere Classified SIC: 2879

DESCRIPTION OF INDUSTRY:

Establishments in this SIC are primarily engaged in the formulation and preparation of ready-to-use agricultural and household pest control chemicals, including insecticides, fungicides and herbicides from technical chemicals or concentrates; and the production of concentrates which require furhter processing before use as agricultural pesticides. This industry also includes establishments primarily engaged in manufacturing or formulating agricultural chemicals, not elsewhere classified, such as minor or trace elements and soil conditioners. Establishments primarily engaged in manufacturing basic or technical agricultural pest control chemicals including insecticides, fungicides, and herbicides such as lead and calcium arsenates, and copper sulfate are classified in Group 281, and DDT, BHC, 2,4-D carbamates, etc., in Group 286. Establishments primarily engaged in manufacturing agricultural lime products are classified in Major Group 32.

The type of formulation most suitable for a specific application is dependent on a large number of factors, including physicochemical properties and biological efficiency of the active ingredient, host-pest relationships, characteristics of the available production/application equipment, and economic and environmental considerations. The most important types of formulations are powders, dusts, wettable powders, emulsifiable concentrates, granules, and aerosols. Typical unit operations used in the pesticide formulation are dry mixing and grinding of solids, dissolving or melting of solids, and blending. Virtually all formulations are batch type operations.

According to the census data there are 353 establishments in the subject SIC. With 68% of the establishments located in EPA Regions IV, V, VI and IX. Most of establishments are small to medium in size, with more than 60% employing less than 20 employees and more than 80% employing less than 50 employees (see census data computer printout on the distribution of establishments by employment size category and EPA region).

CHARACTERISTICS OF HAZARDOUS WASTES PRODUCED:

Wastes from pesticide formulation originate from spills, "off-spec" batches, equipment cleanup and mixing and grinding operations. The exact quantity of the waste is affected to a large extent by the in-plant management practices of good housekeeping. Based on the state and census data, it is estimated that the industry generates a total of 235,400 kg/mo of waste, with an average of 663 kg/mo/establishment.

WASTE TREATMENT, STORAGE, AND DISPOSAL PRACTICES:

According to the state data, 80% of the wastes are landfilled, 13% are incinerated, 7% are recycled and an insignificant percentage (0.05%) is lagooned.

CURRENT DISPOSAL COST:

ALTERNATIVE DISPOSAL METHOD:

Recycling of pesticide containers (when feasible) and rinsing of pesticide containers before disposal are environmentally more acceptable than disposal of unrinsed containers. Incineration generally costs two to four times as much as landfilling.

INDUSTRY PROFILE:

(See table)

ASSESSMENT OF QUALITY OF DATA BASE:

SOURCES OF DATA USED AND EXPLANATORY DATA:

(1) Based on data for 38 establishments covered in state data base
(2) Census data
(3) Assessment of Industrial Hazardous Waste Practices, Organic Chemicals, Pesticides and Explosives Industries, U.S. EPA Contract No. 68-01-2919, 1976

11/27/79. 06.43.27.

INDUSTRY PROFILE[1] SIC: 2879 NATION

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	138	38.9	6900.	2.9
100-200	45	12.7	6750.	2.9
200-300	27	7.6	6750.	2.9
300-400	19	5.4	6650.	2.8
400-500	15	4.2	6750.	2.9
500-600	12	3.4	6600.	2.8
600-700	9	2.5	5850.	2.5
700-800	8	2.3	6000.	2.5
800-900	7	2.0	5950.	2.5
900-1000	6	1.7	5700.	2.4
1000-2000	35	9.9	52500.	22.3
2000-5000	34	9.6	119000.	50.6
> 5000	0	0.0	0.	0.0
TOTAL	355[2]	100.0	235400.	100.0

11/29/79.   13.49.57.

BREAKDOWN OF PLANTS IN EMPLOYMENT SIZE CATEGORIES BY EPA REGION IN SIC 2879

NUMBER OF PLANTS IN EACH CATEGORY

REGION	TOTAL	1-4	5-9	10-19	20-49	50-99	100-249	250-499	500-999	>1000
I	6	2	1	3	0	0	0	0	0	0
II	31	9	3	7	8	2	1	0	1	0
III	20	7	2	6	1	2	1	0	1	0
IV	89	20	11	15	30	7	4	1	0	1
V	46	13	9	7	11	4	0	1	1	0
VI	47	13	6	5	12	4	4	2	0	1
VII	36	12	6	3	6	6	2	0	0	1
VIII	7	3	2	0	1	0	0	1	0	0
IX	58	19	10	12	8	6	3	0	0	0
X	13	5	5	0	3	0	0	0	0	0
NATION	353	103	55	58	80	31	15	5	3	3

INDUSTRY: Miscellaneous Chemical Products, Adhesives and Sealants SIC: 2891

DESCRIPTION OF INDUSTRY:

This SIC includes establishments primarily engaged in manufacturing industrial and household adhesives, glues, calking compounds, sealants, and linoleum, tile, and rubber cements from vegetable, animal, or synthetic plastics materials, purchased or produced in the same establishment. Establishments primarily engaged in manufacturing gelatin and sizes are classified in Industry 2899, and vegetable gelatin or agar-agar in Industry 2833.

Based on the census data, of the 482 establishments in this SIC 44% have fewer than 10 employees, 95% have fewer than 100 employees and 100% have fewer than 500 employees.

CHARACTERISTICS OF HAZARDOUS WASTES PRODUCED:

Hazardous wastes generated by firms in SIC 2891 are primarily (a) wastes from clean-up, "end-of-run" operations, "off-spec" batches of products, and (b) sludges resulting from the treatment of wastewater from process and clean-up operations[2].

The wastes reported by the eight small generator plants in the "state" data file and the percent of plants reporting each waste are as follows:

Waste	% of Plants Reporting*
Solvents	63
Miscellaneous organics	63
Adhesives	25
Oils	25
Alkalis	25
Paint	13

Solvent wastes generated by establishments in this SIC include chlorinated solvents such as perchloroethylene. The miscellaneous organic wastes reported by plants in the state data base consist of resins and alcohol-based organics. The alkali compounds generated are primarily sodium hydroxide.

Although Effluent Guidelines Division (EGD) of EPA has not promulgated standards for the industry, the distribution and total number of generators,

*Column sums to greater than 100% since some plants report generating more than one waste stream.

and waste quantities disposed of other than to municipal sewers is not likely to be significantly affected by regulations under consideration[5]. Even if a number of additional plants were to practice wastewater treatment in response to EGD regulations, most of WWT sludges would be produced in amounts greater than 5000 kg/mo and hence the number of small volume generators would not be expected to change significantly.

WASTE TREATMENT, STORAGE AND DISPOSAL PRACTICES:

Based on EGD data, 35% of the firms generating hazardous wastes report contract hauling to landfill as the disposal method for all or part of their waste, 56% report evaporation followed by landspreading on- or off-site, and 9% report deep well injection.

The disposal practices reported by small generator plants in this industrial group in the state data base and the percent of plants employing each disposal method are shown below.

Disposal Method	% of Plants*
Landfill	38
Recycling	25
Incineration	13
Municipal Sewer	13
Lagoon/Solar Pond	13
"Other" methods	13
Unknown	25

Based on the state survey data, waste types disposed of to landfill include resins, adhesives and solvents. Incineration of solvents and recycling of solvents, paints, resins, and oil are reported. Alkaline wastes are disposed of to sewer.

CURRENT DISPOSAL COST:

*Column sums to more than 100% since some plants report using more than one disposal method.

ALTERNATIVE DISPOSAL METHODS:

INDUSTRY PROFILE:

(See table)

ASSESSMENT OF QUALITY OF DATA BASE:

The industry profile is based on the very large EGD survey data covering a total of 322 production sites.

SOURCES OF DATA USED AND EXPLANATORY NOTES:

(1) Census data

(2) Based on a 1978 EPA/EGD survey of 322 plants producing SIC 2891 products (most all of these plants have SIC 2891 as their primary SIC).

(3) The estimated number of non-, small, and large generators is based on the EGD data listed above in Reference 2

(4) The mean hazardous waste generation rate for large generators is based on the data listed in Reference 2 above.

(5) Information provided by EGD personnel, June 1979.

INDUSTRY PROFILE[3] SIC: 2891 NATION

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	2	2.5	100.	.0
100-200	3	3.7	450.	.0
200-300	2	2.5	500.	.0
300-400	2	2.5	700.	.0
400-500	5	6.2	2250.	.2
500-600	2	2.5	1100.	.1
600-700	2	2.5	1300.	.1
700-800	3	3.7	2250.	.2
800-900	2	2.5	1700.	.1
900-1000	2	2.5	1900.	.1
1000-2000	9	11.1	13500.	1.0
2000-5000	16	19.8	56000.	3.9
> 5000	31	38.3	1337433.[4]	94.2
TOTAL	81	100.0	1419183.	100.0

11/29/79. 13.49.57.

BREAKDOWN OF PLANTS IN EMPLOYMENT SIZE CATEGORIES BY EPA REGION IN SIC 2891

NUMBER OF PLANTS IN EACH CATEGORY

REGION	TOTAL	1-4	5-9	10-19	20-49	50-99	100-249	250-499	500-999	>1000
I	42	11	5	6	13	4	1	2	0	0
II	77	24	10	17	18	5	2	1	0	0
III	31	9	5	7	2	6	2	0	0	0
IV	54	12	15	10	11	3	3	0	0	0
V	133	28	24	28	26	18	8	1	0	0
VI	31	11	7	8	5	0	0	0	0	0
VII	24	4	6	4	6	2	1	1	0	0
VIII	6	3	1	1	1	0	0	0	0	0
IX	63	16	13	11	11	9	3	0	0	0
X	21	3	7	3	6	2	0	0	0	0
NATION	482	121	93	95	99	49	20	5	0	0

INDUSTRY:	Miscellaneous Chemical Products, Chemicals and Chemical Preparations, Not Elsewhere Classified Including Explosives and Carbon Black	SIC:	2892,2895, 2899

DESCRIPTION OF INDUSTRY:

SIC 2892 covers establishments primarily engaged in manufacturing explosives. SIC 2895 covers establishments primarily engaged in manufacturing carbon black (channel and furnace black). Establishments in SIC 2899 are primarily engaged in manufacturing miscellaneous chemical preparations, not elsewhere classified, such as fatty acids, essential oils, gelatin (except vegetable), sizes, bluing, laundry sours, writing and stamp pad inks; industrial compounds, such as boiler and heat insulating compounds, metal, oil and water treating compounds, water-proofing compounds and chemical supplies for foundries.

Of the 1446 establishments in this group of industries, 51% have fewer than 10 employees, 93% have fewer than 100 employees and 99% have fewer than 500 employees.

SIC 2899 accounts for 92% of the establishments in this group while SIC 2892 and 2895 account for 5.7% and 2.4%, respectively.

CHARACTERISTICS OF HAZARDOUS WASTES PRODUCED:

The wastes reported by the 30 small generator plants in the state data base and the percent of plants reporting each waste are shown below:

Waste	% of Plants Reporting*
Solvents	27
Miscellaneous organics	27
Miscellaneous inorganics	20
Oils	17
Explosives	13
Alkalis	13
Acids	13
Metal Containing Compounds	10
Pesticides	7
Radioactive Material	3

*Column sums to greater than 100% since some plants report generating more than one waste stream.

Solvent wastes reported include xylene, acetone, ketones, methylene chloride, benzene, toluene, methanol, and trichloroethylene. Other organic wastes generated include oil-type paste ink, coal tar, binder, and waxes. Metal hydroxides and compounds containing selenium and zinc are also generated. Inorganic wastes mentioned in the state survey data include oxidizer, sodium lignosulfonate, incinerator ash, silica sands powder pigments, and ink residues.

WASTE TREATMENT, STORAGE, AND DISPOSAL PRACTICES:

The disposal practices reported by the 30 small generator plants in this industrial group in the state data base and the percent of plants employing each disposal method are shown below.

Disposal Method	% of Plants*
Landfill	23
Recycling	17
Incineration	10
Lagoon/solar pond	10
Landspreading	3
Deep well injection	3
"Other" methods	10
Unknown	33

Based on the state survey data, 38% of the plants generating solvent wastes recycle or incinerate the solvents; 25% dispose of solvents in landfills and 12% utilize landspreading. Over 50% of the plants report that the disposal method for solvents wastes is unknown, although most of these plants report contractor hauling of solvents. Half of the plants reporting explosive wastes incinerate them; other disposal methods are unknown. All of the plants generating pesticides indicate recycling as the disposal method. Lagoons or ponds are used for a variety of wastes including sodium lignosulfonate, sodium hydroxide, and miscellaneous chemicals.

*Column sums to more than 100% since some plants report using more than one disposal method.

CURRENT DISPOSAL COST:

ALTERNATIVE DISPOSAL METHODS:

INDUSTRY PROFILE:

(See table)

ASSESSMENT OF QUALITY OF DATA BASE:

SOURCES OF DATA USED AND EXPLANATORY NOTES:

(1) The distribution of small generators among the waste generation ranges is based on 30 data points in the state data base. The estimated number of non-, small, and large generators is based on 10 plants reporting from New York and Iowa.

(2) The census data adjusted for the estimated number of zero generators.

(3) The mean hazardous waste generation rate for large generators is based on 4 plants reporting from New York and Iowa.

INDUSTRY PROFILE[1] SIC: 2892 NATION
2895, 2899

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	PERCENT	WASTE QUANTITY KG/MO	PERCENT
0-100	166	16.4	8300.	.0
100-200	63	6.2	9450.	.0
200-300	37	3.7	9250.	.0
300-400	26	2.6	9100.	.0
400-500	19	1.9	8550.	.0
500-600	15	1.5	8250.	.0
600-700	12	1.2	7800.	.0
700-800	10	1.0	7500.	.0
800-900	8	.8	6800.	.0
900-1000	7	.7	6650.	.0
1000-2000	39	3.8	58500.	.0
2000-5000	32	3.2	112000.	.0
> 5000	579	57.2	272130000.[3]	99.9
TOTAL	1013[2]	100.0	272382150.	100.0

INDUSTRY: Miscellaneous Chemical Products, Printing Ink SIC: 2893

DESCRIPTION OF INDUSTRY:

This SIC includes establishments primarily engaged in manufacturing printing ink, gravure ink, screen process ink and lithographic ink.

Of the 416 establishments in this SIC, 38% have fewer than 10 employees, 95% have fewer than 100 employees, and 100% have fewer than 250 employees.

CHARACTERISTICS OF HAZARDOUS WASTES PRODUCED:

The wastes reported by the 10 small generator plants in the state data base and the percent of plants reporting each waste are shown below:

Waste	% of Plants Reporting*
Solvents	90
Ink	60
Miscellaneous Inorganics (e.g., resins, hardeners, adhesives)	20

WASTE TREATMENT, STORAGE, AND DISPOSAL PRACTICES:

Disposal practices employed by the small generator plants in this industrial group and the percent of plants employing each disposal method are as follows:

Disposal Method	% of Plants
Landfill	10
Landburial	10
Unknown	80

Based on state survey data, 71% of the plants reporting solvent wastes indicate that their disposal method is unknown although some of these firms indicate contractor hauling for their solvents. One plant reports land burial for solvents and one utilizes landfill disposal. Of the plants which generate inks and inorganic wastes, all of them report that the disposal method is unknown.

*Column sums to greater than 100% since some plants report generating more than one waste stream.

CURRENT DISPOSAL COST:

ALTERNATIVE DISPOSAL METHODS:

INDUSTRY PROFILE:

(See table)

ASSESSMENT OF QUALITY OF DATA BASE:

SOURCES OF DATA USED AND EXPLANATORY NOTES:

(1) The distribution of small generators among the waste generation ranges is based on 8 data points in the state data base.

(2) Census data

(3) The mean hazardous waste generation rate for large generators is based on one plant reporting from New York.

11/27/79. 08.43.27.

INDUSTRY PROFILE(1) SIC: 2893 NATION

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	17	4.1	850.	.0
100-200	32	7.7	4800.	.2
200-300	30	7.2	7500.	.3
300-400	26	6.2	9100.	.4
400-500	22	5.3	9900.	.5
500-600	19	4.6	10450.	.5
600-700	16	3.8	10400.	.5
700-800	14	3.4	10500.	.5
800-900	12	2.9	10200.	.5
900-1000	10	2.4	9500.	.4
1000-2000	56	13.4	84000.	3.9
2000-5000	38	9.1	133000.	6.1
> 5000	125	30.0	1875000. (3)	86.2
TOTAL	417 (2)	100.0	2175200.	100.0

11/29/79.   13.49.57.

BREAKDOWN OF PLANTS IN EMPLOYMENT SIZE CATEGORIES BY EPA REGION IN SIC 2893

NUMBER OF PLANTS IN EACH CATEGORY

REGION	TOTAL	1-4	5-9	10-19	20-49	50-99	100-249	250-499	500-999	>1000
I	23	6	6	9	2	0	0	0	0	0
II	70	16	11	15	17	6	5	0	0	0
III	32	5	5	8	11	0	3	0	0	0
IV	55	9	13	22	11	0	0	0	0	0
V	114	14	17	25	39	8	11	0	0	0
VI	31	5	10	10	5	1	0	0	0	0
VII	20	3	2	6	9	0	0	0	0	0
VIII	7	2	3	2	0	0	0	0	0	0
IX	50	9	14	5	19	2	1	0	0	0
X	14	5	2	5	2	0	0	0	0	0
NATION	416	74	83	107	115	17	20	0	0	0

INDUSTRY: Petroleum Refining SIC: 2911

DESCRIPTION OF INDUSTRY:

Petroleum refiners are engaged primarily in processing crude oil into fuels and lubricants, and to hydrocarbon feedstocks for petrochemical production. According to a 1979 survey 289 refineries are operating in the U.S., with capacities ranging from less than 500 bbls/day to almost 700,000 bbls per day[1]. An average refinery employs about 100 persons[2].

CHARACTERISTICS OF HAZARDOUS WASTES PRODUCED:

A wide variety of potentially hazardous wastes are generated by refineries. Small refineries, i.e., those which would generate less than 5000 kg/mo of potentially hazardous waste, produce the following waste types[4,5]:

- Tank bottoms - nonleaded, leaded and crude
- API separator sludge
- Once-through cooling water sludge
- Storm water silt
- Slop oil emulsion solids
- Dissolved air flotation float
- Waste biological sludge
- Neutralized HF alkylation sludge
- Exchanger bundle cleaning sludge
- Kerosene filter clays
- Cooling tower sludge

Estimates of the total amount of hazardous waste generated by refineries range from 357 to 700 metric tons per year (or 0.05 to 0.1 kg/bbl of crude processed)[3,4]. Amounts of hazardous wastes generated at individual refineries vary widely depending on both refinery size, equipment age and nature of the operations.

Individual large refineries process more than 100,000 bbls/day and generate more than 200,000 kg/mo of hazardous waste from a wide range of operations. Generally smaller refineries have a more limited range of operations with processing limited to crude vacuum distillation, coking, LPG recovery, hydrotreating, hydrofining, reforming, alkylation, isomerization and visbreaking.

According to one estimate, small refineries using the above processes would be expected to generate about 0.04 kg of hazardous waste per bbl of crude processed[4]. Based on this waste generation factor and the information on refinery production capacities, 27 of the 289 U.S. refineries reportedly operating in 1979 would generate less than 5000 kg/mo of waste (4 would generate less than 600 kg/mo). The 27 refineries account for about 0.1% of the total U.S. refinery wastes.

WASTE TREATMENT, STORAGE AND DISPOSAL PRACTICES[3,4]:

An API study indicates four wastes are given some type of treatment prior to disposal by a significant number of refineries: 100% of refineries treat air flotation float; 53% treat waste biological solids; 28% treat API separator bottoms and 6% treat tank bottoms. Treatment techniques commonly used are shown below:

Waste/Treatment	Settling	Centrifugation	Aerobic Digestion
Air flotation float	X	X	
Waste biological solids	X	X	X
API separator bottoms	X	X	
Tank bottoms	X		

Recovery of oil (or fuel energy) from sandy API separator bottoms, treating clays, air flotation float and tank bottoms can be economically and technically advantageous. The techniques appropriate for each product, respectively, are extraction, incineration, settling and extraction.

Landfarming is used by about 50% of the refineries for the final disposal of biological and air flotation wastes. Most refinery sludges, especially tank bottoms and separator bottoms, are landfarmed to some degree. Most landfarming is done onsite. Offsite landfilling is the predominant means of disposing of other refinery solid wastes.

CURRENT DISPOSAL COSTS:

A recent study for the EPA estimated costs both for treatment and disposal of refinery wastes[2]. A summary of these waste disposal costs is given in the table which follows. Treatment costs vary greatly depending upon the type of treatment, the type of waste and the required capacity of the unit.

Small refineries will most likely dispose of their wastes by landfilling or landspreading with no prior treatment. Thus, using unit cost data presented here, small refineries could be expected to have waste disposal costs of \$3.3 - \$19.6 per metric ton (\$3-\$18 per ton).

ESTIMATED UNIT COSTS FOR DISPOSAL OF REFINERY WASTES BY VARIOUS DISPOSAL METHODS (5)

Disposal Methods	Applicability	Unit Cost
Landspreading	Biodegradable Waste sludges	\$3 to \$18/ton
Landfilling	Dewatered sludges (ultimate disposal)	\$5 to \$12/ton
Incineration	API separator bottoms, DAF float, waste biosludges, slop oil and emulsion sludges	\$15 to over \$1000/ton
Lagoons	Various sludges (ultimate disposal)	\$900 to \$1100/ 100,000 gal/day*
Deep well injection	Various sludges (ultimate disposal)	Site specific, no generalized cost data available
Ocean disposal	Various sludges (ultimate disposal)	\$2/ton for bulk \$15 to \$50/ton for containers

*Operating costs only, capital costs \$180,000 to \$900,000 per 100,000 gal per day of capacity

ALTERNATIVE DISPOSAL METHODS:

INDUSTRY PROFILE:

(See table)

ASSESSMENT OF THE QUALITY OF THE DATA BASE:

The census data for 1976 lists 413 establishments covered by SIC 291 whereas an API survey (Reference 1) indicates a total of 289 refineries operating in 1979. The observed discrepancy can be due to a combination of several factors including incomplete reporting in the API survey, coverage of establishments not actually conducting refining operations in the census data, and a drop in the number of operating refineries since 1976 (the base year for census data).

There is some uncertainty in the waste generation factor used to estimate industry waste profile. The correlation between crude oil processing capacity and waste generation is not well established (particularly for small refineries[3]. Despite the uncertainties in both the total number of refineries and waste generation factor, it is unlikely that the estimated number of refineries which would generate less than 5000 kg/mo of waste would change dramatically with more accurate data since such a small fraction of the total are expected to be small generators.

SOURCES OF DATA CITED:

(1) Oil and Gas Journal, Annual Refining Report, March 1979

(2) Census data

(3) Engineering-Science, Inc., The 1975 API Refinery Solid Waste Survey, Parts 1-4, 1978

(4) Jacobs Engineering Co., Assessment of Hazardous Waste Practices in the Petroleum Refining Industry, USEPA, 1976

(5) Radian Corporation, Petroleum Refining Solid Waste Screening Study, Draft Final Report, USEPA, OAQPS, 1979

(6) Based on an estimated hazardous waste generation rate of 0.04 kg/ bbl of crude oil processed (from Reference 4) and the information on refinery capacities (from Reference 1)

INDUSTRY PROFILE(6) SIC: 2911 NATION

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	0	0.0	0.	0.0
100-200	0	0.0	0.	0.0
200-300	1	.3	250.	.0
300-400	0	0.0	0.	0.0
400-500	1	.3	450.	.0
500-600	2	.7	1100.	.0
600-700	0	0.0	0.	0.0
700-800	0	0.0	0.	0.0
800-900	1	.3	850.	.0
900-1000	0	0.0	0.	0.0
1000-2000	8	2.8	12000.	.0
2000-5000	14	4.8	49000.	.1
> 5000	263	90.7	57860000.	99.9
TOTAL	290(1)	100.0	57923650.	100.0

11/29/79. 13.49.57.

BREAKDOWN OF PLANTS IN EMPLOYMENT SIZE CATEGORIES BY EPA REGION IN SIC 2911

NUMBER OF PLANTS IN EACH CATEGORY

REGION	TOTAL	1-4	5-9	10-19	20-49	50-99	100-249	250-499	500-999	>1000
I	4	3	1	0	0	0	0	0	0	0
II	20	5	1	2	4	1	2	2	1	2
III	32	4	3	1	2	3	9	4	3	3
IV	30	5	0	5	7	6	4	1	2	0
V	63	11	7	4	9	6	7	7	9	3
VI	148	24	7	10	25	13	23	21	14	11
VII	20	2	1	2	4	1	3	6	1	0
VIII	34	6	1	1	5	5	11	5	0	0
IX	46	3	4	2	8	8	7	5	6	3
X	16	4	0	1	6	1	0	4	0	0
NATION	413	67	25	28	70	44	66	55	36	22

INDUSTRY: Rubber and Miscellaneous Plastics Products SIC: 30

DESCRIPTION OF INDUSTRY:

This major group includes establishments manufacturing from natural, synthetic, or reclaimed rubber gutta percha, balata, or gutta siak, rubber products such as tires, rubber footware, mechanical rubber goods, heels and soles, flooring, and rubber sundries. This group also includes establishments primarily manufacturing tires, but establishments primarily recapping and retreading automobile tires are classified in Industry 7534. This group also includes establishments engaged in molding primary plastics for the trade, and manufacturing miscellaneous finished plastics products. The manufacture of elastic webbing is classified in Major Group 22; products made of elastic webbing and garments made from rubberized fabrics in Major Group 23; and synthetic rubber in Industry 2822.

The employment-size categories of the plants varies widely. Based on the census data, 37% of the plants have fewer than 10 employees, 73% have fewer than 50 employees and 95% have fewer than 250 employees.

CHARACTERISTICS OF HAZARDOUS WASTES PRODUCED:

The wastes reported by the 67 small generators in the state data file and the percent of plants reporting each waste shown are shown in the table below. Previous industry studies[1,2] indicate that potentially hazardous dusts from floor sweepings and air pollution control equipment, waste chemical containers and packaging, and wastewater treatment sludges are also generated by plants in SIC 30. While the percent of plants reporting waste oils is shown in the table below, the estimate of total hazardous waste made here does not include waste oils.

Waste	% of plants reporting*
Oil	48
Solvents	40
Resins, epoxy, plastics, rubber, adhesives	19
Paint wastes	6
Acids	3
Alkalis	1
Rags	<1
Lead, cadmium, and chromium compounds	<1
Asbestos fibers	<1

*The total percentage exceeds 100% since some plants report production of more than one waste stream.

Based on the state survey data, the types of waste solvents generated by plants in this SIC include acetone, toluol, methyl ethyl ketone, ethylene chloride, chloroethane, perchloroethylene, Stoddard solvent, mineral spirits, and benzene.

WASTE TREATMENT, STORAGE, AND DISPOSAL PRACTICES:

The disposal methods employed and percent of plants reporting use of each disposal method are shown in the table below for the 67 small generator plants covered in the state data base.

Disposal Method	% of plants reporting*
Landspreading	7
Landfill	31
Incineration	8
Offsite recycle	13
Municipal sewer	2
Lagoon/solar ponds	3
Other methods	8
Unknown	36

Based on state survey data, over 25% of the plants with oil or solvent wastes use landfills for their disposal. Over 30% of the plants indicate that the disposal method for oils or solvents is unknown. About 20% of the firms with oil or solvents recycle or incinerate their wastes. Other disposal methods for solvents include landspreading (4%), sewer (2%), lagoons or ponds (2%) and other methods (10%). Other disposal methods for oils include landspreading (6%), sewer (2%), lagoons or ponds (2%) and other methods (9%). Organic compounds including resins, epoxy, adhesives, plastics and rubber are landfilled by 42% of the plants in the state data. Over 30% of the plants with these wastes indicate that the disposal method is unknown. 8% of the plants use lagoons or ponds and 4% recycle these wastes. More than 30% of the plants with paint wastes use landfills for disposal.

CURRENT DISPOSAL COST:

*Columm sums up to more than 100% since some plants use more than one disposal method.

ALTERNATIVE DISPOSAL METHODS:

INDUSTRY PROFILE:

(See table). Separate industry profiles were calculated for "SIC 30, except 307" and for "SIC 307."

ASSESSMENT OF QUALITY OF DATA BASE:

The four-digit SIC's are not represented in the data base in the same proportions as they are known to exist in the universe. Since sufficient number of data points were available for SIC 307, separate profiles were calculated for SIC 307 and for SIC 30, except 307 to improve the validity of the results.

A previous EPA sponsored study of SIC 30, except 307 estimated a total waste approximately 20% lower than the estimate made in this study. The previous study did not list some wastes such as solvent and paint wastes which were reported in the state data. However, some wastes described as potentially hazardous in the previous study (e.g., baghouse dusts and empty chemical containers) are not reported in the state data collected by this study.

SOURCES OF INFORMATION USED AND EXPLANATORY NOTES:

1. Enviro Control, Inc., "Hazardous Waste Listings: Fabricated Rubber Products Industry," EPA Contract No. 68-01-3937, April 1979.
2. Foster D. Snell, Inc., "Assessment of Industrial Hazardous Waste Practices, Rubber and Plastics Industry," PB-282-070, March 1978.
3. The estimated numbers of plants in each of the generator classes between 100 and 5000 kg/mo are based on 27 data points in the state data. The estimated number of non- and large generators is based on 26 plants reporting from Iowa and Massachusetts.
4. The estimated mean generation rate for large generators is 21,546 kg/mo, based on four plants reporting from Iowa and Massachusetts.
5. Census data adjusted for "zero" generators (estimated at 59%).
6. The estimated numbers of plants in each of the generator classes between 100 and 5000 kg/mo are based on 40 data points in the state data. The estimated number of non- and large generators is based on 15 plants reporting from Iowa and Massachusetts.

7. The estimated mean generation rate for large generators is 17,426 kg/mo based on three plants reporting from California, Iowa and Massachusetts.
8. Census data adjusted for "zero" generators (estimated at 67%).
9. Sum total of profiles for "SIC 307" and "SIC 30, except 307."

11/27/79.   08.43.27.

INDUSTRY PROFILE(3)   SIC: 3000 except 307   NATION

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	148	22.3	7400.	.1
100-200	70	10.6	10500.	.2
200-300	41	6.2	10250.	.2
300-400	28	4.2	9800.	.2
400-500	20	3.0	9000.	.2
500-600	16	2.4	8800.	.2
600-700	12	1.8	7800.	.1
700-800	10	1.5	7500.	.1
800-900	8	1.2	6800.	.1
900-1000	7	1.1	6650.	.1
1000-2000	36	5.4	54000.	1.0
2000-5000	25	3.8	87500.	1.6
> 5000	242	36.5	5214132.(4)	95.8
TOTAL	663(5)	100.0	5440132.	100.0

11/27/79.   08.43.27.

INDUSTRY PROFILE[6]   SIC: 3070   NATION

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	544	20.2	27200.	.1
100-200	241	8.9	36150.	.2
200-300	146	5.4	36500.	.2
300-400	103	3.8	36050.	.2
400-500	77	2.9	34650.	.2
500-600	60	2.2	33000.	.2
600-700	49	1.8	31850.	.2
700-800	40	1.5	30000.	.2
800-900	34	1.3	28900.	.1
900-1000	29	1.1	27550.	.1
1000-2000	162	6.0	243000.	1.2
2000-5000	133	4.9	465500.	2.4
> 5000	1077	40.0	18767802.[7]	94.8
TOTAL	2695[8]	100.0	19798152.	100.0

11/30/79.   10.10.07.

INDUSTRY PROFILE[9]   SIC: 3000 (all)   NATION

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	692	20.6	34600.	.1
100-200	311	9.3	46650.	.2
200-300	187	5.6	46750.	.2
300-400	131	3.9	45850.	.2
400-500	97	2.9	43650.	.2
500-600	76	2.3	41800.	.2
600-700	61	1.8	39650.	.2
700-800	50	1.5	37500.	.1
800-900	42	1.3	35700.	.1
900-1000	36	1.1	34200.	.1
1000-2000	198	5.9	297000.	1.2
2000-5000	158	4.7	553000.	2.2
> 5000	1319	39.3	23981934.	95.0
TOTAL	3358	100.0	25238284.	100.0

11/29/79. 13.49.57.

BREAKDOWN OF PLANTS IN EMPLOYMENT SIZE CATEGORIES BY EPA REGION IN SIC 3070

NUMBER OF PLANTS IN EACH CATEGORY

REGION	TOTAL	1-4	5-9	10-19	20-49	50-99	100-249	250-499	500-999	>1000
I	737	178	109	121	147	90	72	14	4	2
II	1222	275	165	226	251	182	92	25	6	0
III	564	123	70	91	122	69	62	21	5	1
IV	870	238	102	149	180	94	75	24	7	1
V	2222	484	275	336	508	304	225	67	16	7
VI	553	165	83	92	114	50	36	9	3	1
VII	367	83	44	51	90	54	30	10	4	1
VIII	140	44	33	22	31	6	4	0	0	0
IX	1236	387	185	212	229	129	78	13	2	1
X	189	63	30	34	39	14	8	0	1	0
NATION	8100	2040	1096	1334	1711	992	682	183	48	14

12/06/79. 12.30.54.

BREAKDOWN OF PLANTS IN EMPLOYMENT SIZE CATEGORIES BY EPA REGION IN SIC 3000

NUMBER OF PLANTS IN EACH CATEGORY

REGION	TOTAL	1-4	5-9	10-19	20-49	50-99	100-249	250-499	500-999	>1000
I	901	201	133	143	168	112	99	24	17	4
II	1399	315	197	252	284	201	109	31	9	1
III	684	132	89	109	139	81	82	33	12	7
IV	1104	286	124	168	214	130	106	39	18	19
V	2716	560	319	399	613	376	290	98	34	27
VI	657	187	88	108	135	57	54	16	5	7
VII	418	92	50	55	94	61	42	13	4	7
VIII	158	51	36	24	34	6	4	2	0	1
IX	1452	444	211	244	277	150	98	18	5	5
X	216	72	35	37	46	18	9	0	1	0
NATION	9707	2340	1282	1539	2004	1192	893	274	105	78

INDUSTRY: Leather and Leather Products (except leather tanning and finishing) SIC: 31 (except 3111)

DESCRIPTION OF INDUSTRY:

Establishments in this industry are primarily engaged in the manufacture of finished leather products, artifical leather products and other similar products made of other materials. Based on the census data there are 2379 establishments in the subject SIC with most of the establishments located in the New England and eastern seaboard states.

CHARACTERISTICS OF HAZARDOUS WASTES PRODUCED:

Based on data from Iowa, Mass., New York and Rhode Island it is estimated that 77% (or 1831) of the establishments do not generate hazardous wastes and that of the plants producing hazardous wastes no plant generates more than 5000 kg/mo of waste. The predominant hazardous wastes generated are solvents, cements, adhesives, paint sludge, solvent- and cement-contaminated rags, empty solvent and cement containers. The total amount of hazardous waste generated by plants in the subject SIC is estimated at 416,000 kg/mo with an average rate of 760 kg/mo per generator (see Industry Profile).

WASTE TREATMENT, STORAGE AND DISPOSAL PRACTICES:

All plants included in the state data base indicate offsite landfill disposal of hazardous wastes.

ALTERNATIVE DISPOSAL METHODS:

Waste solvents could be recycled, as recycling is environmentally more acceptable than disposal via landfills. Incineration could also be a viable alternative for waste oils and solvents.

INDUSTRY PROFILE:

(See table)

ASSESSMENT OF THE QUALITY OF THE DATA BASE:

SOURCES OF DATA USED:

(1) Based on state data for 9 establishments in SIC's 313-319

(2) Census data, adjusted for the estimated number of "zero" generators (77%)

11/27/79. 08.43.27.

INDUSTRY PROFILE[1] SIC: 3100 (except 3111) NATION

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	160	29.2	8000.	1.9
100-200	76	13.9	11400.	2.7
200-300	48	8.8	12000.	2.9
300-400	34	6.2	11900.	2.9
400-500	27	4.9	12150.	2.9
500-600	22	4.0	12100.	2.9
600-700	18	3.3	11700.	2.8
700-800	15	2.7	11250.	2.7
800-900	13	2.4	11050.	2.7
900-1000	11	2.0	10450.	2.5
1000-2000	65	11.9	97500.	23.4
2000-5000	59	10.8	206500.	49.6
> 5000	0	0.0	0.	0.0
TOTAL	548[2]	100.0	416000.	100.0

12/07/79. 13.31.39.

BREAKDOWN OF PLANTS IN EMPLOYMENT SIZE CATEGORIES BY EPA REGION IN SIC 3100 (including SIC 3111)

NUMBER OF PLANTS IN EACH CATEGORY

REGION	TOTAL	1-4	5-9	10-19	20-49	50-99	100-249	250-499	500-999	>1000
I	541	115	56	62	91	57	79	65	13	3
II	737	192	93	116	148	92	68	22	6	0
III	224	30	16	24	37	24	46	42	5	0
IV	273	62	21	26	45	23	24	53	18	1
V	341	76	33	48	42	55	42	37	6	2
VI	194	53	21	25	33	16	26	16	3	1
VII	160	23	19	12	19	26	20	30	11	0
VIII	45	19	9	7	6	2	1	0	0	1
IX	266	86	53	34	49	17	21	5	1	0
X	46	16	6	10	11	0	3	0	0	0
NATION	2827	672	327	364	481	312	330	270	63	8

INDUSTRY: Leather Tanning and Finishing SIC: 3111

DESCRIPTION OF THE INDUSTRY:

Firms in SIC 3111 are engaged primarily in the tanning of cattlehides, sheephides or pigskins. Most hides (about 87%) are tanned with chromium; the remainder with vegetable products (e.g., bark extracts)(1). Tanning is essentially a batch process in which the hides are immersed in the tanning solution. Based on the census data, there are 449 establishments in SIC 3111 with 53% employing less than 20 persons. Of the 449 firms, 76 are believed to be dealers and conduct no actual tanning operations; another 118 tanners are categorized as "hobby" enterprises (e.g., deer hide tanning and taxidermy)(1).

CHARACTERISTICS OF HAZARDOUS WASTES PRODUCED:

Tanners generate a variety of wastes which would be considered hazardous due to the presence of chromium (and other metals). These include hair, liquors, wastewater treatment screenings and sludges, and leather finishing residues. Small amounts of solvents are also used by tanners and waste solvents require disposal. By far the largest quantity of wastes are sludges from wastewater treatment. Although vegetable tanning generates the same types of wastes as chrome tanning, the wastes are not considered hazardous since the tanning agents are natural organic products of relatively low toxicity(1). The following table summarizes the waste generation rates for typical establishments in various tanning categories(1).

Category	Average Hazardous Waste Generation Rate (kg.mo)
Complete chrome tannery	82,000
Vegetable tannery	0
Sheepskin tannery	7,750
Split tannery	54,000
Beamhouse/tanhouse	217,000
Retan/refinishing	15,000
Leather finisher	1,100

Except for 68 plants in the "leather finishing" category and 118 "hobbiests," all chrome tanneries are estimated to generate more than 5000 kg/mo of hazardous waste(1). Based on the waste generation profiles developed here (see Industrial Profile), it is estimated that about 18 million kg/mo of hazardous waste is generated by the industry, with the "large" tanneries producing an average of about 100,000 kg/mo (mostly WWT sludges) and the small (less than 5000 kg/mo category) tanneries producing an average of 460 kg/mo. The very small "hobbiests" which are in the "less than 100 kg/mo" category produce about 1.2 kg/mo/"establishment."

WASTE TREATMENT, STORAGE, AND DISPOSAL PRACTICES(1):

About 60% of the hazardous waste generated by tanneries is disposed to landfills (10% to "sanitary landfills"). About 25% of the wastes are estimated to be disposed of to open dumps and the remaining wastes are primarily disposed in lagoons, trenches, pits, ponds, or by agricultural spreading.

WWT sludges are the only tannery wastes which are currently treated prior to disposal. Sludge dewatering is accomplished using gravity or mechanical means. It is expected that more widespread use of mechanical dewatering will occur as more tanneries install wastewater treatment/pretreatment facilities.

CURRENT DISPOSAL COST(1):

Estimated disposal costs (1974) for tannery wastes range from $2/1000 kg for open dump disposal to $38/1000 kg for dewater/landfill disposal (sludge). Average cost for landfill disposal via contract hauling is estimated at about $30/1000 kg.

ALTERNATIVE DISPOSAL METHODS(1):

Some tanneries are located where municipal sewers could be used to dispose of aqueous waste. However, this alternative merely changes the point at which sludges are generated (sewage treatment plant vs. tannery), although some sludge disposal cost saving might occur due to economics of scale. Specific tannery wastes such as trim and shavings can be used as a fertilizer or animal feed supplements as is the practice at some midwestern tanneries at present. The use of chromium-containing wastes as fertilizer and/or animal feed can be environmentally sound if surface and ground water pollution does not result from the practice and chrome in feed is kept to prescribed levels (chromium is not highly toxic to mamals but is toxic to aquatic organisms and lower terrestrial plant life).

INDUSTRIAL PROFILE:

(See table)

ASSESSMENT OF THE QUALITY OF THE DATA BASE:

The industry profile and other information in this assessment has been obtained primarily from a previous EPA study of the tanning industry[1]. The study was based on data from 41 tanneries representing 50% of the nationwide industry production. Since tanning is essentially a batch process, waste quantities are approximately proportional to the number of hides processed and waste generation for small tanneries can be estimated from data for larger tanneries[2].

There is some uncertainty in both the number of "tanners" in the "less than 100 kg/mo" category and the waste produced by these "tanners." Hobbiests and taxidermists tend to be underrepresented in the census data since many are part-time operations and have no "employees" (hence they do not appear in IRS statistics upon which 1976 census data is largely based). In addition, the amount of wastes generated by hobbiests and taxidermists is not well known, since these "tanners" do not conduct the same operations as commercial tanners[2].

SOURCES OF DATA USED AND EXPLANATORY NOTES:

(1) SCS Engineers, "Assessment of Industrial Hazardous Waste Practices - Leather Tanning and Finishing Industry, U.S. EPA Office of Solid Waste, November 1976.

(2) Information supplied by the Tanners' Council of America, May 1979

(3) Based on (a) a waste generation factor of 0.16 kg/equivalent hide for 68 leather finishers from Reference 1, (b) a "production" of less than 10 hides per year by the 118 hobbiests (making them all generators of less than 100 kg/mo of waste), (c) the assumption that 21 vegetable tanners and the 76 dealers generate no wastes and (d) all other firms in SIC 3111 generate more than 5000 kg/mo of waste.

(4) Census data, ajusted for "zero" generators (per Reference 3)

11/27/79. 08.43.27.

INDUSTRY PROFILE[3] SIC: 3111 NATION

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	121	34.4	121.	.0
100-200	4	1.1	600.	.0
200-300	5	1.4	1250.	.0
300-400	2	.6	700.	.0
400-500	3	.9	1350.	.0
500-600	3	.9	1650.	.0
600-700	3	.9	1950.	.0
700-800	2	.6	1500.	.0
800-900	3	.9	2550.	.0
900-1000	2	.6	1900.	.0
1000-2000	12	3.4	18000.	.1
2000-5000	14	4.0	49000.	.3
> 5000	178	50.6	17800000.	99.5
TOTAL	352[4]	100.0	17880571.	100.0

12/06/79. 12.33.08.

BREAKDOWN OF PLANTS IN EMPLOYMENT SIZE CATEGORIES BY EPA REGION IN SIC 3111

NUMBER OF PLANTS IN EACH CATEGORY

REGION	TOTAL	1-4	5-9	10-19	20-49	50-99	100-249	250-499	500-999	>1000
I	130	31	12	29	24	20	11	1	2	0
II	113	39	19	15	23	9	4	4	0	0
III	29	5	1	5	5	3	9	1	0	0
IV	31	7	3	5	8	1	4	3	0	0
V	62	9	6	6	10	13	10	7	1	0
VI	15	5	1	3	4	2	0	0	0	0
VII	16	1	2	2	7	3	1	0	0	0
VIII	9	5	1	1	2	0	0	0	0	0
IX	33	12	3	2	8	3	5	0	0	0
X	11	4	1	4	2	0	0	0	0	0
NATION	449	118	49	72	93	54	44	16	3	0

INDUSTRY: Stone, Clay, Glass and Concrete Products SIC: 32

DESCRIPTION OF INDUSTRY:

The establishments in the subject SIC are engaged in the manufacturing of flat glass and other glass products, cement, structural clay products, pottery, concrete and gypsum products, cut stone, abrasive and miscellaneous nonmetallic mineral products. Raw materials used are primarily stone, clay, sand, alkalis and pigment chemicals. Major production processes include crushing, grinding, mixing, extruding, calcination, drying and firing. According to the census data (see computer printout), there are over 15,713 establishments in SIC 32, located in all 10 EPA regions. The majority (83%) of the establishments has less than 50 employees with 31% employing from 1 to 4 employees.

CHARACTERISTICS OF HAZARDOUS WASTES PRODUCED:

Wastes of a hazardous nature which are generated are mainly waste lube oil, and toxic and ignitable solvents(1). Some plants may also generate alkali and acidic wastes. Based on the state data, the total hazardous waste (excluding lube oil) generated by the industry is estimated at 1.8 million kg/mo with an average generation rate of 583 kg/mo/establishment (see Industry Profile).

The quantity of hazardous waste generated by an establishment is usually insignificant compared to the quantity of the nonhazardous waste. Nonhazardous wastes include rejected or broken products and process "dust" collected from various operations.

WASTE TREATMENT, STORAGE, AND DISPOSAL PRACTICES:

Based on the state data, 70% of the wastes are landfilled, 30% are contract hauled and an insignificant percentage (0.03%) is recycled.

Many establishments recycle the nonhazardous waste (e.g., process "dust") although some dispose of such wastes in landfills.

When designed and operated properly, landfills should be environmentally adequate for disposal of wastes generated by the subject SIC.

CURRENT DISPOSAL COST:

One establishment reported landfill cost at $55/ton.

ALTERNATIVE DISPOSAL METHOD:

Other environmentally acceptable disposal methods include recycling and controlled incineration.

INDUSTRY PROFILE(8):

(See table)

ASSESSMENT OF QUALITY OF DATA BASE:

SOURCES OF DATA USED AND EXPLANATORY NOTES:

(1) Three types of wastes (cement kiln dust, alkali waste from lime production and asbestos waste which are generated by establishments in SIC 3292) are not included in this assessment. Cement kiln dust is considered a "special" waste subject to different regulations. Establishments generating alkali waste from lime production are assessed to be "large" generators; asbestos wastes are regulated under OSHA and other acts such as the Clean Air Act.

(2) Census data

(3) Based on data for 22 small generators in the state data base

(4) Contact with three establishments and the following five trade associations:

Portland Cement Association
Glass Packaging Institute
Sealed Insulating Glass Manufacturing Association
Gypsum Association
American Concrete Pressure Pipe Association

(5) EPA/Effluent Guidelines Division Development Document: Flat Glass (EPA 440/1-74-001c)

(6) EPA/Effluent Guidelines Division Development Document: Cement Manufacturing Point Source (EPA 550/1-74-005a)

(7) Industrial Process Profiles for Environmental Use:

Chapter 17, The Gypsum and Wallboard Industry, NTIS PB-281-484
Chapter 18, The Lime Industry, NTIS PB-281-481
Chapter 19, The Clay Industry, NTIS PB-281-486

(8) Based on the assumption that establishments in the 4-digit SIC's which did not appear in the state data do not generate hazardous wastes; based on this assumption 80% of the establishments in SIC 32 are considered non-hazardous waste generators.

11/27/79.   08.43.27.

INDUSTRY PROFILE(3)   SIC: 3200   NATION

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	1408	44.8	70400.	3.8
100-200	383	12.2	57450.	3.1
200-300	224	7.1	56000.	3.1
300-400	155	4.9	54250.	3.0
400-500	116	3.7	52200.	2.8
500-600	92	2.9	50600.	2.8
600-700	75	2.4	48750.	2.7
700-800	63	2.0	47250.	2.6
800-900	53	1.7	45050.	2.5
900-1000	46	1.5	43700.	2.4
1000-2000	269	8.6	403500.	22.0
2000-5000	258	8.2	903000.	49.3
> 5000	0	0.0	0.	0.0
TOTAL	3142(2,8)	100.0	1832150.	100.0

11/29/79. 13.49.57.

BREAKDOWN OF PLANTS IN EMPLOYMENT SIZE CATEGORIES BY EPA REGION IN SIC 3200

NUMBER OF PLANTS IN EACH CATEGORY

REGION	TOTAL	1-4	5-9	10-19	20-49	50-99	100-249	250-499	500-999	>1000
I	781	279	157	156	111	36	30	7	2	3
II	1334	441	282	234	186	65	76	24	19	7
III	1606	398	276	297	325	115	105	54	30	6
IV	2648	686	513	583	516	165	131	32	15	7
V	3691	1187	701	758	570	207	158	61	33	16
VI	1690	488	338	325	303	105	91	31	9	0
VII	1103	364	250	232	154	41	48	8	5	1
VIII	581	219	128	91	81	40	16	4	1	1
IX	1737	568	320	340	307	103	63	23	12	1
X	542	215	102	106	69	31	15	3	1	0
NATION	15713	4845	3067	3122	2622	908	733	247	127	42

INDUSTRY: Rolling, Drawing, and Extruding of Metal SIC: 3315,3316, 3317,335

DESCRIPTION OF INDUSTRY:

This group of industries includes the following SIC's: 3315 (Steel Wire Drawing and Steel Nails and Spikes), which includes establishments primarily engaged in drawing wire from purchased iron or steel rods, bars or wire and which may be engaged in the further manufacture of products made from wire; 3316 (Cold Rolled Steel Sheet, Strip, and Bars), which includes establishments primarily engaged in (a) cold rolling steel sheets and strip from purchased hot rolled sheets; (b) cold drawing steel bars and steel shapes from purchased hot rolled steel bars; and (c) producing other cold finished steel; 3317 (Steel Pipe and Tubes), which includes establishments engaged in the production of welded or seamless steel pipe and tubes and heavy riveted steel pipe from purchased material; and 335 (Rolling, Drawing, and Extruding of Nonferrous Metals), which includes establishments primarily engaged in rolling, drawing, and extruding of nonferrous metals into plates, sheets, strips, bars, tubing and wire.

The plants in the category are distributed between the EPA regions approximately in proportion to population with the exception of Regions I and VIII. Region I has 13.8% of the plants in this group but only 5.75% of the population and Region VIII has only 0.9% of the plants but 2.71% of the population.

Plants fall into all employment size categories without being concentrated in any one category. About 18% of the plants have fewer than 10 employees, 46% have fewer than 50 and 16% have in excess of 250 employees.

CHARACTERISTICS OF HAZARDOUS WASTES PRODUCED:

The table which follows shows the wastes reported by the 35 sampled plants in this industrial grouping, as well as the percent of plants reporting each waste. It can be seen from the table that about one-third of the wastes are cleaning chemicals of various kinds.

WASTE TYPES AND RELATIVE QUANTITIES

Waste	% of Plants Reporting Waste*	% of Total Waste Reported	% of Non-oil Waste Reported
Oil	48.57	25.44	--
Solvent	34.28	7.36	9.91
Cyanides	11.43	0.28	0.38
Copper sludge	8.57	4.63	6.24
Acids	8.57	6.34	8.54
Alkaline cleaners	8.57	8.86	11.93
Plating solution with metals	8.57	5.67	7.65
Copper and other metal oxide powders	5.71	4.72	6.36
Caustics	2.86	4.42	5.95
Organic hazardous waste	2.86	22.26	29.98
Enamel coatings	2.86	0.73	0.99
Potassium permanganate	2.86	0.04	0.05
Fats and waxes	2.86	8.28	11.15
Sodium nitrate	2.86	0.27	0.36
Lead dross	2.86	0.35	0.47
Pesticides and unrinsed containers	2.86	0.03	0.04
		99.68	100.00

*The sum exceeds 100 since many plants report more than one waste stream.

WASTE TREATMENT STORAGE AND DISPOSAL PRACTICE:

The table which follows shows the percent of sampled plants which disposed of each listed waste by the indicated disposal methods. As can be seen by the table, disposal via contract hauling is generally the most prevalent disposal methods for plants reporting waste disposal.

CURRENT DISPOSAL COST:

PERCENT OF FACILITIES DISPOSING OF INDICATED WASTE BY INDICATED DISPOSAL METHOD

Waste	Unknown		Contract Hauled to Unspecified Disposal		Recycle		Landfill		Sewer		Other Method		Incineration	
	% of Facilities	% of Waste	% of Facilities	% of Waste	% of Facilities	% of Waste	% of Facilities	% of Waste	% of Facilities	% of Waste	% of Facilities	% of Waste	% of Facilities	% of Waste
Oil	33.3	50.2	22.2	19.3	11.1	18.3	11.1	2.3	5.6	7.7	5.6	0.8	5.6	1.3
Solvent	30.0	17.9	40.0	20.2	30.0	61.9								
Cyanides			75.0	60.2	25.0	39.8								
Copper sludge			100	100										
Acids			33.3	7.0	66.7	93.0								
Alkaline cleaners			33.3	70.6					33.3	16.6	33.3	12.8		
Plating solutions			33.3	19.6	33.3	2.0	33.3	78.4						
Caustics*									100	100				
Organic hazardous waste*									100	100				
Enamel coating*			100	100										
Potassium permanganate*			100	100										
Fats and waxes*							100	100						
Sodium nitrate*			100	100										
Lead dross*	100	100												
Pesticides and unrinsed containers					100	100								

*Only one plant reported disposing of this waste.

ALTERNATIVE DISPOSAL METHODS:

INDUSTRY PROFILES:

Based on survey data from Iowa, Massachusetts, and New York, it was estimated that 21.6% of the plants in this industrial grouping generated no hazardous wastes, that 24.3% generated in excess of 5,000 kg/mo, and that the plants generating more than 5,000 k/mo generated an average of 147,700 kg/mo.

ASSESSMENT OF QUALITY OF DATA BASE:

SOURCES OF DATA USED AND EXPLANATORY NOTES:

(1) Based on "state" data base covering 35 small generators

(2) Census data adjusted for "zero" generators (estimated at 22%)

11/27/79. 08.43.27.

INDUSTRY PROFILE[1] SIC: 3315, 3316, 3317, 335 NATION

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	242	19.5	8470.	.0
100-200	17	1.4	2550.	.0
200-300	33	2.7	8250.	.0
300-400	25	2.0	8750.	.0
400-500	59	4.7	26550.	.0
500-600	29	2.3	15950.	.0
600-700	25	2.0	16250.	.0
700-800	29	2.3	21750.	.0
800-900	25	2.0	21250.	.0
900-1000	25	2.0	23750.	.0
1000-2000	226	18.2	339000.	.6
2000-5000	133	10.7	465500.	.8
> 5000	375	30.2	55387500.	98.3
TOTAL	1243[2]	100.0	56345520.	100.0

12/06/79. 12.30.54.

BREAKDOWN OF PLANTS IN EMPLOYMENT SIZE CATEGORIES BY EPA REGION IN SICS 3315, 3316, 3317 and 335

NUMBER OF PLANTS IN EACH CATEGORY

REGION	TOTAL	1-4	5-9	10-19	20-49	50-99	100-249	250-499	500-999	>1000
I	214	31	12	14	41	33	36	30	13	4
II	203	22	18	22	42	27	43	19	7	3
III	174	16	11	14	27	24	46	20	12	4
IV	174	20	8	12	24	35	47	18	4	6
V	438	36	26	50	82	76	89	44	28	7
VI	104	18	4	10	22	18	23	7	2	0
VII	43	4	0	7	5	11	10	3	2	1
VIII	14	2	1	2	4	3	1	1	0	0
IX	160	24	18	16	35	28	22	9	3	3
X	21	2	6	1	1	4	5	0	1	1
NATION	1545	175	104	150	283	259	322	151	72	29

INDUSTRY: Foundries SIC: 332,336

DESCRIPTION OF INDUSTRY:

This group includes establishments primarily engaged in the casting of metals. SIC 332 includes establishments that manufacture iron and steel castings. SIC 336 includes establishments that manufacture castings of aluminum, brass, bronze, and other nonferrous metals and alloys.

Establishments which produce castings and which are also engaged in fabricating operations, such as machining, assembling, etc., in manufacturing a specified product are classified in the industry of the specified product. In addition to the casting of metal, many establishments whose primary SIC is either 332 or 336 are engaged in ancillary processes such as heat treating, pickling, metal cleaning, painting, etc.

Foundries are distributed among the EPA regions roughly in proportion to population with a slight concentration in Region 5. Ferrous foundries are in all employment size categories and tend to be larger than non-ferrous foundries. About 35% of ferrous foundries have more than 100 employees and 48% have fewer than fifty. About 80% of the non-ferrous foundries have fewer than 50 employees and 36% have fewer than 10[1].

CHARACTERISTICS OF HAZARDOUS WASTES PRODUCED:

Metal foundries produce large quantities of solid wastes including such things as slags, core butts, dusts, and scrubber sludges. Much of this waste contains heavy metals and other toxic chemicals but testing sponsored by the American Foundryman's Society and the EPA have found that these wastes do not release their toxic components in leaching tests[3,4,5].

Since the metal casting process itself does not result in hazardous waste, the ancillary processes (e.g., metal cleaning, finishing, etc.) determine which hazardous wastes are generated at a given foundry. Approximately half of the non-oil hazardous wastes reported in the "state" data by establishments in SIC 332 and 336 are chemicals used in metal cleaning. Waste oil was the only hazardous waste reported by 27% of the plants in SIC 332 and 22% of the plants in SIC 336[6].

WASTE TREATMENT, STORAGE AND DISPOSAL PRACTICES:

The two tables which follow show the waste disposal practices reported in the "state" data. It can be seen from these tables that off-site landfill is the most commonly reported method of disposal, being reported by more than half the plants in both SIC 332 and 336.

Non-hazardous wastes are reported to be open dumped. These wastes are generated in vastly larger quantities than are the hazardous wastes. This is particularly true for SIC 332 where one estimate[5] is that approximately 1.5 x 10^6 MT of non-hazardous wastes are generated each month as opposed to 0.303 MT/mo estimated in this assessment.

SIC 332:

Disposal Method	% of plants reporting use of disposing method	% of all hazardous waste to disposal method	% of non-oil hazardous waste to disposal method
Landfill (offsite)	54	42	49
Septic tank	9	1.5	1.8
Recycle	18	49	49
Unknown	27	7.6	0
		100	100

SIC 336:

Disposal Method	% of plants reporting use of disposing method	% of all hazardous waste to disposal method	% of non-oil hazardous waste to disposal method
Landfill (offsite)	55	15	29
Landspread	11	0.3	0
Recycle	11	46	0
Unknown	44	39	71
		100	100

CURRENT DISPOSAL COST:

ALTERNATIVE DISPOSAL METHODS:

SIC: 332,336

HAZARDOUS WASTES REPORTED BY NINE NONFERROUS FOUNDRIES

Waste	% of Plants Reporting Waste	% of Total Amount of Hazardous Waste Reported	% of Total Amount of non-oil Hazardous Waste Reported
Oil	56	51.1	--
Solvents	44	23.9	48.9
Degreaser sludge	22	7.1	14.5
HCl, NH_3	11	9.1	18.7
Paints	11	8.7	17.7
Chromium hydroxide solution	11	0.1	0.2
		100	100

HAZARDOUS WASTES REPORTED BY 11 IRON AND STEEL FOUNDRIES

Waste	% of Plants Reporting Waste	% of Total Amount of Hazardous Waste Reported	% of Total Amount of non-oil Hazardous Waste Reported
Oil	27	15.8	--
Alkaline solution	27	13.7	16.3
Liquid caustic	27	13.5	16.1
Acid Solution	9	9.8	11.6
Chemical Cleaners	9	2.1	2.4
Organic Solvent	9	1.6	2.0
Caustic soda (solid)	9	2.2	2.6
Inorganic Hazardous Waste	9	41.1	48.8
X-ray Emulsion	9	0.1	0.13
Pesticides	9	0.03	0.03
		100	100

INDUSTRY PROFILE:

(See table)

ASSESSMENT OF QUALITY OF DATA BASE:

Based on the results of laboratory tests sponsored by the EPA and the American Foundrymen's Society, this assessment assumes that all slags, dusts and scrubber sludges from metal foundries are non-hazardous. Should any of these wastes prove to be hazardous in subsequent testing, the estimate of hazardous waste quantity presented here would be low.

The data collected by this study indicate that there are no plants in SIC 332 which generate more than 5 MT of hazardous waste per month while there are plants in SIC 336 which generate more than 5 MT of hazardous waste per month. This is apparently inconsistent with the fact that plants in SIC 332 tend to be larger than those in SIC 336. One possible explanation is a reporting error in the "state" surveys. However, it appears more likely that the hazardous wastes from ferrous foundries are disposed of to POTW's and so are not reported in the "state" data base. The prevalence of neutralizable acid and alkaline wastes from SIC 332 and the prevalence of organic solvent wastes from SIC 336 tends to support the latter explanation.

SOURCES OF DATA USED AND EXPLANATORY NOTES:

(1) Department of Commerce, Bureau of Census "County Business Patterns 1976," computer tapes
(2) SRI International, "Structure of the Foundry Industry," Final Interim Report, November 1978, CPA Contract No. 68-01-4433
(3) American Foundrymen's Society
(4) Non-Ferrous Founders Society
(5) Calspan Corporation, "Assessment of Industrial Hazardous Waste Practices in the Metal Smelting and Refining Industry," April 1977, Contract No. 68-01-2604
(6) "State" data base
(7) Based on state data for 24 small generators
(8) Census data adjusted for "zero" generators; of the 42 plants covered by the survey data from New York, Massachusetts and Iowa, 26 plants (62%) reported "zero" hazardous waste generation and no plant reported more than 5000 kg/mo hazardous waste production.

(9) Based on state data for 9 small generators

(10) Census data adjusted for "zero" generators; of the 20 plants covered by the survey data from New York, Iowa and Massachusetts, 12 plants (55%) reported "zero" hazardous waste generation and 4 plants (20%) reported hazardous waste generation in excess of 5000 kg/mo with a mean value of 93,625 kg/mo.

11/27/79. 08.43.27.

INDUSTRY PROFILE[7] SIC: 3320 NATION

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	184	35.6	9200.	3.0
100-200	79	15.3	11850.	3.9
200-300	47	9.1	11750.	3.9
300-400	33	6.4	11550.	3.8
400-500	24	4.6	10800.	3.6
500-600	19	3.7	10450.	3.4
600-700	15	2.9	9750.	3.2
700-800	12	2.3	9000.	3.0
800-900	10	1.9	8500.	2.8
900-1000	9	1.7	8550.	2.8
1000-2000	48	9.3	72000.	23.8
2000-5000	37	7.2	129500.	42.8
> 5000	0	0.0	0.	0.0
TOTAL	517[8]	100.0	302900.	100.0

11/27/79.   08.43.27.

INDUSTRY PROFILE[9]   SIC: 3360   NATION

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN
VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	133	15.3	6650.	.0
100-200	62	7.1	9300.	.0
200-300	39	4.5	9750.	.0
300-400	27	3.1	9450.	.0
400-500	21	2.4	9450.	.0
500-600	18	2.1	9900.	.0
600-700	14	1.6	9100.	.0
700-800	11	1.3	8250.	.0
800-900	9	1.0	7650.	.0
900-1000	97	11.2	92150.	.3
1000-2000	46	5.3	69000.	.2
2000-5000	45	5.2	157500.	.5
> 5000	347	39.9	32487875.	98.8
TOTAL	869[10]	100.0	32886025.	100.0

11/29/79.   13.49.57.

BREAKDOWN OF PLANTS IN EMPLOYMENT SIZE CATEGORIES BY EPA REGION IN SIC 3320

NUMBER OF PLANTS IN EACH CATEGORY

REGION	TOTAL	1-4	5-9	10-19	20-49	50-99	100-249	250-499	500-999	>1000
I	82	6	2	9	28	15	19	2	1	0
II	84	11	5	9	20	11	15	10	2	1
III	176	11	19	10	37	33	33	20	9	4
IV	139	9	11	16	35	21	25	14	5	3
V	525	32	30	44	127	87	103	62	20	20
VI	103	14	9	11	19	21	17	8	2	2
VII	82	12	5	6	11	18	21	6	2	1
VIII	21	4	0	1	7	4	3	2	0	0
IX	110	13	8	17	22	15	29	5	1	0
X	44	4	5	3	14	5	8	3	1	1
NATION	1366	116	94	126	320	230	273	132	43	32

11/29/79.   13.49.57.

BREAKDOWN OF PLANTS IN EMPLOYMENT SIZE CATEGORIES BY EPA REGION IN SIC 3360

NUMBER OF PLANTS IN EACH CATEGORY

REGION	TOTAL	1-4	5-9	10-19	20-49	50-99	100-249	250-499	500-999	>1000
I	150	33	34	42	30	6	4	1	0	0
II	177	33	22	44	43	21	10	1	2	1
III	139	27	16	39	36	7	5	6	3	0
IV	122	37	15	19	27	12	7	4	0	1
V	642	113	97	128	143	63	73	16	6	3
VI	109	28	18	21	22	14	5	1	0	0
VII	98	15	22	22	18	8	12	1	0	0
VIII	24	4	6	9	5	0	0	0	0	0
IX	233	48	37	49	56	30	10	3	0	0
X	41	16	8	8	1	6	1	1	0	0
NATION	1735	354	275	381	381	167	127	34	11	5

INDUSTRY: Secondary Smelting and Refining of Nonferrous Metals   SIC: 3341

DESCRIPTION OF INDUSTRY:

This SIC includes establishments primarily engaged in recovering nonferrous metals and alloys from new and used scrap and dross. This industry includes establishments engaged in both the recovery and alloying of precious metals. Plants engaged in the recovery of tin through secondary smelting and refining, as well as by chemical processes, are included in this industry.

Secondary smelters tend to be located in or near large cities which serve as sources of scrap metal. Based on the census data, many of the establishments in this industry are small with 39% having fewer than 10 employees and 71% having fewer than 50 employees.

CHARACTERISTICS OF HAZARDOUS WASTES PRODUCED:

Hazardous wastes from secondary metal smelting and refining plants most commonly include baghouse dusts, and scrubber sludges which can leach toxic chemicals. Furnace slags are another common waste but not all of these release their toxic components in leaching tests. Blast furnace slags from secondary copper smelters are reported to leach significant amounts of heavy metals. Some secondary aluminum slags contain high concentrations of soluble salts such as NaCl, KCl, $MgCl_2$ and $ZnCl_2$[(1)]. Many secondary lead refiners use lead-acid batteries as their scrap source and dispose of battery cases containing residual sulfuric acid. Occasionally, secondary refiners dispose of scrap contaminated with oil, grease, or other substances. These wastes may be hazardous.

The rate of waste generation at a particular plant is a function of the type of metal processed, amount of metal processed, scrap source, refining process(es) used, degree of air pollution cleanup, degree of wastewater treatment, and degree of in-plant recycling[(1)].

WASTE TREATMENT, STORAGE AND DISPOSAL PRACTICES:

Open dumping is reported to be the primary disposal practice for slags. This practice creates the potential for groundwater contamination by heavy metals which may leach from the copper slags and by salt which may leach from the aluminum slag. Approximately 50 percent of the aluminum slag is reported to be open dumped onsite and 50 percent is contractor hauled and disposed of offsite[(2)].

Storage in unlined lagoons is reported to be the primary disposal practice for sludges. This practice also creates the potential for groundwater contamination by heavy metals which may leach from electrolytic copper refinery sludges, lead refinery scrubber sludges and from lead-refinery baghouse-dust leaching solutions. Scrubber sludges from aluminum refineries may contaminate groundwater by leaching fluorides[2].

CURRENT DISPOSAL COST:

Responding to a TRW inquiry, one lead recycling plant in Pennsylvania reported a solid waste disposal cost of $16.09/cubic yard. This plant disposes of approximately 130 tons/day of solid waste which is composed of blast furnace slag, crushed battery cases, wastewater treatment sludge and scrubber sludge. Another lead recycling plant reported a cost of $6.00 per ton for the disposal of 160 tons per month of furnace slag.

The following are 1977 cost estimates for disposal of the hazardous wastes described previously[2]:

Waste Source/Type	Waste Amount (MT/yr)	Capital Cost ($)	Annual Cost ($)
Lead/scrubber sludge	1,500	43,900	11,560
Aluminum/slag	14,000	N/A	24,990
Aluminum/scrubber sludge	5,000	16,455	108,190
Copper/pyrometallurgical refinery slag	3,500	6,650	6,755
		32,805	33,700
Copper/electrolytic refinery slag	14,000	5,410	770
Copper/electrolytic sludge	16 (dry weight)		

ALTERNATIVE DISPOSAL METHODS:

INDUSTRY PROFILE:

(See table)

ASSESSMENT OF QUALITY OF DATA BASE:

SOURCES OF DATA USED AND EXPLANATORY NOTES:

(1) EPA/EGD Draft Report on Effluent Limitations and Pretreatment Standards for Point Sources Within the Nonferrous Metals Manufacturing Point Source Category, Section III, 1979.

(2) Calspan Corp., "Assessment of Industrial Hazardous Waste Practices in the Metal Smelting and Refining Industry," Vol. III, EPA Contract No. 68-01-2604, April 1977.

(3) Based on data for 5 small generators in the state data base

(4) Census data, adjusted for the estimated number of "zero" generators (20%); the percentage of zero generators and large generators based on New Jersey state data for 5 plants which indicated 1 zero generator and 2 large generators.

(5) Total waste quantity is that reported based on a previous study (Reference 1) of the secondary lead, aluminum and copper smelting and refining industry. This estimate may be low for SIC 3341 since lead, aluminum and copper smelting and refining industry account for only about 62% of plants in this SIC.

(6) EPA, "Development Document for Interim Final Effluent Limitations Guidelines and Proposed New Source Performance Standards for the Secondary Copper Subcategory of the Copper Segment of the Nonferrous Metals Manufacturing Point Source Category," February 1975.

(7) EPA/EGD

(8) Aluminum Recycling Association

(9) International Lead Zinc Research Organization

(10) One individual establishment

INDUSTRY PROFILE(3) SIC: 3341 NATION

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	9	3.1	450.	.0
100-200	15	5.2	2250.	.0
200-300	12	4.1	3000.	.0
300-400	12	4.1	4200.	.0
400-500	8	2.7	3600.	.0
500-600	8	2.7	4400.	.0
600-700	6	2.1	3900.	.0
700-800	6	2.1	4500.	.0
800-900	5	1.7	4250.	.0
900-1000	5	1.7	4750.	.0
1000-2000	28	9.6	42000.	.1
2000-5000	24	8.2	84000.	.3
> 5000	153	52.6	31977000.	99.5
TOTAL	291(4)	100.0	32138300.(5)	100.0

11/29/79. 13.49.57.

BREAKDOWN OF PLANTS IN EMPLOYMENT SIZE CATEGORIES BY EPA REGION IN SIC 3341

NUMBER OF PLANTS IN EACH CATEGORY

REGION	TOTAL	1-4	5-9	10-19	20-49	50-99	100-249	250-499	500-999	>1000
I	32	13	3	6	6	4	0	0	0	0
II	60	17	8	11	8	10	5	0	1	0
III	48	15	7	6	9	4	5	1	1	0
IV	32	8	6	3	2	7	4	2	0	0
V	99	15	12	11	26	19	14	2	0	0
VI	26	6	4	3	4	5	2	2	0	0
VII	13	2	1	2	3	2	3	0	0	0
VIII	8	3	2	3	0	0	0	0	0	0
IX	55	15	11	5	10	10	4	0	0	0
X	9	2	1	2	2	0	2	0	0	0
NATION	382	96	55	52	70	61	39	7	2	0

INDUSTRY: Metal Heat Treating SIC: 3398

DESCRIPTION OF INDUSTRY:

This industry includes establishments primarily engaged in heat treating of metal for the trade including annealing, brazing, burning, hardening, shot peening, and tempering of metal.

Based on the census data (see computer printout), there are a total of 771 establishments in SIC 3398. Plants tend to be small with 40% having fewer than 10 employees and 89% having fewer than 50 employees. The industry is heavily concentrated in Region V where 44% of the plants are located.

CHARACTERISTICS OF HAZARDOUS WASTES PRODUCED:

The table which follows lists the types and relative quantities of wastes reported in a recent hazardous waste survey of 32 metal heating treating establishments[1]. Waste acids and brines sent to POTW's are not included in the table. Based on the survey data, about 5% of the acids and 48% of the quenching brines are discharged to sewer. Cyanide salts comprise between 31 and 57% of the waste salts reported in the survey. (A more precise estimate is not possible since several respondents did not specify the nature of their "waste salt.") Quenching oil comprises 98% of the waste oil reported, while the remainder include lube oil, hydraulic oil, and cutting oil.

Waste oils were reported by 56% of the plants in the survey and 12.5% of the plants reported oil as their only hazardous waste.

The total hazardous waste quantity generated by the establishments in the subject SIC is estimated at 653,000 kg/mo, with an average of 1220 kg/mo/ generator.

WASTE TREATMENT, STORAGE AND DISPOSAL PRACTICES:

The table which follows lists the waste disposal methods reported for each waste in the recent survey of metal heat treaters[1]. Based on the data shown in the table, "contract disposal" is by far the most prevalent disposal method.

WASTE TYPES AND RELATIVE QUANTITIES

Waste	% of Total Waste Including Oil	% of Total Waste Excluding Oil	% of Plants* Reporting Waste Stream	% of Waste Streams
Oil	59	--	56	27
Solvent wastes	13	32	38	18
Acid	8.4	21	6	2.9
Waste salts	5.2	13	44	21
Baghouse dusts	5.1	13	38	18
Quenching brine	3.4	8.4	12	5.8
Scrubber sludge	2.8	7.0	3	1.5
Wastewater treatment sludge	2.5	6.2	6	2.9
Caustics	0.09	0.23	3	1.5
TOTAL	100	100	--	100

*This column sums to greater than 100% since almost all plants report more than one waste stream.

PERCENT OF FACILITIES DISPOSING OF INDICATED WASTE STREAM BY INDICATED DISPOSAL METHOD

Waste	Contract Disposal	Landfill (Offsite)	Land Spreading (Onsite)	Incineration (Onsite)	Recycle (Offsite)	Recycle (Onsite)	Sewer	Municipal Refuse System	Did Not State
Oil	35	12	6	6	6	12	6	--	18
Oily sludge	100								
Solvent	30	10	--	--	10	10	20	--	20
Solvent sludge	--	--	--	--	50	50	--	--	--
Cyanide salt	43	14	--	--	--	--	29	--	14
Neutral salt	43	29	--	--	--	--	29	--	--
Nitrate salt		100							
Salt (unspecified)	33	67							
Quenching brine		20	20				40		20
Acids	50						50		
Caustics	100								
Glass Beads (surface blasting)								100	
Baghouse dust	33	33						17	17
Scrubber sludge								100	
Wastewater treatment sludge	100								

CURRENT DISPOSAL COST:

About half of the establishments responding to the survey (16 plants) provided data on waste disposal costs. The reported costs ranged from "zero" to $857/metric ton (mean value of $169/metric ton). It is suspected that in some cases the reported costs are for the disposal of all plant wastes and not only the hazardous wastes. (The costs reported by some plants included incidental costs such as that associated with waste sampling and analysis.) A number of plants reported selling their waste oils and waste solvents. Some plants disposing hazardous wastes to the sewer or the local municipal refuse system reported no incremental cost due to the disposal of their hazardous wastes to these systems.

The data indicate no correlation between waste quantity disposed of and unit disposal cost. One plant indicated that waste salts contaminated with cyanide were being stored onsite because no disposal company willing to pick up such a small amount of waste could be found.

ALTERNATIVE DISPOSAL METHODS:

INDUSTRY PROFILE:

(See table)

ASSESSMENT OF QUALITY OF DATA BASE:

SOURCES OF DATA USED AND EXPLANATORY NOTES:

(1) At the request of TRW, the Metal Treating Institute (MTI) conducted a hazardous waste survey of a number of plants in SIC 3398. An industry specific survey form prepared by TRW was mailed by MTI to 135 plants; responses were received from 32 plants (or 24% of plants surveyed).

(2) Census data adjusted for "zero" generators.

11/27/79. 08.43.27.

INDUSTRY PROFILE[1] SIC: 3398 NATION

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	130	24.3	6500.	1.0
100-200	72	13.5	10800.	1.7
200-300	48	9.0	12000.	1.8
300-400	35	6.6	12250.	1.9
400-500	26	4.9	11700.	1.8
500-600	22	4.1	12100.	1.9
600-700	16	3.0	10400.	1.6
700-800	15	2.8	11250.	1.7
800-900	11	2.1	9350.	1.4
900-1000	11	2.1	10450.	1.6
1000-2000	61	11.4	91500.	14.0
2000-5000	52	9.7	182000.	27.9
> 5000	35	6.6	273000.	41.8
TOTAL	534[2]	100.0	653300.	100.0

11/29/79. 13.49.57.

BREAKDOWN OF PLANTS IN EMPLOYMENT SIZE CATEGORIES BY EPA REGION IN SIC 3398

NUMBER OF PLANTS IN EACH CATEGORY

REGION	TOTAL	1-4	5-9	10-19	20-49	50-99	100-249	250-499	500-999	>1000
I	78	23	21	16	14	4	0	0	0	0
II	90	20	16	31	15	5	1	1	1	0
III	45	9	11	12	7	5	0	0	1	0
IV	38	10	8	9	8	2	1	0	0	0
V	339	51	67	78	102	30	10	1	0	0
VI	40	9	6	9	9	6	1	0	0	0
VII	15	3	1	6	4	1	0	0	0	0
VIII	9	2	4	3	0	0	0	0	0	0
IX	105	18	23	30	21	12	1	0	0	0
X	12	3	2	7	0	0	0	0	0	0
NATION	771	146	159	201	180	65	14	2	2	0

INDUSTRY: Primary Metal Products, not elsewhere classified SIC: 3399

DESCRIPTION OF INDUSTRY:

This industrial category includes establishments primarily engaged in manufacturing primary metal products, not elsewhere classified, such as non-ferrous nails, brads, and spikes and metal powder, flakes, and paste. This is one of the "not elsewhere classified" categories and appears to be relatively heterogeneous with respect to processes employed.

Brads, nails, tacks, etc. are manufactured from metal by machining, extrusion, and other similar processes. Metal powders are made from either solid metal or chemical compounds (generally oxides of metals) and are produced by one of three different processes: atomization, electrolytic deposition, or gaseous reduction[1].

Based on the census data, there are a total of 249 establishments in SIC 3399, with 21% having fewer than five employees and 82% having fewer than 20 employees.

CHARACTERISTICS OF HAZARDOUS WASTES PRODUCED:

The solid wastes resulting from the manufacture of nails, brads, etc. include metal turnings, clippings, and other metal remnants. Metal powder production may generate dusts, slags, or sludges depending on the manufacturing process used[1]. All of the above wastes are reported to be high enough in metal content that complete recycling within the plant is practiced[1]. Other waste produced include oils, solvents and paint.

WASTE TREATMENT, STORAGE, AND DISPOSAL PRACTICES:

Metal turnings, clippings, dust, slags and other metal remnants have high metal contents and are recycled within the plant. Other wastes (e.g., oil, solvents) are recycled, incinerated or sent to landfills for ultimate disposal.

CURRENT DISPOSAL COST:

ALTERNATIVE DISPOSAL METHODS:

INDUSTRY PROFILE:

(See table)

ASSESSMENT OF QUALITY OF DATA BASE:

The heterogeneity of this industry compromises any generalizations made about the industry as a whole.

SOURCES OF DATA USED AND EXPLANATORY NOTES:

(1) Calspan Corporation, "Assessment of Industrial Hazardous Waste Practices in the Metal Smelting and Refining Industry," Vol. III, EPA Contract No. 68-01-2604, April 1977

(2) Based on data for 4 small generators in the state data base

(3) Census data, adjusted for the estimated number of "zero" generators (based on 8 plants reported in the N.Y. survey of SIC 339); all plants are assumed to generate less than 5000 kg/mo of waste (based on plants included in the New Jersey and Iowa surveys)

11/27/79.   06.43.27.

INDUSTRY PROFILE[2]   SIC: 3399   NATION

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	45	35.7	2250.	2.8
100-200	18	14.3	2700.	3.3
200-300	11	8.7	2750.	3.4
300-400	7	5.6	2450.	3.0
400-500	6	4.8	2700.	3.3
500-600	4	3.2	2200.	2.7
600-700	4	3.2	2600.	3.2
700-800	3	2.4	2250.	2.8
800-900	3	2.4	2550.	3.2
900-1000	2	1.6	1900.	2.4
1000-2000	12	9.5	18000.	22.3
2000-5000	11	8.7	38500.	47.6
> 5000	0	0.0	0.	0.0
TOTAL	126[3]	100.0	80850.	100.0

11/29/79.   13.49.57.

BREAKDOWN OF PLANTS IN EMPLOYMENT SIZE CATEGORIES BY EPA REGION IN SIC 3399

NUMBER OF PLANTS IN EACH CATEGORY

REGION	TOTAL	1-4	5-9	10-19	20-49	50-99	100-249	250-499	500-999	>1000
I	19	3	3	2	4	5	1	0	0	1
II	28	3	5	4	8	6	1	1	0	0
III	40	9	7	5	11	5	3	0	0	0
IV	27	6	2	1	11	3	4	0	0	0
V	82	22	7	14	20	15	3	1	0	0
VI	9	2	2	1	2	1	1	0	0	0
VII	7	1	2	1	1	2	0	0	0	0
VIII	6	1	0	3	0	2	0	0	0	0
IX	25	7	3	2	6	5	2	0	0	0
X	6	0	3	0	2	1	0	0	0	0
NATION	249	54	34	33	65	45	15	2	0	1

INDUSTRY: Fabricated Metal Products, Except Machinery and Transportation Equipment   SIC: 34 (except 3431 and 3479)

DESCRIPTION OF INDUSTRY:

This major group includes establishments engaged in fabricating ferrous and nonferrous metal products such as metal cans, tinware, hand tools, cutlery general hardware, nonelectric heating apparatus, fabricated structural metal products, metal forgings, metal stampings, ordnance (except vehicles and guided missles), and a variety of metal and wire products not elsewhere classified.

Census data indicate that there are 27,820 establishments in this industry group; 43% have fewer than 10 employees, 90% have fewer than 100 employees and 99% have fewer than 500 employees.

CHARACTERISTICS OF HAZARDOUS WASTE PRODUCED:

The types of waste reported by the 263 small generator plants in this industrial group in the state data base and the percent of plants reporting each waste type are as follows:

Waste Type	% of Plants*
Solvents	43
Paint wastes	35
Oils	30
Heavy metal containing wastes	20
Acids	14
Cyanides	8
Alkalis	7
Asbestos dust	<1
Resins, plastics, enamel	<1
Inorganic sludges	<1
Explosive wastes	<1

Telephone interviews with four establishments also found that oils and solvents were the most commonly generated wastes in this industry[3].

*Column sums up to more than 100% since some plants report generating more than one waste type.

The types of solvent wastes reported by plants in the state survey data include Stoddard solvent, kerosene, mineral spirits, xylol, methylene chloride, toluol, naphtha, benzene, Solvasil, trichloroethane, acetone, trichloroethylene, perchloroethylene, and Barton solvent. Metal containing wastes include metal hydroxides and metal cyanides, tin, nickel, chromium, iron, magnesium and zinc.

WASTE TREATMENT, STORAGE, AND DISPOSAL PRACTICES:

Disposal practices employed by the 263 small generator plants in this industrial group in the state data base and the percent of plants employing each disposal method is reported below.

Disposal Method	% of Plants*
Landfill	35
Municipal sewer	21
Offsite recycle	17
Incineration	5
Landspreading	2
Lagoons/solar ponds	2
Deep well injection	2
Other methods	8
Unknown	31

More than 50% of the establishments in the state survey data indicating that their disposal method is unknown also indicate that the waste is hauled away by contractors. 29% of the plants use landfill for solvent disposal and 25% incinerate or recycle their solvents. 24% of the plants indicate that their disposal method for solvents is unknown. Other disposal methods for solvents include discharge to sewer (11%), landspreading, deep well injection, and lagoons or ponds (<3%).

About 40% of the establishments with paint waste use landfills for disposal of such waste and 24% indicate that the disposal method is unknown. Other disposal methods for paint waste include recycling (16%), sewer (6%) deep well injection, landspreading, and incineration (<6%) and "other" (9%).

Oil wastes are landfilled by 24% of the plants; 18% indicate recycling and 34% indicate unknown disposal methods for oil. Compounds containing

*Column sums up to greater than 100% since some plants report using more than one disposal method.

metals and cyanides are sent to the sewer by about 40% of the plants; landfills are used by about 15% of the establishments.

CURRENT DISPOSAL COST:

ALTERNATIVE DISPOSAL METHODS:

INDUSTRY PROFILE

(See table)

ASSESSMENT OF QUALITY OF DATA BASE:

SOURCES OF DATA USED AND EXPLANATORY NOTES:

1. Census data
2. The following table lists the SIC's which are included in this industrial grouping and the census data for the number of establishments in each SIC. For each SIC shown, the number of samples used in calculating the statistics listed across the top are given. The last column lists the source state for the samples used to estimate the percent of non-small, and large generators.
3. Telephone interviews with four establishments

SIC	Number of Establishments	Number of data points in state samples used to calculate: Small Generator Profile	Percent of non-, Small and Large Generators	Mean Large Generator Generation Rate	Source state for samples used to estimate percent of non-, small and large generators
3410	553	17	6	--	Mass.
3420	1,873	19	23	2	Mass., Iowa
3432, 3433	653	11	10	2	Ia.
3440	10,403	67	53	2	Mass., Ia.
3450	2,396	17	8	--	Mass., Ia.
3460	3,201	19	19	2	Mass., Ia.
3471	3,088	65	69	7	Mass., Ia., N.Y.
3480	386	5	5	1	Mass., Ia.
3490	5,099	43	23	6	Mass., Ia.

INDUSTRY PROFILE(2) SIC: 3410 NATION

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	80	17.4	4000.	1.0
100-200	19	4.1	2850.	.7
200-300	22	4.8	5500.	1.4
300-400	24	5.2	8400.	2.2
400-500	26	5.7	11700.	3.0
500-600	27	5.9	14850.	3.8
600-700	28	6.1	18200.	4.7
700-800	28	6.1	21000.	5.4
800-900	27	5.9	22950.	5.9
900-1000	26	5.7	24700.	6.4
1000-2000	141	30.7	211500.	54.6
2000-5000	12	2.6	42000.	10.8
> 5000	0	0.0	0.	0.0
TOTAL	460	100.0	387650.	100.0

11/27/79. 08.43.27.

INDUSTRY PROFILE[2] SIC: 3420 NATION

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	307	36.3	15350.	.7
100-200	80	9.5	12000.	.5
200-300	47	5.6	11750.	.5
300-400	33	3.9	11550.	.5
400-500	25	3.0	11250.	.5
500-600	20	2.4	11000.	.5
600-700	16	1.9	10400.	.5
700-800	13	1.5	9750.	.4
800-900	12	1.4	10200.	.4
900-1000	10	1.2	9500.	.4
1000-2000	59	7.0	88500.	3.9
2000-5000	60	7.1	210000.	9.2
> 5000	163	19.3	1873359.	82.0
TOTAL	845	100.0	2284609.	100.0

11/27/79. 08.43.27.

INDUSTRY PROFILE(2) SIC: 3432 NATION
3433

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	105	17.8	5250.	.2
100-200	64	10.9	9600.	.3
200-300	44	7.5	11000.	.3
300-400	32	5.4	11200.	.3
400-500	25	4.2	11250.	.3
500-600	20	3.4	11000.	.3
600-700	17	2.9	11050.	.3
700-800	14	2.4	10500.	.3
800-900	12	2.0	10200.	.3
900-1000	11	1.9	10450.	.3
1000-2000	61	10.4	91500.	2.7
2000-5000	53	9.0	185500.	5.5
> 5000	131	22.2	2967936.	88.7
TOTAL	589	100.0	3346436.	100.0

11/27/79.   08.43.27.

INDUSTRY PROFILE(2)   SIC: 3440   NATION

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	2618	40.6	130900.	2.1
100-200	810	12.6	121500.	2.0
200-300	472	7.3	118000.	1.9
300-400	322	5.0	112700.	1.8
400-500	238	3.7	107100.	1.7
500-600	186	2.9	102300.	1.7
600-700	150	2.3	97500.	1.6
700-800	124	1.9	93000.	1.5
800-900	105	1.6	89250.	1.5
900-1000	90	1.4	85500.	1.4
1000-2000	506	7.8	759000.	12.3
2000-5000	442	6.9	1547000.	25.1
> 5000	385	6.0	2788555.	45.3
TOTAL	6448	100.0	6152305.	100.0

11/27/79. 08.43.27.

INDUSTRY PROFILE(2) SIC: 3450 NATION

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	630	35.1	31500.	2.9
100-200	270	15.0	40500.	3.7
200-300	162	9.0	40500.	3.7
300-400	113	6.3	39550.	3.6
400-500	84	4.7	37800.	3.5
500-600	65	3.6	35750.	3.3
600-700	53	3.0	34450.	3.2
700-800	43	2.4	32250.	3.0
800-900	37	2.1	31450.	2.9
900-1000	31	1.7	29450.	2.7
1000-2000	171	9.5	256500.	23.5
2000-5000	137	7.6	479500.	44.0
> 5000	0	0.0	0.	0.0
TOTAL	1796	100.0	1089200.	100.0

INDUSTRY PROFILE[2] SIC: 3460 NATION

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	880	37.1	44000.	.0
100-200	250	10.6	37500.	.0
200-300	147	6.2	36750.	.0
300-400	102	4.3	35700.	.0
400-500	77	3.3	34650.	.0
500-600	61	2.6	33550.	.0
600-700	50	2.1	32500.	.0
700-800	42	1.8	31500.	.0
800-900	36	1.5	30600.	.0
900-1000	31	1.3	29450.	.0
1000-2000	181	7.6	271500.	.3
2000-5000	176	7.4	616000.	.6
> 5000	336	14.2	101657472.	98.8
TOTAL	2369	100.0	102891172.	100.0

11/27/79.   08.43.27.

INDUSTRY PROFILE(2)   SIC: 3480   NATION

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	136	47.6	6800.	.5
100-200	25	8.7	3750.	.3
200-300	14	4.9	3500.	.3
300-400	10	3.5	3500.	.3
400-500	8	2.8	3600.	.3
500-600	6	2.1	3300.	.3
600-700	5	1.7	3250.	.3
700-800	4	1.4	3000.	.2
800-900	4	1.4	3400.	.3
900-1000	3	1.0	2850.	.2
1000-2000	20	7.0	30000.	2.4
2000-5000	22	7.7	77000.	6.2
> 5000	29	10.1	1107800.	88.5
TOTAL	286	100.0	1251750.	100.0

11/27/79. 08.43.27.

INDUSTRY PROFILE[2] SIC: 3490 NATION

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	692	20.9	34600.	.0
100-200	299	9.0	44850.	.1
200-300	179	5.4	44750.	.1
300-400	125	3.8	43750.	.1
400-500	93	2.8	41850.	.1
500-600	73	2.2	40150.	.0
600-700	59	1.8	38350.	.0
700-800	48	1.4	36000.	.0
800-900	41	1.2	34850.	.0
900-1000	35	1.1	33250.	.0
1000-2000	191	5.8	286500.	.3
2000-5000	153	4.6	535500.	.6
> 5000	1326	40.0	81176394.	98.5
TOTAL	3314	100.0	82390794.	100.0

INDUSTRY: Enameled Iron and Metal Ware and Coating, Engraving, and Allied Services, Not Elsewhere Classified

SIC: 3431 and 3479

DESCRIPTION OF INDUSTRY:

SIC 3431 includes establishments primarily engaged in manufacturing enameled iron, cast iron, or pressed metal sanitary ware. SIC 3479 includes establishments primarily engaged in performing the following types of services on metals: (1) enameling, lacquering, and varnishing metal products for the trade; (2) hot dip galvanizing of mill sheets, plates and bars, castings, and formed products fabricated of iron and steel; hot dip coating such items with aluminum, lead, or zinc; retinning cans and utensils; (3) engraving, chasing and etching jewelry, silverware, notarial and other seals, and other metal products for the trade and for job contracting for purposes other than printing; (4) and other metal services, not elsewhere classified.

Census data indicate that there are 1,529 establishments in these two SIC's; 51% have fewer than 10 employees, 90% have fewer than 100 employees, and only 0.2% have more than 500 employees.

CHARACTERISTICS OF HAZARDOUS WASTES PRODUCED:

The types of hazardous wastes reported by the 18 small generators in the state data base and the percent of plants which report each waste type are shown below.

Waste Type	% of plants*
Paint wastes	33
Solvents	33
Heavy metal compounds	19
Alkaline compounds	14
Acids	14
Unspecified sludges	10
Phosphate sludge	5
Fly ash	5
Oil	5

*Sums to greater than 100% since many plants report more than one waste stream.

Solvent wastes generated by establishments in these SIC's include trichloroethylene, naphtha, gasoline, lacquers, toluene and Stoddard solvent. Wastes having metal compounds contain zinc, chromium and iron.

A previous EPA/EGD study[1] identified nickel sludges and chromium wastes as hazardous wastes which would be expected to come from some of the enameling operations carried out by some of the establishments in SIC 3631.

WASTE TREATMENT, STORAGE, AND DISPOSAL PRACTICES:

The disposal practices employed by the 18 small generator plants in the state data base are as follows:

Disposal Method	% of plants*
Landfill	24
Municipal sewer	9
Landspreading	5
Deep well injection	5
Lagoon/solar pond	5
Offsite recycling	5
"Other" methods	9
Unknown	43

Of those establishments indicating that their disposal method is unknown, more than 30% indicate that these wastes are hauled by contractors. 50% of the plants with solvent wastes and 67% of the plants with paint wastes indicate that their disposal method is unknown. 25% of the plants generating solvents indicate "other" methods for disposal. Recycling and municipal sewer are also mentioned for solvent disposal. Acids and alkalis are sent to landfills by 40% of the responding establishments.

CURRENT DISPOSAL COST:

ALTERNATIVE DISPOSAL METHODS:

*The column sums up to more than 100% since some plants report using more than one disposal method.

INDUSTRY PROFILE:

(See table)

ASSESSMENT OF QUALITY OF DATA BASE:

The sample is representative of the establishment population with respect to SIC for this industry grouping; 5.6% of the sample is from SIC 3431 and 94.4% is from SIC 3479, while 6.3% of the population is from SIC 3431 and 93.7% is from SIC 3479.

SOURCES OF INFORMATION USED AND EXPLANATORY NOTES:

1. Hittman Associates, Inc., "Development Document for Effluent Guidelines and Standards of Performance. The Porcelain Enamel Industry," EPA Contract No. 68-01-3501, November 1976.
2. The estimated number of plants in the small-generator classes is based on 18 plants reporting in the state data base. The estimated number of non- and large generators is based on 22 plants reporting from New York, Iowa and Massachusetts.
3. The mean generation rate for large generators is based on four plants reporting from New York, Iowa and Massachusetts.
4. Census data adjusted for "zero" generators.

11/27/79. 08.43.27.

INDUSTRY PROFILE(2) SIC: 3431 3479 NATION

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	3	.4	150.	.0
100-200	17	2.5	2550.	.0
200-300	26	3.8	6500.	.1
300-400	29	4.2	10150.	.2
400-500	29	4.2	13050.	.2
500-600	29	4.2	15950.	.3
600-700	26	3.8	16900.	.3
700-800	23	3.3	17250.	.3
800-900	20	2.9	17000.	.3
900-1000	20	2.9	19000.	.4
1000-2000	113	16.4	169500.	3.2
2000-5000	75	10.9	262500.	5.0
> 5000	277	40.3	4709000.(3)	89.5
TOTAL	687(4)	100.0	5259500.	100.0

11/29/79.   13.55.57.

BREAKDOWN OF PLANTS IN EMPLOYMENT SIZE CATEGORIES BY EPA REGION IN SICS 3431 and 3479

NUMBER OF PLANTS IN EACH CATEGORY

REGION	TOTAL	1-4	5-9	10-19	20-49	50-99	100-249	250-499	500-999	>1000
I	160	61	33	38	22	5	0	1	0	0
II	215	79	52	42	30	8	4	0	0	0
III	105	33	19	15	22	11	5	0	0	0
IV	114	44	15	17	14	14	5	4	1	0
V	450	111	83	108	82	32	29	4	0	1
VI	136	36	23	29	27	11	9	0	1	0
VII	38	15	6	8	8	1	0	0	0	0
VIII	15	6	3	3	2	1	0	0	0	0
IX	269	92	57	59	43	11	7	0	0	0
X	27	15	3	5	4	0	0	0	0	0
NATION	1529	492	294	324	254	94	59	9	2	1

INDUSTRY: Electroplating and Metal Finishing SIC: 3471

DESCRIPTION OF INDUSTRY:

The establishments in this industry are primarily engaged in all types of electroplating, plating, anodizing, coloring and finishing of metals, and formed products for the trade. Based on the census data, there are 3090 establishments in SIC 3471 of which 52% have less than 10 employees. Plants are located in every metropolitan area with a greater density found in heavily industralized regions. About 33% of the establishments are located in EPA Region V; the establishments in EPA Regions I, II and V account for 58% of all plants in SIC 3471 (see census data computer printout for the distribution of establishments by EPA region and employment size category).

The 3090 establishments classified under this SIC in the census data are all job shops doing work on materials mostly owned by others. There are an estimated additional 4000 captive shops engaged in SIC 3471 activities which are associated with other manufacturing operations in other SIC's[1]. The electroplating wastes generated by these captive shops will be accounted for as part of the wastes generated by the primariy SIC's.

CHARACTERISTICS OF HAZARDOUS WASTES PRODUCED:

The total quantity of potentially hazardous land-destined wastes generated by this SIC is estimated at 13.4 million kg/mo, with an average generation rate of 4340 kg/mo/generator (see Industry Profile).

Waste data for plants covered in the state data base (113 plants, average waste generation rate of 400 kg/mo) indicate that the major hazardous wastes generated by the "small" (less than 5000 kg/mo) plants in SIC 3471 include water treatment sludges, spent plating solutions and prefinishing cleaning materials. A breakdown of the reported waste quantity by waste type is as follows:

Waste Stream	% of Total Waste	Major Constituents/ Characteristics
Water treatment sludge	23	Metal hydroxide
Spent plating bath	26	Metal, cyanide
Prefinishing cleaning material		
Degreasing solvent	23	Polychlorinated organic
Acid and alkaline cleaner	12	Acid, alkaline
Paint sludge	12	Paint
Anodizing sludge	2	Metal sludge
Empty container	2	Paper, glass, plastic with chemical residue

A study of the electroplating and metal finishing industry conducted by Battelle for OSW/EAP[2] predicts that a 50% increase in land disposed waste quantity should result from promulgation of EPA/EGD BPT, and a 100% increase in waste quantity should result from the promulgation of BAT. Then additional wastes will be in the form of WWT sludges produced by the application of the more advance treatment practices commensurate with the BPT, BAT technology levels.

WASTE TREATMENT, STORAGE AND DISPOSAL PRACTICES:

The empty containers for chemicals used in the plating operations are reportedly triple rinsed before disposal with the municipal refuse[3]. Based on the state data, 48% of the plants, mostly smaller operations, discharge all of their untreated waste (excluding the empty containers) to the POTW's. Proposed pretreatment standards[1] for discharges to POTW's exempt plants with wastewater flows of less than 10,000 GPD provided that the wastewater does not contain Cd, Pb, CN and Cr(VI). When these standards are promulgated, additional smaller plants which produce wastewaters containing Cd, Pb, CN and which currently dispose such wastewater to sewer without treatment would be required to employ pretreatment, thus generating waste sludges requiring disposal.

The wastes that are not discharged to POTW's are land disposed. Based on the state data, wastes from 55% of the plants are hauled to off-site disposal sites. A breakdown of the waste quantity by reported disposal methods (onsite and offsite) is as follows:

Disposal Method	% of Waste*	Estimated Total Waste Quantity for Small Generators for Various Disposal Methods†
Landfilling	34	324,000
Recycling	33	314,000
Deep-well injection	24	228,000
Lagooning	8	76,000
Miscellaneous (storage, landspreading)	1	10,000

*Based on state data
†Based on the estimates shown in the Industry Profile table

Based on the Battelle study(2), the landfilling operations used by establishments in SIC 3471 may range from an open dump to a covered landfill to use of abandoned mines and quarries. Waste recycling consists mainly of turning over the waste solvents and metal solutions to commercial reclaimers. Waste disposal by deep-well injection is practiced mainly in the state of Oklahoma where such practice is prevalent.

CURRENT DISPOSAL COST:

Based on the data collected by Versar Inc.(4) during a survey for OSW/EPA in 1974, the average unit costs for land disposal of wastes from the subject industry are as follows:

<u>Toxic Waste</u> (chromium and cyanide)	\$2.71 - \$5.51/kg
<u>Other Hazardous Wastes</u>	
Combined hauling-treatment-disposal	2.9¢/liter
Hauling	0.53¢/liter
Treatment and Disposal	2.3¢/liter

The total national cost for waste treatment and disposal of electroplating and metal finishing waste for 1973 was estimated at \$20,000,000. This cost represents approximately 2.5% of the value-added cost for the entire industry.

With the promulgation of the effluent guidelines, more sophisticated and expensive treatment and disposal practices will be utilized, thus increasing the total national cost of treatment and disposal by the industry.

ASSESSMENT OF QUALITY OF DATA BASE:

The major source of information for this SIC has been the state data which cover 113 plants in the small generator category. Battelle conducted a survey of the industry in 1976[2]. The data generated in that study are in reasonable accord with those presented in this assessment. A comparison of the two estimates follows:

	TRW's Estimate	Battelle's Estimate
Total Waste (generated by all generators)	13.5×10^6 kg/mo	9.6×10^6 kg/mo
% of plants in EPA Region V	33	40
% of plants in EPA Regions I, II, V	58	67
WWT sludge as a percentage of total waste(for small generators only)	23	--
WWT sludge as a percentage of total waste (for all generators)	--	25
% of small generators' waste hauled to offsite disposal facilities	55	--
% of waste from all generators hauled to offsite disposal facilities	--	60 - 70

SOURCES OF DATA USED:

(1) Development Document for Proposed Existing Source Pretreatment Standards for the Electroplating Point Source Cagetory, EPA 400/1-78/085, February 1978

(2) Assessment of Industrial Hazardous Waste Practices. Electroplating and Metal Finishing Industries - Job Shops, Battelle Columbus Labs, for EPA, September 1976.

(3) American Electroplater Society

(4) Survey of the Electroplating Industry, Versar Inc., for OSW/EPA, 1974

(5) Based on state data for SIC's 3470 and 3471

(6) Census data

11/27/79.   08.43.27.

INDUSTRY PROFILE[5]   SIC: 3471   NATION

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	1180	38.2	59000.	.4
100-200	400	12.9	60000.	.4
200-300	270	8.7	67500.	.5
300-400	120	3.9	42000.	.3
400-500	100	3.2	45000.	.3
500-600	70	2.3	38500.	.3
600-700	60	1.9	39000.	.3
700-800	50	1.6	37500.	.3
800-900	30	1.0	25500.	.2
900-1000	30	1.0	28500.	.2
1000-2000	90	2.9	135000.	1.0
2000-5000	70	2.3	245000.	1.8
> 5000	620	20.1	12586000.	93.9
TOTAL	3090[6]	100.0	13408500.	100.0

11/29/79.   13.49.57.

BREAKDOWN OF PLANTS IN EMPLOYMENT SIZE CATEGORIES BY EPA REGION IN SIC 3471

NUMBER OF PLANTS IN EACH CATEGORY

REGION	TOTAL	1-4	5-9	10-19	20-49	50-99	100-249	250-499	500-999	>1000
I	360	113	86	69	62	25	4	1	0	0
II	416	140	89	92	76	14	3	2	0	0
III	180	64	39	37	33	7	0	0	0	0
IV	232	70	46	47	51	10	7	1	0	0
V	1022	278	215	236	197	73	22	1	0	0
VI	162	64	33	32	26	5	2	0	0	0
VII	100	41	22	21	13	1	1	1	0	0
VIII	33	15	9	4	3	2	0	0	0	0
IX	525	150	113	125	105	26	4	1	1	0
X	58	25	9	10	8	6	0	0	0	0
NATION	3088	960	661	673	574	169	43	7	1	0

INDUSTRY: Machinery, Except Electrical SIC: 351,352,353, 358,359

DESCRIPTION OF INDUSTRY:

The major group 35 includes establishments engaged in manufacturing machinery and equipment, other than electrical equipment (Major Group 36) and transportation equipment (Major Group 37). The groups in this assessment include SIC 351, Engines and Turbines; SIC 352, Farm and Garden Machinery and Equipment; SIC 353, Construction, Mining, and Materials Handling Machinery and Equipment; SIC 358, Refrigeration and Service Industry Machinery; SIC 359, Miscellaneous Machinery, Except Electrical.

According to the census data, there are a total of 23,578 establishments in the subject SIC's; 61% of the establishments have fewer than 10 employees, 94% have fewer than 100 employees and 99% have fewer than 500 employees.

CHARACTERISTICS OF HAZARDOUS WASTES PRODUCED:

The wastes reported by the 88 small generator plants in the state data base and the percent of plants reporting each waste are as follows:

Waste	% of plants reporting*
Solvents	42
Paint wastes	41
Oil	39
Alkalis	13
Acids	10
Heavy metals	7
Miscellaneous inorganics	7

Based on the state data, solvent wastes include Chlorothene VG, xylene, acetone, methanol, toluene, naphtha, Barsol, acetylene, gasoline, trichloroethane, Stoddard solvent and methyl ethyl ketone. Metallic wastes include lead naphthenate, zinc and iron phosphate sludges, and chromic acid. Other wastes generated are derusting agent, sodium stearate, Fremont 71A metal conditioner, oxidizing agents, spent brake linings, and propellants.

*Column sums to greater than 100% since some plants report generating more than one waste stream.

WASTE TREATMENT, STORAGE, AND DISPOSAL PRACTICES:

The disposal practices reported by the 88 small generator plants in the state data base and the percent of plants employing each disposal method are shown below:

Disposal Method	% of plants*
Landfill	31
Offsite recycle	22
Municipal sewer	4
Incineration	3
Deep well injection	2
Lagoon/solar pond	2
"Other" method	4
Unknown	49

Over 40% of the establishments indicating that their disposal method is unknown indicate contract hauling of their wastes. 30% of the plants generating solvent wastes recycle or incinerate them; 23% use landfills for solvent disposal. Over 40% indicate that the disposal method is unknown. Other disposal methods for solvents include deep well injection and sewer disposal. Paint wastes are landfilled by 38% of the plants; over 25% recycle or incinerate paint waste, and over 30% of the plants indicate that their disposal method is unknown. Almost half of the establishments indicate unknown disposal for oils. The other primary methods for oil disposal are recycling (20%) and landfill (14%). Metal containing wastes are recycled by over 35% of the plants; 15% use landfills for disposal and 30% indicate that the disposal method is unknown. Acids and alkalis are disposed of by the following methods: landfill (24%), deep well injection (10%), recycling (10%), municipal sewer (10%) and other (5). Over 40% indicate that the disposal method is unknown.

CURRENT DISPOSAL COST:

*Column sums to more than 100% since some plants report using more than one disposal method.

ALTERNATIVE DISPOSAL METHODS:

INDUSTRY PROFILE:

(See table)

ASSESSMENT OF QUALITY OF DATA BASE:

SOURCES OF DATA USED AND EXPLANATORY NOTES:

1. The estimated number of non-, small and large generators is based on 20 plants reporting from New York, Massachusetts and Iowa. The distribution of small generators among the waste generation ranges indicated in the industry profile is based on 88 data points.
2. The mean hazardous waste generation rate for large generators is based on 4 plants reporting from Massachusetts and Iowa.
3. Census data adjusted for the "zero" generators.

11/27/79. 08.43.27.

INDUSTRY PROFILE[1]   SIC: 3510 NATION
3520, 3530,
3580, 3590

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	3237	17.2	161850.	.2
100-200	2050	10.9	307500.	.4
200-300	1388	7.4	347000.	.5
300-400	1010	5.4	353500.	.5
400-500	785	4.2	353250.	.5
500-600	634	3.4	348700.	.5
600-700	523	2.8	339950.	.5
700-800	439	2.3	329250.	.5
800-900	375	2.0	318750.	.5
900-1000	324	1.7	307800.	.4
1000-2000	1823	9.7	2734500.	4.0
2000-5000	1527	8.1	5344500.	7.8
> 5000	4705	25.0	57626840.[2]	83.7
TOTAL	18820[3]	100.0	68873390.	100.0

INDUSTRY: Machinery, Except Electrical SIC: 354,355, 356,357

DESCRIPTION OF INDUSTRY:

The major group 35 includes establishments engaged in manufacturing machinery and equipment, other than electrical equipment (Major Group 36) and transportation equipment (Major Group 37). The groups in this assessment include SIC 354, Metalworking Machinery and Equipment; SIC 355, Special Industry Machinery, Except Metalworking Machinery; SIC 356, General Industrial Machinery and Equipment; and SIC 357, Office Computing and Accounting Machines.

Based on the census data, of the 17845 establishments in this SIC grouping, 47% have fewer than 10 employees, 90% have fewer than 100 employees, and 98% have fewer than 500 employees.

CHARACTERISTICS OF HAZARDOUS WASTES PRODUCED:

The wastes reported by the 142 small generator plants in the state data base and the percent of plants reporting each waste are shown below:

Waste	% of plants reporting*
Oil	59
Solvents	53
Paint wastes	20
Acids	15
Metal containing wastes	14
Miscellaneous organics	11
Miscellaneous inorganics	10
Alkalis	9
Cyanides	5

A previous EPA sponsored study identified the following substances as potentially hazardous wastes generated by establishments in SIC 355 and 357: flammable solvents, heavy metals, oil, acid/alkali solutions, cyanides, and sweepings and grindings[(1)]. Based on state survey data, solvents generated include trichloroethylene, degreasing solvent, toluol, xylol, lacquer, acetone, isopropyl alcohol, perchloroethylene, kerosene, naphtha, and toluene. Wastes containing metals contain copper, chromium, lead, gold, tin, cadmium, brass,

*Column sums to greater than 100% since some plants report generating more than one waste stream.

iron, zinc and aluminum. Acidic wastes include sulfuric, chromic, nitric, hydrochloric, and fluoroboric acids. Other wastes mentioned are grinding compound, developer, fixer, adhesives, rubber cement and epoxy.

WASTE TREATMENT, STORAGE, AND DISPOSAL PRACTICES:

The disposal practices reported by the 142 small generator plants in the state data base and the percent of plants employing each disposal method are as follows:

Disposal Method	% of plants*
Landfill	25
Off-site recycle	17
Landspread	9
Municipal sewer	7
Incineration	1
Deep well injection	1
"Other" methods	12
Unknown	48

Based on state survey data, about 25% of the plants indicating that their disposal methods are unknown report that the wastes are hauled away by contractors. Of those plants reporting oil or solvent wastes, about 40% indicate that the disposal method is unknown. Over 15% of the plants recycle or incinerate oils and solvents. Landfills are used for solvent disposal by 24% of the plants and for oil disposal by 16%. Over 10% dispose of oil by landspreading. Fewer than 5% of the plants report landspreading or municipal sewer for solvent disposal.

Paint wastes are landfilled by 34% of the plants. Other disposal methods for paint include recycling (10%), landspreading (8%), municipal sewer (5%), incineration (3%), other (10%), and unknown (29%). Acids and alkalis are disposed of in landfills by 17% of the plants; almost 40% indicate that their disposal method is unknown. Other disposal methods reported include municipal sewer (12%), recycling (10%), landspreading (7%), and other (15%).

*Column sums to more than 100% since some plants report using more than one disposal method.

Metal containing wastes are disposed of by unknown methods for 58% of the plants; 12% use municipal sewer and 12% use landfill for disposal. 8% of the plants recycle metals.

CURRENT DISPOSAL COST:

ALTERNATIVE DISPOSAL METHODS:

INDUSTRY PROFILE:

(See table)

ASSESSMENT OF QUALITY OF DATA BASE:

The previous EPA sponsored study estimated a total hazardous waste (excluding oil) from SIC's 355 and 357 of approximately 8.04×10^4 MT/yr[1]. Comparison of this result to the estimate of total hazardous waste generated is impossible since the populations sampled by the two studies are different. The methods used in the two studies to estimate waste quantities are also different; the previous study used census estimates of number of employees and a waste per employee factor to estimate total waste.

SOURCES OF DATA USED AND EXPLANATORY NOTES:

1. WAPORA, Inc., "Assessment of Industrial Hazardous Waste Practice-Special Machinery Manufacturing Industries;" PB-265-981, March 1977.
2. The estimated number of non-, small, and large generators is based on 50 plants reporting from Massachusetts, New York and Iowa. The distribution of small generators among the waste generation ranges indicated in the industry profile is based on 142 data points.
3. The estimated mean hazardous waste generation rate for large generators is based on 20 plants reporting from Massachusetts, New York and Iowa.
4. Census data adjusted for "zero" generators.

INDUSTRY PROFILE[2] SIC: 3540 NATION
3550,
3560, 3570

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	3555	33.2	177750.	.1
100-200	1030	9.6	154500.	.0
200-300	578	5.4	144500.	.0
300-400	382	3.6	133700.	.0
400-500	276	2.6	124200.	.0
500-600	211	2.0	116050.	.0
600-700	168	1.6	109200.	.0
700-800	138	1.3	103500.	.0
800-900	115	1.1	97750.	.0
900-1000	98	.9	93100.	.0
1000-2000	527	4.9	790500.	.2
2000-5000	416	3.9	1456000.	.4
> 5000	3212	30.0	336800684.[3]	99.0
TOTAL	10706[4]	100.0	340301434.	100.0

INDUSTRY: Electrical and Electronic Machinery, Equipment and Supplies — SIC: 36 (except 3691 and 3692)

DESCRIPTION OF INDUSTRY:

This major group includes establishments engaged in manufacturing machinery, apparatus, and supplies for the generation, storage, transmission, transformation, and utilization of electrical energy. The manufacture of household appliances is included in this group, but industrial machinery and equipment powered by built-in or detachable electric motors is classified in Major Group 35. Establishments primarily engaged in manufacturing instruments for indicating, measuring, and recording electrical quantities are classified in Industry 3825.

Based on the census data, of the 12,316 establishments in this SIC grouping 39% have fewer than 10 employees, 80% have fewer than 100 employees, and 95% have fewer than 500 employees.

CHARACTERISTICS OF HAZARDOUS WASTES PRODUCED:

The wastes reported by the 218 small generator plants in the state data base and the percent of plants reporting each waste are shown below:

Waste	% of plants reporting*
Solvents	64
Oils	37
Metal containing compounds	23
Acids	22
Alkalis	17
Paint wastes	16
Cyanides	5

The type of solvents reported by establishments in this SIC include xylene, trichloroethylene, acetone, denatured alcohol, isopropyl alcohol, trichloroethane, lacquer, freon, methyl ethyl ketone, toluene, naphtha, methylene chloride, perchloroethylene, glycol ether, and benzene. Metals contained in wastes include barium, chromium, copper, gold, iron, lead, manganese, mercury, nickel, selenium, silver, tin, tungsten, and zinc. Other wastes reported include phosphorous compounds, sodium salts, and PCB's.

*Column sums to greater than 100% since some plants report generating more than one waste stream.

SIC: 36 (except 3691 and 3692)

WASTE TREATMENT, STORAGE AND DISPOSAL PRACTICES:

The disposal practices employed by the 218 small generator plants in the state data base and the percent of plants employing each disposal method are as follows:

Disposal Method	% of plants*
Landfill	31
Off-site recycle	22
Municipal sewer	11
Landspreading	5
Incineration	3
Deep well injection	1
Lagoon/solar pond	1
"Other" methods	6
Unknown	42

About 33% of the plants in the state data base indicating that their disposal method is unknown report that their wastes are hauled by contractors. Solvent wastes are disposed of in landfills by almost 25% of the plants; over 25% report recycling or incineration for solvent disposal. Other disposal methods include municipal sewer (6%), landspreading (5%), and other methods (<5%). 35% of the plants indicate that the disposal method for solvents is unknown. Disposal methods for oil are unknown by over 45% of the plants. Other disposal methods for oil include landfill (18%), recycling or incineration (17%), municipal sewer (10%), and landspreading (4%). Acid and alkali compounds are recycled or incinerated by almost 25% of the plants; 17% use landfills for disposal, and 18% report disposal to municipal sewer. 34% indicate that the disposal method is unknown. Metal containing wastes are disposed of to unknown methods by 45% of the plants. Other disposal methods are landfill (18%), incineration or recycling (20%), municipal sewer (11%), deep well injection (4%) and other (4%). Over 50% of the firms generating paint wastes indicate that their disposal method is unknown. Landfill disposal is reported for over 25% of the establishments; 17% recycle or incinerate paint wastes.

*Column sums to more than 100% since some plants report using more than one disposal method.

SIC: 36 (except 3691 and 3692)

Less than 5% of the establishments use deep well injection or municipal sewer for disposal of paint waste.

CURRENT DISPOSAL COST:

ALTERNATIVE DISPOSAL METHODS:

INDUSTRY PROFILE:

(See table)

ASSESSMENT OF QUALITY OF DATA BASE:

SOURCES OF DATA USED AND EXPLANATORY NOTES:

1. The estimated number of non-, small, and large generators is based on 161 plants reporting from Massachusetts, New York, and Iowa. The distribution of small generators among the waste generation ranges indicated in the industry profile is based on 218 data points.
2. The mean hazardous waste generation rate for large generators is based on 37 plants reporting from Massachusetts, New York, and Iowa.
3. Census data adjusted for "zero" generators.

12/05/79.   16.38.56.

INDUSTRY PROFILE[1]   SIC: 3600   NATION
(except 3691 and 3692)

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS		WASTE QUANTITY	
	NUMBER	PERCENT	KG/MO	PERCENT
0-100	2201	24.9	108664.	.1
100-200	886	10.0	132900.	.1
200-300	527	6.0	131750.	.1
300-400	368	4.2	128800.	.1
400-500	273	3.1	122850.	.1
500-600	211	2.4	116050.	.1
600-700	170	1.9	110500.	.1
700-800	142	1.6	106500.	.1
800-900	119	1.3	101150.	.1
900-1000	102	1.2	96900.	.1
1000-2000	560	6.3	840000.	.8
2000-5000	458	5.2	1603000.	1.5
> 5000	2821	31.9	106334200.[2]	96.7
TOTAL	8838[3]	100.0	109933264.	100.0

INDUSTRY: Storage and Primary Batteries SIC: 3691, 3692

Establishments in the subject SIC's are engaged in the production of storage (SIC 3691) and primary (SIC 3692) batteries. Based on the census data (see computer printouts), there are 200 and 58 establishments in SIC's 3691 and 3692, respectively.

Over 95% of the storage batteries produced are lead-acid storage cells, nickel-cadmium storage cells, cadmium-silver storage cells and zinc-silver storage cells. The major uses of these batteries are in automotive and industrial appliances, calculators, portable appliances, satellites and other space applications. The majority of the primary batteries (95%) are of the following types: carbon-zinc cell, carbon-zinc air cell, alkaline-manganese cell, mercury Ruben and Weston cell, magnesium-carbon cell, zinc-silver cell and lead reserve cell. The major uses of the primary cells are in radio, flashlight, camera equipment, battery-powered toys, tape recorders, electric watches, and other instruments such as portable potentiometers and voltage recorders.

CHARACTERISTICS OF HAZARDOUS WASTES PRODUCED

The hazardous wastes generated consist largely of wastewater treatment sludges (which may contain toxic metals such as cadmium, mercury and lead), rejected and scrap cells, and lube oils and solvents. The total quantity of hazardous waste produced by the subject industry is estimated at 7.9 million kg/mo with an average of 31,000 kg/mo/establishment (see Industry Profile).

WASTE TREATMENT, STORAGE AND DISPOSAL PRACTICES:

Based on the state data for establishments in the subject SIC's, the percentages of the waste quantities handled by various disposal methods are as follows: waste recycling (58%), landfill (9%), contract hauling (17%) and onsite sotrage (17%).

CURRENT DISPOSAL COSTS

ALTERNATIVE DISPOSAL METHODS:

Where recycling of scrap cells and battery acids is technically and economically feasible, such wastes should be recycled (as is practiced in many facilities). When designed and operated properly, landfilling is an environmentally adequate disposal method.

INDUSTRY PROFILE:

(See table)

ASSESSMENT OF QUALITY OF DATA BASE:

A total waste generation quantity of 7.9 million kg/mo is estimated in this assessment for the establishments in the subject SIC's. This estimated quantity is only 60% of another estimate reported in a recent industry assessment study for EPA/OSW[(1)]. This other estimate, however, is based on a different approach (the "model plant" approach for estimating waste quantities) than that used in this study.

SOURCES OF DATA USED AND EXPLANATORY NOTES:

(1) Assessment of Industrial Hazardous Waste Practices: Storage and Primary Battery Industries, NTIS Report No. PB-241-204/7WP

(2) Based on waste quantity data for 9 establishments covered in the state data base

(3) Census data, adjusted for the estimated "zero" generators (11%)

INDUSTRY PROFILE[2] SIC: 3691 NATION
3692

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	41	17.8	2050.	.0
100-200	2	.9	300.	.0
200-300	2	.9	500.	.0
300-400	2	.9	700.	.0
400-500	2	.9	900.	.0
500-600	3	1.3	1650.	.0
600-700	3	1.3	1950.	.0
700-800	3	1.3	2250.	.0
800-900	3	1.3	2550.	.0
900-1000	3	1.3	2850.	.0
1000-2000	24	10.4	36000.	.5
2000-5000	48	20.9	168000.	2.1
> 5000	94	40.9	7732440.	97.2
TOTAL	230[3]	100.0	7952140.	100.0

12/07/79.   13.02.10.

BREAKDOWN OF PLANTS IN EMPLOYMENT SIZE CATEGORIES BY EPA REGION IN SICS 3691 TO 3692

NUMBER OF PLANTS IN EACH CATEGORY

REGION	TOTAL	1-4	5-9	10-19	20-49	50-99	100-249	250-499	500-999	>1000
I	12	0	1	0	5	1	3	1	1	0
II	20	2	4	2	3	3	3	2	1	0
III	30	7	1	4	1	5	6	4	2	0
IV	46	7	3	6	7	0	15	4	3	1
V	51	10	3	5	2	7	11	11	1	1
VI	23	3	3	5	3	1	4	4	0	0
VII	19	2	0	2	2	4	6	2	1	0
VIII	5	1	0	1	1	1	1	0	0	0
IX	37	12	7	4	2	4	6	2	0	0
X	15	3	4	4	0	3	1	0	0	0
NATION	258	47	26	33	26	29	56	30	9	2

INDUSTRY: Transportation Equipment SIC: 37

DESCRIPTION OF INDUSTRY:

This major group includes establishments engaged in manufacturing equipment for transportation of passengers and cargo by land, air and water. Important products produced by establishments classified in this major group include motor vehicles, aircraft, guided missiles and space vehicles, ships, boats, railroad equipment, and miscellaneous transportation equipment such as motorcycles, bicycles, and snowmobiles.

Based on the census data,of the 8536 establishments in this major group 44% have fewer than 10 employees, 82% have fewer than 100 employees, and 95% have fewer than 500 employees.

CHARACTERISTICS OF HAZARDOUS WASTES PRODUCED:

The wastes reported by the 65 small generator plants in the state data base and the percent of plants reporting each waste are shown below:

Waste	% of plants reporting*
Solvents	55
Oils	51
Paint wastes	31
Alkalis	14
Acids	13
Metal containing compounds	12
Cyanides	9

Based on state survey data, the type of solvent wastes generated include xylene, chloroform, dichlorobenzene, Stoddard solvent, kerosene, trichloroethane, isopropyl alcohol, trichloroethylene, methylene chloride, perchloroethylene, freon, acetone, styrene and Cellosolve. Metals contained in some wastes include iron, aluminum, barium, chromium, and cadmium.

WASTE TREATMENT, STORAGE AND DISPOSAL PRACTICES:

The disposal practices employed by the 65 small generator plants in the state data base and the percent of plants employing each disposal method are shown below:

*Column sums to greater than 100% since some plants report generating more than one waste stream.

Disposal Method	% of plants*
Landfill	27
Recycle	10
Municipal sewer	8
Incineration	5
Deep well injection	5
Lagoon/solor pond	4
Landspreading	3
"Other" methods	5
Unknown	52

Of those plants reporting that their disposal method is unknown, 23% indicate that the wastes are hauled by contractors. Solvents are landfilled by over 20% of the plants in the state data base; 38% indicate that their disposal method for solvents is unknown. Other disposal methods include recycling or incineration (19%), landspreading (4%), deep well injection (4%), municipal sewer (2%), lagoons or ponds (2%), and other (9%). Almost half of the establishments with oil wastes indicate that their disposal method is unknown. Landfills are used by 24% of the plants; 12% recycle or incinerate oil waste. Other disposal methods are deep well injection (4%), municipal sewer (4%), and lagoons or ponds (4%). Paint wastes are landfilled by 34% of the plants; over 30% indicate that the disposal method is unknown. 10% of the establishments incinerate or recycle paint waste and 10% use municipal sewers for disposal. 7% indicate deep well injection and 7% indicate other methods. Disposal methods for acids and alkalis include landfill (35%), municipal sewer (19%), recycling or incineration (12%), deep well injection (4%), other (5%) and unknown (23%). Metal wastes are disposed of in landfills by 40% of the plants; over 30% indicate that the disposal method is unknown. Other disposal methods reported for metals are municipal sewer (13%) and lagoons or ponds (13%).

*Column sums to more than 100% since some plants report using more than one disposal method.

CURRENT DISPOSAL COST:

ALTERNATIVE DISPOSAL METHODS:

INDUSTRY PROFILE:

(See table)

ASSESSMENT OF QUALITY OF DATA BASE:

The estimate of total hazardous waste from the industrial group is highly sensitive to the estimated mean generation rate for large generators. That number is based on 14 data points, 13 of which are from SIC 371 and 11 of which are from New York. Thus, the estimated large generator rate may not be representative of the population of plants in this group.

SOURCES OF DATA USED AND EXPLANATORY NOTES:

1. The estimated number of non-, small, and large generators is based on 31 plants reporting from Massachusetts, New York and Iowa. The distribution of small generators among the waste generation ranges indicated in the industry profile is based on 64 data points in the state data base.
2. The mean hazardous waste generation rate for large generators is based on 14 plants reporting from New York, Massachusetts, and Iowa.
3. Census data adjusted for number of "zero" generators.

11/27/79. 08.43.27.

INDUSTRY PROFILE(1) SIC: 3700 NATION

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	679	8.8	33950.	.0
100-200	90	1.2	13500.	.0
200-300	97	1.3	24250.	.0
300-400	103	1.3	36050.	.0
400-500	110	1.4	49500.	.0
500-600	115	1.5	63250.	.0
600-700	121	1.6	78650.	.0
700-800	126	1.6	94500.	.0
800-900	129	1.7	109650.	.0
900-1000	132	1.7	125400.	.0
1000-2000	1251	16.2	1876500.	.1
2000-5000	915	11.9	3202500.	.2
> 5000	3842	49.8	1318958600.(2)	99.6
TOTAL	7710(3)	100.0	1324666300.	100.0

11/29/79.   13.49.57.

BREAKDOWN OF PLANTS IN EMPLOYMENT SIZE CATEGORIES BY EPA REGION IN SIC 3700

NUMBER OF PLANTS IN EACH CATEGORY

REGION	TOTAL	1-4	5-9	10-19	20-49	50-99	100-249	250-499	500-999	>1000
I	427	129	74	59	67	34	21	20	6	17
II	578	177	75	112	68	48	56	21	8	13
III	549	165	77	74	74	46	49	26	10	28
IV	1277	393	193	180	188	113	100	50	35	25
V	1916	419	215	273	289	209	213	117	61	121
VI	972	302	133	151	172	75	65	44	14	16
VII	460	120	56	76	78	43	41	23	5	18
VIII	198	66	43	28	27	10	13	6	1	4
IX	1697	552	282	232	259	144	106	55	27	40
X	462	176	78	73	58	26	25	10	9	7
NATION	8536	2499	1226	1258	1279	748	689	372	176	289

INDUSTRY: Measuring, Analyzing, and Controlling Instruments, Medical, Dental and Optical Goods, and Watches and Clocks

SIC: 38 (except 3861)

DESCRIPTION OF INDUSTRY:

This major group includes establishments engaged in manufacturing instruments (including professional and scientific) for measuring, testing, analyzing, and controlling, and their associated sensors and accessories; optical instruments and lenses; surveying and drafting instruments; surgical, medical and dental equipment and supplies; ophthalmic goods; and watches and clocks.

Based on the census data, of the 5674 establishments in this group 48% have fewer than 10 employees, 86% have fewer than 100 employees, and 97% have fewer than 500 employees.

CHARACTERISTICS OF HAZARDOUS WASTES PRODUCED:

The wastes reported by the 52 small generator plants in the state data base and the percent of plants reporting each waste are shown in the table below.

Waste	% of plants reporting*
Solvents	55
Oils	29
Metal containing compounds	24
Acids	18
Alkalis	12
Paint wastes	6

The type of solvents reported by plants in the state data base include perchloroethylene, Stoddard solvent, carbon tetrachloride, methyl ethyl ketone, acetone, lacquer, freon, kerosene, trichloroethylene, ethanol, methanol, Solvasil, mineral spirits and glycol. Metals contained in wastes include chromium, copper, gold, iron, nickel and rhodium.

*Column sums to greater than 100% since some plants report generating more than one waste stream.

WASTE TREATMENT, STORAGE, AND DISPOSAL PRACTICES:

Disposal practices employed by the 52 small generator plants in the state data base and the percent of plants employing each disposal method are shown below.

Disposal Method	% of plants*
Landfill	12
Recycle	8
Municipal sewer	4
Incineration	2
Lagoon/solar pond	2
"Other" methods	10
Unknown	67

Almost 30% of the plants in the state data base indicating unknown disposal methods for their wastes report that the wastes are hauled away by contractors. About 16% of the plants report disposal of solvents by recycling or incineration. Other disposal methods for solvents include landfill (7%), municipal sewer (3%), lagoons or ponds (3%) and other (13%). 57% of the establishments indicate that their solvent disposal method is unknown.

Oil wastes are landfilled by 18% of the plants and incinerated or recycled by 18% of the plants. About 47% of the plants report that their oil disposal method is unknown; 18% dispose of oil by other methods. Disposal methods for metal wastes are unknown by 80% of the establishments. Other disposal methods for metals include landfill (13%) and lagoons or ponds (7%). Acid and alkali disposal methods include landfill, incineration, recycling, municipal sewer, and lagoons or ponds; 65% of the plants indicate that the disposal method is unknown.

Paint wastes are landfilled by 25% of the plants. Other disposal methods are reported for 25% of the plants. About 50% indicate that the disposal method for their paint waste is unknown.

*Column sums to more than 100 since some plants report using more than one disposal method.

SIC: 38 (except 3861)

CURRENT DISPOSAL COST:

ALTERNATIVE DISPOSAL METHODS:

INDUSTRY PROFILE:

(See table)

ASSESSMENT OF QUALITY OF DATA BASE:

The assessment results (i.e., "Industry Profile" and total waste quantity) are sensitive to the estimated relative number of non-, small, and large generators. Because of lack of appropriate data for plants in the subject SIC, These estimates were based on data for similar SIC's[1].

SOURCES OF DATA USED AND EXPLANATORY NOTES:

1. Data were not available on plants in the subject SIC to estimate the proportion of firms in this SIC group which were non-, small, or large generators. Accordingly, the estimates were based on the available data for plants in SIC's 342 and 35, which would be similar to those in the subject SIC's. The estimated percentages of establishments which are large generators and non-generators are 43% and 9%, respectively, based on the data for SIC's 342 and 35. The distribution of small generators among the waste generation ranges indicated in the industry profile is based on 52 data points in the state data base for the subject SIC's.
2. The mean hazardous waste generation rate for large generators used here is based on data for plants in SIC's 342 and 35.
3. Census data adjusted for the estimated "zero" generators.

12/04/79.   12.28.34.

INDUSTRY PROFILE[1]   SIC: 3800 (except 3861)   NATION

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	723	21.1	35856.	.2
100-200	419	12.2	62850.	.4
200-300	271	7.9	67750.	.5
300-400	193	5.6	67550.	.5
400-500	149	4.3	67050.	.5
500-600	117	3.4	64350.	.4
600-700	95	2.8	61750.	.4
700-800	79	2.3	59250.	.4
800-900	66	1.9	56100.	.4
900-1000	56	1.6	53200.	.4
1000-2000	321	9.4	481500.	3.3
2000-5000	271	7.9	948500.	6.6
> 5000	669	19.5	12373000.[2]	85.9
TOTAL	3429[3]	100.0	14398706.	100.0

12/07/79. 13.31.39.

BREAKDOWN OF PLANTS IN EMPLOYMENT SIZE CATEGORIES BY EPA REGION IN SIC 3800 (including 3861)

NUMBER OF PLANTS IN EACH CATEGORY

REGION	TOTAL	1-4	5-9	10-19	20-49	50-99	100-249	250-499	500-999	>1000
I	666	196	90	96	99	61	51	38	25	10
II	1128	335	177	180	188	94	97	26	15	16
III	533	148	86	86	93	42	35	27	9	7
IV	482	181	86	63	49	31	31	20	18	3
V	1278	377	199	199	187	111	105	50	32	18
VI	404	142	57	82	59	24	25	8	4	3
VII	200	64	36	26	38	8	11	12	5	0
VIII	161	69	29	19	20	10	6	1	4	3
IX	1291	445	208	199	202	104	76	38	10	9
X	145	60	24	23	20	7	5	3	0	3
NATION	6288	2017	992	973	955	492	442	223	122	72

INDUSTRY: Photographic Equipment and Supplies SIC: 3861

DESCRIPTION OF INDUSTRY:

This SIC covers establishments primarily engaged in manufacturing (1) photographic apparatus, equipment, parts, attachments, and accessories, such as still and motion picture cameras and projection apparatus; photocopy and microfilm equipment; blueprinting and diazotype (white printing) apparatus and equipment; and other photographic equipment; and (2) sensitized film, paper, cloth and plates, and prepared photographic chemicals for use therewith.

Based on the census data, of the 614 plants in this SIC 48% have fewer than 10 employees, 86% have fewer than 100 employees, and 95% have fewer than 500 employees.

CHARACTERISTICS OF HAZARDOUS WASTE PRODUCED:

The wastes reported by the 11 small generator plants in the state data base and the percent of plants reporting each waste are shown below:

Waste	% of Plants Reporting*
Solvents	64
Oils	54
Miscellaneous inorganics	45
Paint wastes	27
Miscellaneous organics	18
Metal Containing Compounds	9
Cyanides	9
Acids	9

The type of solvent wastes generated by plants in this SIC include acetone, lacquer, methyl ethyl ketone, isopropyl alcohol, 1,1,1 trichloroethane, chloroform, and trichloroethylene. Other organics include epoxy resin powder and carbon black. The inorganic wastes reported are pigments, polymers, developers, and fixers. Metal containing compounds include wastes containing aluminum, iron, brass and silver.

*Column sums to greater than 100% since some plants report generating more than one waste stream.

WASTE TREATMENT, STORAGE, AND DISPOSAL PRACTICES:

Disposal practices employed by the 11 small generator plants in the state data base and the percent of plants employing each disposal method are shown below:

Disposal Method	% of Plants*
Landfill	18
Incineration	9
Recycling	9
Unknown	64†

Based on state survey data, about 50% of the plants with solvent wastes recycle or incinerate them. One plant reports landfill disposal. The remainder indicate that the disposal method is unknown. Other waste types are landfilled or disposed of by unknown methods.

Information gathered by EPA's Effluent Guidelines Division in their "308" questionnaires(1) indicate that many firms in this SIC discharge wastes to POTW's. This disposal method, however, was not reported by any of the 11 small generator plants in the state data base.

CURRENT DISPOSAL COST:

ALTERNATIVE DISPOSAL METHODS:

INDUSTRY PROFILE:

(See table)

ASSESSMENT OF QUALITY OF DATA BASE:

*Column sums to more than 100% since some plants report using more than one disposal method.

†86% of these indicate contract hauling to unknown disposal method.

SOURCES OF DATA USED AND EXPLANATORY NOTES:

(1) Information provided by EPA/EGD

(2) The estimated number of non-, small, and large generators is based on 31 plants reporting from New York and Massachusetts. The distribution of small generators among the waste generation ranges indicated in the industry profile is based on six plants reporting in the "state" data file.

(3) The mean hazardous waste generation rate for large generators is based on 18 plants reporting from New York and Massachusetts.

(4) Census data adjusted for "zero" generators.

INDUSTRY PROFILE[2] SIC: 3861 NATION

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	17	3.3	850.	.0
100-200	19	3.7	2850.	.0
200-300	16	3.1	4000.	.0
300-400	13	2.5	4550.	.0
400-500	11	2.1	4950.	.0
500-600	9	1.7	4950.	.0
600-700	7	1.4	4550.	.0
700-800	6	1.2	4500.	.0
800-900	6	1.2	5100.	.0
900-1000	5	1.0	4750.	.0
1000-2000	28	5.4	42000.	.1
2000-5000	23	4.5	80500.	.1
> 5000	356	69.0	68708000.[3]	99.8
TOTAL	516[4]	100.0	68871550.	100.0

12/06/79. 12.33.08.

BREAKDOWN OF PLANTS IN EMPLOYMENT SIZE CATEGORIES BY EPA REGION IN SIC 3861

NUMBER OF PLANTS IN EACH CATEGORY

REGION	TOTAL	1-4	5-9	10-19	20-49	50-99	100-249	250-499	500-999	>1000
I	42	17	5	6	6	2	2	0	1	3
II	163	47	35	26	20	9	9	5	5	7
III	41	12	4	9	8	3	3	1	1	0
IV	25	8	4	2	6	1	1	1	1	1
V	141	43	22	16	20	16	10	8	3	3
VI	17	8	2	0	2	1	2	1	1	0
VII	18	4	3	3	4	1	1	2	0	0
VIII	10	5	2	1	1	0	0	0	0	1
IX	143	46	24	26	25	11	7	4	0	0
X	14	5	2	2	3	0	0	1	0	1
NATION	614	195	103	91	95	44	35	23	12	16

INDUSTRY: Miscellaneous Manufacturing Industries SIC: 39 (except 391 and 396)

DESCRIPTION OF INDUSTRY:

This major group includes establishments primarily engaged in manufacturing products not classified in any other manufacturing major group. Industries in this group fall into the following categories; musical instruments; toys, sporting and athletic goods; pens, pencils, and other office and artists' materials; brooms and brushes; caskets; and other miscellaneous manufacturing industries.

Based on the census data, of the 10,864 establishments in this grouping, 54% have fewer than 10 employees, 88% have fewer than 100 employees, and 99% have fewer than 500 employees.

CHARACTERISTICS OF HAZARDOUS WASTES PRODUCED:

The wastes reported by the 30 small generator plants in the state data base and the percent of plants reporting each waste are shown below:

Waste	% of plants reporting*
Solvents	53
Paint wastes	26
Oils	15
Acids	12
Metal containing compounds	12
Cyanides	3
Alkalis	3

Solvent wastes include trichloroethylene, perchloroethylene, mineral spirits, xylol, toluol, methyl ethyl ketone, Stoddard solvent, acetone, and 1,1,1-trichloroethane. Acids include phosphoric, chromic, and nitric acid. Inorganic wastes include spent ferric chloride, copper sulfate, and fixer and developer solutions.

WASTE TREATMENT, STORAGE, AND DISPOSAL PRACTICES:

Disposal practices employed by the 30 small generator plants in the state data base and the percent of plants employing each disposal method are shown below:

*Column sums to greater than 100% since some plants report generating more than one waste stream.

Disposal Method	% of plants*
Landfill	44
Municipal sewer	18
Recycle	12
Landspreading	6
Deep well injection	3
Incineration	3
Lagoon/solar pond	3
"Other" methods	3
Unknown	60

About 12% of the plants in the state data base indicating that their disposal method is unknown report contractor hauling of their wastes. Over 40% of the plants use landfills for disposal of solvents; about 25% recycle or incinerate solvent wastes. Other disposal methods include municipal sewer (9%), landspreading (5%), lagoons or ponds (5%), and other (5%). About 15% indicate that their disposal method for solvents is unknown. Paint wastes are landfilled by 56% of the plants; other disposal methods are landspreading and municipal sewer. Over 20% of the plants indicate that their disposal method for paint wastes is unknown. The disposal method for oils is unknown by 60% of the plants; 40% report recycling of oil. About 60% of the plants dispose of acid and alkali to municipal sewer; 20% indicate disposal by deep well injection and 20% indicate that the disposal method is unknown. Disposal methods mentioned for metal containing wastes include deep well injection and municipal sewer.

CURRENT DISPOSAL COST:

ALTERNATIVE DISPOSAL METHODS:

INDUSTRY PROFILE:

(See table)

*Column sums to more than 100% since some plants report using more than one disposal method.

SIC: 39 (except 391 and 396)

ASSESSMENT OF QUALITY OF DATA BASE:

The assessment results (i.e., "Industry Profile" and total waste quantity) are sensitive to the estimated number of non-, small, and large generators. Since these estimates were determined by best judgment, the reliability of the results for this SIC is not as good as it is for SIC's in which estimates are based on actual data.

SOURCES OF DATA USED AND EXPLANATORY NOTES:

1. Data were not available for plants in the subject SIC to estimate the proportion of firms in this SIC group which were non-, small, or large generators. Accordingly, the estimates were based on data available for similar SIC's (SIC's 342 and 35) for which data were available. The distribution of small generators among the waste generation ranges indicated in the industry profile is based on 30 data points in the state data base for the subject SIC.
2. The mean hazardous waste generation rate for large generators is based on data for plants in SIC's 342 and 35.
3. Census data adjusted for estimated "zero" generators.

11/27/79.   08.43.27.

INDUSTRY PROFILE[1]   SIC: 3900   NATION

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	1615	26.0	80750.	.1
100-200	783	12.6	117450.	.2
200-300	485	7.8	121250.	.2
300-400	344	5.5	120400.	.2
400-500	260	4.2	117000.	.2
500-600	204	3.3	112200.	.2
600-700	165	2.7	107250.	.2
700-800	138	2.2	103500.	.2
800-900	116	1.9	98600.	.2
900-1000	100	1.6	95000.	.2
1000-2000	552	8.9	828000.	1.5
2000-5000	451	7.3	1578500.	2.8
> 5000	998	16.1	52894000.[2]	93.8
TOTAL	6211[3]	100.0	56373900.	100.0

INDUSTRY: Jewelry, Silverware, and Plated Ware, Costume Jewelry, Costume Novelties, Buttons, and Miscellaneous Notions — SIC: 3910,3960

DESCRIPTION OF INDUSTRY:

Establishments in the subject SIC's are primarily engaged in manufacturing jewelry, costume novelties, buttons and miscellaneous notions worn on or carried about the person; manufacturing silverware, plated ware and stainless steel ware; manufacturing jewelers' findings and materials; and lapidary work on gems. Based on the census data there are a total of 3,810 establishments in SIC's 3910 and 3960.

The following data on the industry structure are from Reference 1. There are about 1500 establishments in the precious (karet gold and platinum) jewelry industry. Over 600 of these are located in the middle Atlantic area (New York and New Jersey), with the majority employing fewer than 20 employees. There are 330 firms in the lapidary industry, 240 of which are located in the New York area. There are 800 firms dealing in low- and medium-priced jewelry with more than 300 located in the New England (Greater Providence-Attleboro) area. There are 237 finding manufacturers supplying metal parts to other jewelry manufacturers, with the majority located in the New England area.

CHARACTERISTICS OF HAZARDOUS WASTES PRODUCED:

The total quantity of potentially hazardous land-destined wastes generated by establishments in SIC 3910 and SIC 3960 is established at 2.1 million kg/mo. This quantity of waste is generated by 37% of the establishments in the industry. The remaining 63% of the establishments either do not generate any hazardous wastes or discharge such wastes to POTW's.

Mechanization and the quantity of wastes produced by an establishment is generally in an inverse proportion to the quality of metal and stone used. Most of the establishments handling low- and medium-priced jeweleries have in-house electroplating capability. The wastes produced is very similar in characteristics to those produced in the electroplating industry; these wastes are primarily wastewater treatment sludges, spent plating baths and spent degreasing solvents (see assessment summary sheet for SIC 3471).

WASTE TREATMENT, STORAGE AND DISPOSAL PRACTICES:

Based on the state data, the waste quantity breakdown for different disposal practices are as follows:

Disposal Method	% Wastes	Estimated Total Quantity of Waste, kg/mo
Hauled to off-site disposal	10	214,000
Landfilling	52	1,111,000
Recycling	36	769,000
Lagooning	1	21,000

Rhode Island Dept. of Health conducted field visits to 12 establishments in the subject industry and reported the following on waste recovery, storage, treatment, and transportation.

Recovery On Site - Two firms indicated efforts to recover gold, silver or rodium from spent plating solution or rinse water. One firm recovered the metals on site, the other used an evaporator to drive water off spent plating solution. The remaining sludge was then sent to a refiner.

Another firm recovered peroxide from a gold rinse and sent to a reclaimer. Another firm reclaimed trichloroethylene from degreasing operations. The oil contaminated solvent is passed over a heated coil to boil off the solvent. The fumes are captured and reliquified. A large amount (1600 kg/mo) of sludge is generated in this operation. It is sent to a solvent reclaimer.

Waste Reduction On Site - The above solvent reclaiming system can be thought of as waste reduction. One firm employs a system of catch basins in series which aid in settling out metals in plating rinse water before sewer discharge. A total of about 100 gal/yr of sludge is pumped from these basins and sent to a reclaimer.

Storage Methods - Two firms indicated systems of catch basins or septic tanks for plating wastes. But unlike the case above, the settlings were disposed of rather than reclaimed. Two firms indicated storage of solvent degreasers in drums before being sent to a reclaimer. Another firm stored polishing dust in drums before land disposal.

Treatment Procedures - Five firms indicated they treated plating waste. The typical treatment facilities consisted of:

Batch treatment with sodium hypochlorate to break down cyanides and/or

Batch treatment with sodium hydroxide to aid in precipitation of metals

Addition of acid to adjust the pH of the effluent water (usually discharged to sewer)

Yearly pumping and disposal of sludge from settling areas

Collection Procedures - In almost all cases where plating is involved, rinse water is caught on the floor and piped to treatment and disposal. One firm indicated collection of polishing dust with a vacuum blower system.

Transportation Methods - Two firms indicated trucking drums of solvents to a reclaimer. Two firms trucked treatment waste sludge in drums to land disposal. Three firms indicated transportation of sludge in pumper trucks to land disposal or a reclaimer. One firm trucked polishing dust in drums to land disposal.

Miscellaneous - The problems in the jewelry industry are uniform and coincide with those of the plating industry. Almost all jewelry industry wastes is plating waste which is difficult and expensive to treat. Also, this industry is reluctant to install facilities when in many cases they don't know what level of pretreatment is needed.

ASSESSMENT OF DATA BASE:

The major source of information on the subject industry is the Rhode Island data in the state data base. In 1977 the Rhode Island Dept. of Health sent out 609 questionnaires and received a 40% response. They conducted follow-up field visits (discussed above) to 12 establishments.

Quantitative estimates shown in the profile table are based on waste generation for 60 establishments in SIC 3910 and SIC 3960.

SOURCE OF INFORMATION AND EXPLANATORY NOTES:

(1) The Jewelry Industry by G. R. Frankovich, Manufacturing Jewelers and Silversmiths of America, Providence, R.I.

(2) Rhode Island Hazardous Waste Report, Rhode Island Dept. of Health, Division of Solid Waste Management, March 1977

(3) Based on state data for 60 establishments and the census data (Reference 4)

(4) Census data, adjusted for "zero" generators and discharges into POTW's

11/27/79.   08.43.27.

INDUSTRY PROFILE[3]   SIC: 3910   NATION
3960

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	1060	76.3	53000.	2.5
100-200	30	2.2	4500.	.2
200-300	20	1.4	5000.	.2
300-400	10	.7	3500.	.2
400-500	9	.6	4050.	.2
500-600	7	.5	3850.	.2
600-700	5	.4	3250.	.2
700-800	4	.3	3000.	.1
800-900	3	.2	2550.	.1
900-1000	2	.1	1900.	.1
1000-2000	20	1.4	30000.	1.4
2000-5000	10	.7	35000.	1.6
> 5000	210	15.1	1980090.	93.0
TOTAL	1390[4]	100.0	2,129,690.	100.0

11/29/79. 13.58.19.

BREAKDOWN OF PLANTS IN EMPLOYMENT SIZE CATEGORIES BY EPA REGION IN SICS 3910 and 3960

NUMBER OF PLANTS IN EACH CATEGORY

REGION	TOTAL	1-4	5-9	10-19	20-49	50-99	100-249	250-499	500-999	>1000
I	933	304	148	160	142	81	60	26	10	2
II	1479	577	299	266	203	91	34	8	0	1
III	136	55	24	25	14	11	2	4	0	1
IV	171	92	28	16	11	6	12	5	0	1
V	269	126	48	45	28	11	9	0	2	0
VI	215	82	48	36	35	6	6	1	1	0
VII	54	27	7	3	9	3	3	2	0	0
VIII	66	26	15	10	11	1	2	0	1	0
IX	426	195	88	70	51	18	2	2	0	0
X	61	39	6	9	6	0	1	0	0	0
NATION	3810	1523	711	640	510	228	131	48	14	5

INDUSTRY: Railroad Transportation SIC: 40 (and parts of SIC 411)

DESCRIPTION OF INDUSTRY:

The railroad operations which generate hazardous wastes are included in the SIC's 40 and 41, under the subcategories 4013 (switching and terminal establishments) and 411 (local and suburban passenger transportation).

For statistical purposes the Interstate Commerce Commission classifies railroad operating companies into three gorups: Class I railroads (annual revenues more than $50 million), Class II (revenue from $10 to $50 million), and Class III (revenue less than $10 million). Most of the available data concerns Class I railroads which handle 99% of the traffic. The number of railroad companies, percentage of traffic handled, etc. for the 3 classes of railroad companies are as follows[1-5]:

	Total Railroad Companies	Locomotives in Operation	Percentage of Traffic	Percentage of Railroad Workers
Class I	42	23,355	99	93
Class II	18	524	1	7
Class III	278	987		

The number of Class I railroad locations and associated activities which are generators of waste in the U.S. are as follows:

Waste Generating Establishment	Number in U.S.*	Units Serviced per Day*
Locomotive fueling/wash stations†	850	17 - 180
Running maintenance shops	375	unknown
Heavy diesel repair shops	75	1 - 10
Tank car cleaning stations	135	1 - 11

*Based on data in Reference (1)

†Fueling stations may or may not include wash facilities, running maintenance shops often include fueling and washing, and heavy diesel repair shops may include fueling, washing and running maintenance.

Hazardous wastes are also generated by Class I and III railroads at company owned establishments where fueling, washing and running maintenance are conducted in a single area. Heavy diesel repair and tank car washing for Class II and III railroads is generally performed at Class I railroad facilities.

The distribution of railroad establishments in the various EPA regions is shown below. The distribution is estimated by proportioning the nationwide total of establishments according to the railroad employment distribution (as given in Reference 4).

Number of Establishments by EPA Region

Facility Type	I	II	III	IV	V	VI	VII	VIII	IX	X
Class I										
Fueling/wash stations	20	62	122	114	227	78	86	38	64	36
Maintenance shops	9	27	54	50	100	35	38	17	28	16
Heavy diesel repair	2	5	11	10	20	7	8	3	6	3
Tank car cleaning	3	10	19	18	36	12	14	6	10	6
Class II										
Fuel/maintenance/wash stations	7	22	43	40	80	28	30	13	23	13
Totals	41	126	249	232	463	160	176	77	131	74
Fraction of Total	.024	.073	.143	.134	.267	.092	.101	.045	.075	.043

CHARACTERISTICS OF HAZARDOUS WASTE PRODUCED:

The major hazardous waste generated by the railroad industry is oily wastewater. Estimates of the amount or characteristics of raw wastes produced for each of the various operations (per locomotive or per tank car) is as follows[1]:

Activity	Wastewater gal	Oil kg	SS kg	DS kg	Detergent kg	Phenols kg	Chromium kg	pH Units
Locomotive fueling	5	0.8	14	--	--	--	--	--
Locomotive wash	1200	4.5	4.5	13.5	0.2	--	--	9-11
Locomotive maintenance	300	1.1	1.1	3.5	0.05	--	--	9-11
Locomotive heavy repair	2000	7.7	7.7	23	0.4	0.01	0.04	9-11
Tank car cleaning	3000	11	11	34	0.7	1.1	0.11	4-11

Heavy diesel repair shops are the sources of the largest total volumes of wastewater in the railroad industry. The prime waste constituents are free and emulsified oil, suspended solids, detergents, acid and alkaline materials, chromium, and phenols.

Washing of tank cars produces the most toxic wastes of the railroad industry. Wastes are normally complex mixtures of chemical products. Wastes are typically characterized by high COD and BOD and contain constituents such as oil, suspended solids, phenols, acids, alkalis, detergents, solvents, nitrogen compounds, chromium and cyanide.

The total hazardous wastes generated by Class I railroad facilities are estimated as the quantities shown below.

Total Hazardous Waste Generated by Class I Railroad Facilities, kg/mo

	Waste Oils	Sludges
Fueling stations	6,975,000 [6]	6,596,000 [6]
Maintenance shops	1,823,000 [7]	4,251,000 [7]
Heavy diesel repair shops	8,480,000 [8]	27,380,000 [8]
Tank car cleaning	228,000 [9]	3,838,000 [9]
Total	17,506,000	42,065,000

The total quantity of oily wastewaters generated by Class II and III railroad facilities (locomotive fueling, washing, maintenance) is estimated at 308,500 kg/mo and 1,007,000 kg/mo, respectively[10].

Waste generation rates above were determined for each of the establishment types by using combinations of survey data available from Reference 1, communications with Class III railroad companies, and other miscellaneous data from the listed references.

WASTE TREATMENT, STORAGE, AND DISPOSAL PRACTICES:

The majority of facilities for Class I railroads utilize an engineered treatment system to remove oil, settleable solids and certain chemical constituents from wastewaters. The wastewaters are treated at railroad terminal facilities using processes such as gravity oil separation, emulsion-breaking, coagulation, air flotation, biological treatment, clarification and filtration. Waste oils and fuels are skimmed and sold for recycling by contractors, or used onsite as fuel in furnaces. Sludges are carried away by contractors to landfills or incinerators. The treated wastewaters are discharged to the municipal sewer to nearby creeks or rivers, or partially reused in washing operations. The majority of the treatment plants do not achieve the effluent guidelines proposed for the railroad industry[1].

It was estimated by one study in 1974[1] that approximately one-third of the Class I railroad facilities were still lacking wastewater treatment systems. Most running maintenance stations do not utilize catchment facilities, and leaks, spills, and wash wastewaters typically are discharged directly to nearby ground. At smaller fueling and wash stations, spillage and oil wastes typically drain directly to ground.

At Class II and III railroad facilities, the oil wastewaters are rarely processed through on-site treatment systems. Wastewaters associated with diesel maintenance (about one-half the total wastewaters produced) are generally carried away by contractors for recycling, and wastewaters associated with fueling and locomotive washing are normally dumped along the right of way or on nearby open ground.

Summary of Disposal Methods

	Waste Oils	Sludge	Wastewaters
Class I			
Fueling stations	60% recycle, 40% to open ground	100% landfill	--
Running maintenance	60% recycle, 40% to open ground	100% landfill	--
Heavy diesel repair	50% recycle, 50% onsite reuse	100% landfill	--
Tank car cleaning	100% recycle	100% landfill	--
Class II and III			
Fuel/wash/maintenance	--	--	50% recycle, 50% to open ground

CURRENT DISPOSAL COST:

The disposal of waste oil by waste oil collectors is generally at no cost to the generators, and larger quantities of waste oil are often purchased by waste oil collectors. About one-half the quantity of wastewaters produced by Class II and III railroad facilities can also be hauled away by collectors at no cost.

ALTERNATIVE DISPOSAL METHODS:

Waste disposal options available to the railroad industry are already being used in varying degrees. The environmentally preferred disposal method for waste oils is collection by recycle contractors.

INDUSTRY PROFILE:

The following tables summarize the numbers of large and small waste generators in the railroad industry by facility type and the total quantities of of waste generated by all railroad facilities.

Number of Large and Small Generators

	Waste Oils		Sludge		Wastewaters	
	Large Gen.	Small Gen.	Large Gen.	Small Gen.	Large Gen.	Small Gen.
Class I						
Fueling stations	586	264	574	276	--	--
Maintenance shops	150	225	311	64	--	--
Heavy diesel repair	75	0	75	0	--	--
Tank car cleaning	6	130	132	3	--	--
Class II and III						
Class II shops	--	--	--	--	15	3
Class III shops	--	--	--	--	70	208

ASSESSMENT OF QUALITY OF DATA BASE:

SOURCES OF DATA USED AND EXPLANATORY NOTES:

(1) U.S. Environmental Protection Agency, Office of Enforcement and General Counsel, Development Document for Proposed Effluent Limitations Guidelines and New Source Performance Standards for the Railroad Segment of the Transportation Industry - Point Source Category, (Draft), USEPA, April 1974.

(2) Association of American Railroads (AAR)

(3) Interstate Commerce Commission

(4) Association of American Railroads, Yearbook of Railroad Facts for 1975

(5) National Railway Publishing Company, Pocket List of Railroad Officials

(6) Based on wastewater characterizations at two fueling station sites and estimates of residuals created by treatment systems operating at these facilities. Average generation rate for the two stations was estimated to be 150 kg/mo of oils per locomotive/day and 139 kg/mo of sludge per locomotive/day. This rate was applied to survey data of activity levels (locomotive fueled per day) for 12 separate stations to achieve a log-normal distribution of generation rates from which total waste quantity profiles were tabulated.

(7) Based on wastewater characterizations[1] at four stations and estimates of residuals created by treatment systems operating at the facility, a log-normal distribution of generation rates was derived and used to tabulate waste quantity profiles.

(8) Based on a characterization of wastewaters from a representative repair shop[1], the average waste generation rate was assumed to be 113,000 kg/mo of waste oils and 365,000 kg/mo of sludge.

(9) Based on tank car washing facilities, wastewater characterization[1,11] and estimates of residuals created by treatment systems operating at the facility, it was estimated that treatment systems at tank car cleaning establishments produce oil wastes of 9.6 kg and sludges of 228 kg for each tank car washing. Applying this rate to tank car activity levels for 13 separate stations, a log-normal distribution of generation rates was derived and used to tabulate waste quantity profiles.

(10) Based on waste generation data obtained from discussions with two separate class III railroad facilities[12,13], the average quantity of waste generated by a Class III shop was estimated to be 3600 kg/

mo and the average quantity from a Class II shop was estimated to be 17,000 kg/mo. These facilities do not employ wastewater treatment systems.

(11) Earley, D. E., K. M. Tackett, and T. R. Blackwood, Monsanto Research Corp., Source Assessment: Rail Tank Car, Tank Truck, and Drum Cleaning, State of the Art, for USEPA, IERL, Cincinnati, Ohio, Contract No. 68-02-1874, EPA-600/2-78-004g, April 1978.

(12) One railroad company in Georgia

(13) One railroad company in California

(14) American Short Line Railroad Association

(15) Liptak, B. G., Environmental Engineers Handbook, Volume I, Water Pollution, 1974.

11/27/79. 08.43.27.

INDUSTRY PROFILE SIC: 4000 NATION

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	0	0.0	0.	0.0
100-200	7	.4	1050.	.0
200-300	10	.6	2500.	.0
300-400	8	.5	2800.	.0
400-500	11	.6	4950.	.0
500-600	8	.5	4400.	.0
600-700	8	.5	5200.	.0
700-800	8	.5	6000.	.0
800-900	8	.5	6800.	.0
900-1000	8	.5	7600.	.0
1000-2000	120	6.9	180000.	.4
2000-5000	354	20.5	1239000.	2.9
> 5000	1177	68.2	41924740.	96.6
TOTAL	1727	100.0	43385040.	100.0

INDUSTRY PROFILE: ESTIMATED NUMBER OF PLANTS AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION RANGE CATEGORIES (WASTE OILS GENERATED AT RAILROAD FACILITIES)

Waste Generation Ranges (kg/mo)	Establishments		Waste Quantity	
	Number	% Total	kg/mo	% Total
less than 100	0	0		
100 - 200	3	0.2	450	0.0
200 - 300	5	0.3	1,250	0.0
300 - 400	8	0.6	2,800	0.0
400 - 500	9	0.6	4,050	0.0
500 - 600	10	0.7	5,500	0.0
600 - 700	11	0.8	7,150	0.0
700 - 800	11	0.8	8,250	0.0
800 - 900	11	0.8	9,350	0.0
900 - 1000	11	0.8	10,450	0.1
1000 - 2000	148	10	222,000	1.3
2000 - 5000	391	27	1,368,500	7.8
more than 5000	816	57	15,866,000	91
U.S. Total	1434	100	17,506,000	100

INDUSTRY: Local and Suburban Transit and Interurban Highway Passenger Transportation — SIC: 41

DESCRIPTION OF INDUSTRY:

This SIC includes establishments which provide passenger transportation service. The establishments which generate hazardous waste are service garages which provide maintenance for buses, taxis, and other passenger vehicles. These service garages are classified by the SIC's 4171 and 4172.

Based on reported survey data(1), it was assumed that nearly all fleet operators service their vehicles in a fleet service garage (as opposed to general automotive or service stations which are addressed under other SIC's). Based on the assumption that the number of fleets (of size 10 or greater) is equivalent to the number of service garages handling exclusively the passenger transport vehicles, the estimated number of service garages is tabulated based on fleet data(2) for buses and passenger transport cars.

FLEET DATA AND NUMBER OF SERVICE GARAGES

Buses:						Total
Size of fleet (no. vehicles)	>500	100-499	50-99	25-49	10-24	--
No. in these fleets	100,764	93,777	46,361	33,068	11,456	285,426
No. of fleets (service garages)*	201	312	618	894	674	2,699
Adjusted no. fleets (service garages)†	233	361	715	1,034	780	3,123
Percentage of total garages	7.5	11.6	22.9	33.1	25.0	100

Passenger cars:						
Size of fleet (no. vehicles)	>500	100-499	50-99	25-49	10-24	--
No. in these fleets	183,706	70,315	21,575	15,699	6,734	298,000
No. of fleets (service garages)*	368	234	288	423	396	1,709
Percentage of total garages	21.5	13.7	16.8	24.8	23.2	100

*Estimated by dividing total number of buses in fleets by the median number of buses in the fleet size range.

†The estimated number of fleets is adjusted proportionately such that the total of the fleet numbers conforms to the known total of bus fleets (3123)(1).

Assuming the bus and car fleets are distributed according to population, the number of service garages in each EPA region would be as follows:

EPA Region:	I	II	III	IV	V	VI	VII	VIII	IX	X
Number of fleet service garages	280	662	551	749	1034	478	266	130	541	155
Percentage of total garages	5.8	13.7	11.4	15.5	21.4	9.9	5.5	2.7	11.2	3.2

CHARACTERISTICS OF HAZARDOUS WASTES PRODUCED:

The major hazardous waste generated by the bus and car service garages is waste oil. Other hazardous wastes which are generated are various toxic and ignitable solvents. Corrosive wastes from radiation flushings, greases and brake fluids. Estimates of the total amount of raw wastes produced at bus and transport car service garages is as follows:

	Bus garages	Car garages	Total
Total vehicles	285,426	298,000	583,426
Average mileage per year*	38,000	25,000	--
Average mileage between service(1)	7,500	5,000	--
Quantity of waste oils generated, kg/mo†	2,579,000	447,000	3,026,000
Quantity of wastewater sludge, kg/mo‡	856,000	476,600	1,333,000
Quantity of other waste fluids, kg/mo§	72,300	12,400	83,700

*Based on reference (1) for buses and an assumed 25,000 miles/year for cars

†Based on average of 7 gal. oil (21.4 kg) per service for a bus, and 1.2 gal. oil (3.6 kg) produced per car service

‡Assumes an onsite treatment system to remove sludge (consisting of oils, greases, detergents, and settleable solids) from wash wastewaters before discharge to sewer. The average quantity of sludge produced is assumed to be 3 kg/mo per bus and 1.6 kg/mo for cars(3).

§The generation rate for these combined wastes is estimated to be 0.6 kg per bus service and 0.1 kg per car service.

WASTE TREATMENT, STORAGE, AND DISPOSAL METHODS:

Waste disposal practices at the bus and car garages investigated here are similar to those of other automotive repair garages. The majority of establishments contract the removal of waste oils and solvents for reclaiming. Sludges are generally hauled away for disposal at sanitary landfills.

SUMMARY OF CURRENT DISPOSAL METHODS[4,5]

Waste	Disposal Method
Waste oils	90% to recycle, 10% to sewers, landfills, or open ground
Waste fluids (including solvents)	80% to solvent reclaimers 20% to sewer or other disposal means
Wastewater sludges	100% to municipal landfills

CURRENT DISPOSAL COST:

The disposal of waste oil by waste oil collectors is at no cost to the generators, and larger quantities of waste oil are often purchased by waste oil collectors. Waste fluids containing solvents are generally hauled away at no cost by solvent reclaimers. The unit costs for waste disposal to sanitary landfills (Subtitle D) and hazardous waste management facilities (Subtitle C) are presented in Section 4, Volume I.

ALTERNATIVE DISPOSAL METHODS:

The most environmentally acceptable disposal method for waste oils and waste solvents is by recycle contractors.

INDUSTRY PROFILE:

(See tables)

SOURCES OF DATA USED AND EXPLANATORY NOTES:

(1) The Fleet Owner Fleet Marketing Handbook Number Five, McGraw-Hill Publications Company, 1978

(2) MVMA Motor Vehicle Facts and Figures, 1978

(3) Vehicle Maintenance Department of U.S. Postal Service at Los Angeles, 1979

(4) Based on state data for a related SIC (repair shops, SIC 7539)

(5) Weinstein, N. J., "Waste Oil Recycling and Disposal," Recon Systems Inc., August 1974

(6) Waste generation rates for garages servicing different fleet sizes

Bus service garage:

Maximum no. in fleet	25	50	100	500	>500
Percent of total fleets (garages)	25.0	33.1	22.9	11.6	7.5
Cumulative percent of total buses	25.0	58.1	81.0	92.6	100
Waste oil generated per garage, kg/mo	378	452	904	4517	--
Sludge & liquid wastes gen. by garage, kg/mo	81	163	325	1626	--

Car service garage:

Maximum no. in fleet	25	50	100	500	500
Percent of total fleets (garages)	23.2	24.8	16.8	13.7	21.5
Cumulative percent of total uses	23.2	48.0	64.8	78.5	100
Waste oil generated per garage, kg/mo	38	75	150	750	--
Sludge & liquid per garage, kg/mo	41	82	164	820	--

INDUSTRY PROFILE[6] SIC: 4100 NATION

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	2079	43.0	95634.	5.7
100-200	1094	22.7	164100.	9.8
200-300	443	9.2	110750.	6.6
300-400	190	3.9	66500.	4.0
400-500	96	2.0	43200.	2.6
500-600	57	1.2	31350.	1.9
600-700	57	1.2	37050.	2.2
700-800	201	4.2	150750.	9.0
800-900	270	5.6	229500.	13.7
900-1000	31	.6	29450.	1.8
1000-2000	187	3.9	280500.	16.7
2000-5000	125	2.6	437500.	26.1
> 5000	0	0.0	0.	0.0
TOTAL	4830	100.0	1676284.	100.0

INDUSTRY PROFILE: ESTIMATED NUMBER OF PLANTS AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION RANGE CATEGORIES

Waste oils generated by garages servicing passenger transport vehicles(6)

Waste Generation Ranges (kg/mo)	Establishments		Waste Quantity	
	Number	% Total	kg/mo	% Total
less than 100	940	19.5	37,000	1.2
100 - 200	188	3.9	28,200	.9
200 - 300	68	1.4	17,000	.6
300 - 400	1439	29.8	437,000	14.4
400 - 500	565	11.7	221,670	7.3
500 - 600	276	5.7	133,190	4.4
600 - 700	182	3.8	104,620	3.5
700 - 800	264	5.5	188,410	6.2
800 - 900	316	6.5	247,930	8.2
900 - 1000	31	.6	25,530	.8
1000 - 2000	125	2.6	162,120	5.4
2000 - 5000	437	9.0	1,423,350	47.0
more than 5000				
U.S. Total	4839	100	3,026,000	100

INDUSTRY: Motor Freight Transportation SIC: 42

DESCRIPTION OF INDUSTRY:

This industry involves the transfer of freight by trucks and the operation of facilities supporting the freight transport operations (warehousing, truck garages, and truck freight handling terminals). The facilities which generate hazardous wastes are included in the SIC 4231 (terminal and joint terminal maintenance facilities for motor freight transportation). The facilities generating hazardous waste in SIC 4231 consist of commercial truck service establishments (terminals and service centers) which develop waste oil from crankcase drainings and other maintenance activities, truck washing terminals which generate large volumes of wastewaters during the cleaning of residual materials from tank trucks.

The industry is widely distributed over the U.S. with freight depots located near both urban and rural collection and redistribution points. Maintenance and storage terminals are located primarily in urban areas. Truck service centers, which supply principally fuel and lubricants, are found both in urban areas and on interstate and secondary highways. The terminals are usually large and may handle more than 200 units/day, while the truck service centers are smaller and may handle as few as 10 units/day. The total number of these service establishments in the U.S. is estimated at 15,400[1].

Truck washing terminals are located near pipeline terminals, shore installations and cargo loading points. The number of tank trucks washed at these terminals varies from 10 to 90 per day. There are approximately 500 truck washing terminals in the U.S.[2].

The distribution of truck service and truck washing establishments by EPA regions is shown below. The distribution of service centers is assumed to reflect the population distribution, and the distribution of truck washing establishments is based on data from an EPA study[2].

EPA Region Designation

EPA Region	No. of Service Establishments	% of Total	No. of Truck Wash Terminals	% of Total
I	885	5.7	32	6.4
II	2105	13.7	45	9.0
III	1749	11.4	66	13.2
IV	2380	15.5	60	12.0
V	3292	21.4	111	22.2
VI	1519	9.9	82	16.4
VII	839	5.4	41	8.2
VIII	417	2.7	22	4.4
IX	1725	11.2	27	5.4
X	487	3.2	14	2.8
Total	15,400	100	440	100

CHARACTERISTICS OF HAZARDOUS WASTE PRODUCED:

The truck service establishments generate waste oils as a result of engine maintenance. The oil wastes are both ignitable and toxic.

Based on the typical frequency of truck service and the quantity of waste oil and cleaning wastewaters produced during servicing, and assuming that all heavy duty trucks (HDT) and light duty trucks (LDT) in fleets of 25 or more vehicles are serviced at those trucking establishments, the total waste oils produced by truck service establishments is estimated at 7.1×10^7 kg/mo; the waste oils produced by trucks serviced in other service areas covered under other industry cateogires (e.g., gasoline service stations) is estimated at 1.1×10^8. The bases for these estimates are as follows:

	Total Number*	Miles Per Yr/Truck*	Miles Between Servicing*	Qty. Waste Oil Per Service* (gal)	Total Qty. Waste Oil Produced kg/mo
LDT	28,298,000	50,000	5,000	1-2	10.8×10^6
LDT, fleets of 25 or more	2,504,000	50,000	5,000	1-2	9.6×10^6
HDT	1,264,000	288,000	18,000	10-14	61.5×10^6

*Data based on References, 3, 4, and 5

Cleaning of truck tankers produces large quantities of corrosive and toxic wastewaters. Wastewaters are typically characterized by high BOD and COD and contain constituents such as oil, suspended solids, phenols, acids, alkalis, detergents, solvents, and nitrogen compounds. Truck cleaning terminals wash from 10 to 90 trucks per day and produce an average of 500 gallons of wastewater for each tank washed[22]. Terminals washing only 10 units per day would generate 150,000 gallons (about 567,000 kg)/month of wastewater. Based on a reported figure of 5,010,000 tank truck washings per year, representative wastewater characterizations[2], and the assumption that the wash terminals employ wastewater treatment systems to meet effluent guidelines, it is estimated that the tank car washing terminals would generate a total of 146,000 kg/mo of waste oil and grease, and about 3,000,000 kg/mo of sludge.

WASTE TREATMENT, STORAGE, AND DISPOSAL PRACTICES:

Oil wastes at truck service and truck washing establishments are normally reclaimed, either onsite for reuse at the establishment, or by a contractor who processes the wastes for resale as lubricants or fuel oil. A minor percentage of the total oil wastes generated in this industry may be disposed to open ground or refuse collection systems. It is estimated that approximately two-thirds of the wastewater generated from truck washing is discharged to municipal sewers without treatment[6]. The remaining quantity of wastewaters are discharged after oils, settleable solids and chemical constituents are removed by onsite treatment systems. In the future, it is expected that all truck washing terminals would employ wastewater treatment systems to comply with effluent discharge limitations.

Summary of Disposal Methods

	Waste Oils	Sludge
service establishments	100% recycle	--
truck washing terminals	1/3 recycle, 2/3 to sewer with wastewaters	1/3 to landfill, 2/3 to sewer with wastewaters

CURRENT DISPOSAL COST:

The disposal of waste oil by waste oil collectors is generally at no cost to the generators, and larger quantities of waste oil are often purchased by waste oil collectors.

ALTERNATIVE DISPOSAL METHODS:

Acceptable waste disposal options available to the trucking industry are already being used in varying degrees. The environmentally preferable disposal method for waste oils is collection by recycle contractors.

INDUSTRY PROFILE:

The following tables summarize the numbers of large and small waste generators in the industry by facility type and the total quantities of waste generated by all motor freight facilities.

Number of Large and Small Generators

	Waste Oils		Sludge	
	Large Generator	Small Generator (less than 5000 kg/mo)	Large Generator	Small Generator
service establishments	4213	11,088	--	--
truck wash terminals	0	400	500	0

ASSESSMENT OF QUALITY OF DATA BASE:

SOURCES OF DATA USED AND EXPLANATORY NOTES:

(1) Based on the total quantity of waste oils generated at the truck service establishments (see Characteristics of Hazardous Waste Produced) and the average quantity of waste per establishment (as determined from the log normal distribution of the establishment waste oil generation rates).

(2) Monsanto Research Corporation, Source Assessment: Rail Tank Car, Tank Truck, and Drum Cleaning, State of the Art, prepared for Environmental Protection Agency, April 1978

(3) California Trucking Association

(4) Bureau of the Census

(5) MVMA Motor Vehicle Facts and Figures, 1978

(6) Development Document for Proposed Effluent Limitation Guideline and New Source Performance Standards for the Trucking Segment of the Transportation Industry (draft copy), National Field Investigation Center, USEPA, Cincinnati, Ohio, April 1974

(7) Based on fit of a log-normal distribution to oil waste generation data for six separate truck service establishments surveyed in the Los Angeles area

(8) Based on fitting of a log-normal distribution of truck washing terminal waste generation rates to be consistent with the known number of terminals[2] and the total estimated waste quantities (see Characteristics of Hazardous Wastes Produced)

INDUSTRY PROFILE(8) SIC: 4231 NATION

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	0	0.0	0.	0.0
100-200	0	0.0	0.	0.0
200-300	0	0.0	0.	0.0
300-400	0	0.0	0.	0.0
400-500	0	0.0	0.	0.0
500-600	0	0.0	0.	0.0
600-700	0	0.0	0.	0.0
700-800	0	0.0	0.	0.0
800-900	0	0.0	0.	0.0
900-1000	0	0.0	0.	0.0
1000-2000	0	0.0	0.	0.0
2000-5000	0	0.0	0.	0.0
> 5000	500	100.0	3000000.	100.0
TOTAL	500	100.0	3000000.	100.0

SIC: 4231

INDUSTRY PROFILE: ESTIMATED NUMBER OF PLANTS AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION RANGE CATEGORIES (waste oils generated at tank truck washing terminals[8])

Waste Generation Ranges (kg/mo)	Establishments		Waste Quantity	
	Number	% Total	kg/mo	% Total
less than 100				
100 - 200	50	10	7,500	5.1
200 - 300	240	48	60,000	41.0
300 - 400	145	29	50,750	34.7
400 - 500	50	10	22,50	15.4
500 - 600	10	2	5,500	3.8
600 - 700				
700 - 800				
800 - 900				
900 - 1000				
1000 - 2000				
2000 - 5000				
more than 5000				
U.S. Total	500		146,000	

INDUSTRY PROFILE: ESTIMATED NUMBER OF PLANTS AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION RANGE CATEGORIES (waste oils from truck service establishments[7])

Waste Generation Ranges (kg/mo)	Establishments		Waste Quantity	
	Number	% Total	kg/mo	% Total
less than 100				
100 - 200				
200 - 300	77	0.5	19,250	.03
300 - 400	137	0.9	47,950	.07
400 - 500	185	1.2	83,250	.12
500 - 600	200	1.3	110,000	.15
600 - 700	262	1.7	170,300	.24
700 - 800	308	2.0	231,000	.32
800 - 900	308	2.0	264,880	.37
900 - 1000	354	2.3	336,300	.47
1000 - 2000	3,234	21	4,851,000	6.8
2000 - 5000	6,006	39	21,021,000	30
more than 5000	4,312	28	43,965,100	62
U.S. Total	15,400	100	71,100,000	100

INDUSTRY: Postal Service SIC: 43

DESCRIPTION OF INDUSTRY:

The U.S. Postal Service employs a fleet of vehicles to transport and deliver mail. Hazardous wastes are generated as a result of maintenance of the postal vehicles. In metropolitan areas, vehicles are normally serviced by post office personnel at central garages. In rural areas, the vehicle fleets are generally serviced by independent garages or service stations (the latter establishments are included in SIC 753, automotive repair shops).

As of February 1979, the U.S. Postal Service fleet numbered 125,309 vehicles, of which 65,129 are self-maintained by the U.S. Postal Service garages, and 60,180 are maintained by individual garages or service stations[1]. Based on extrapolations of survey data[2,3,4] for Los Angeles, Bakersfield, and Palmdale in California, a relationship between the number of postal garages, population of city, and numbers of vehicles serviced was constructed with the following results:

						Total
Population of city (thousands)	45-250	250-650	650-1350	1350-2300	2300-3200	--
No. garages in city	1	2	3	4	5	--
No. vehicles serviced/garage	179	300	367	388	400	--
No. cities this size in U.S.[5]	372	42	10	2	3	--
Total population in these cities (millions)	55.1	18.9	10.0	3.7	8.6	96.2
No. postal garages in these cities	112*	84	30	8	15	249
Total no. vehicles serviced in these cities	19,800†	25,200	11,010	3,104	6,000	65,114

*This estimate (for cities of pop. 45,000 to 250,000 only) was determined based on the number of vehicles serviced per garage (179) and the total number of vehicles in the affected cities (18,800).

†This figure (for cities of pop. 45,000 to 250,000 only) was determined by subtracting the total number of vehicles serviced at garages in all other cities from the known total number of postal vehicles (65,114). This is plausible, since it was known that some fraction of the cities in this population range would service postal vehicles at independent service stations rather than postal garages.

Assuming that the postal garages are distributed nationwide according to population, the number of postal garages in each EPA region are as follows:

Region	No. of Postal Garages	Percentage of Total Garages
I	14	5.6
II	34	13.7
III	28	11.2
IV	38	15.3
V	53	21.3
VI	25	10.0
VII	14	5.6
VIII	7	2.8
IX	28	11.2
X	8	3.2

CHARACTERISTICS OF HAZARDOUS WASTES PRODUCED:

Hazardous wastes generated by maintenance of postal vehicles consist of crankcase oil, transmission oil, grease, solvents used for parts cleaning, brake fluid, coolant, asbestos from brake pad grinding and collected solids from vehicle washing. Oils, grease, solvents, brake fluid and coolant are generally combined together as oily waste and removed by a recycle operator. Wastewaters from vehicle washing may be processed through an onsite treatment system resulting in the production of oily sludge which is removed and commonly disposed of at landfills. The estimated amounts of wastes which are produced in the servicing of the postal vehicles are as follows(2):

oil wastes	3.6 kg/vehicle/mo
sludge from wastewaters	1.3 kg/vehicle/mo
asbestos	0.0015 kg/vehicle/mo

The total waste produced nationwide by postal garages is calculated by applying the waste generation rates to garage activity levels (i.e., number of vehicles serviced per garage and number of postal garages - see Description of Industry) to attain garage generation rates. Based on the above waste generation rates and garage activity levels (see Description of Industry), the estimated total waste production by postal garages is 83,550 kg/mo of non-oil waste and 231,350 kg/mo of waste oil (see Industry Profile).

WASTE TREATMENT, STORAGE, AND DISPOSAL PRACTICES:

Waste oils generated at postal garages are normally sold for recycling by contractors. Sludges from wastewater treatment facilities are carried away by contractors to landfills. The treated wastewaters are discharged to the municipal sewer. It is estimated that vehicle wash water from smaller garages (in cities of less than 250,000 population) is discharged directly to the sewer without treatment. Asbestos from brake pad grinding is collected by a vacuum cleaner, in accordance with OSHA regulations, and removed for disposal in a landfill by a contract hauler.

Summary of Disposal Methods

	Waste oils	Sludges & Asbestos
percentage of waste recycled	100	0
percentage of waste to sewer	0	30
percentage of waste to landfill	0	70

CURRENT DISPOSAL COST:

The disposal of waste oil by waste oil collectors is generally at no cost to the generators, and larger quantities of waste oil are often purchased by waste oil collectors.

ALTERNATIVE DISPOSAL METHODS:

Acceptable waste disposal options available to the postal service are already being used in varying degrees. The environmentally acceptable disposal method for waste oils is collection by recycle contractors, and the most economical acceptable disposal method for the sludge is burial in hazardous waste landfills.

INDUSTRY PROFILE:

(See tables)

ASSESSMENT OF QUALITY OF DATA BASE:

SOURCES OF DATA USED AND EXPLANATORY NOTES:

(1) Based on discussions with employees of the Vehicle Division of the U.S. Postal Service

(2) Vehicle Maintenance Division, U.S. Postal Service at Los Angeles

(3) Vehicle Maintenance Division, U.S. Postal Service at Bakersfield

(4) U.S. Postal Service at Palmdale

(5) Dan Golenpaul Associates, Information Please Almanac, 1976

11/27/79.   08.43.27.

INDUSTRY PROFILE   SIC: 4300   NATION

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS		WASTE QUANTITY	
	NUMBER	PERCENT	KG/MO	PERCENT
0-100	0	0.0	0.	0.0
100-200	0	0.0	0.	0.0
200-300	112	45.0	28000.	33.5
300-400	84	33.7	29400.	35.2
400-500	30	12.0	13500.	16.2
500-600	23	9.2	12650.	15.1
600-700	0	0.0	0.	0.0
700-800	0	0.0	0.	0.0
800-900	0	0.0	0.	0.0
900-1000	0	0.0	0.	0.0
1000-2000	0	0.0	0.	0.0
2000-5000	0	0.0	0.	0.0
> 5000	0	0.0	0.	0.0
TOTAL	249	100.0	83550.	100.0

09/12/79. 09.49.40.

INDUSTRY PROFILE SIC: 4300 NATION
(Waste Oil)

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS		WASTE QUANTITY	
	NUMBER	PERCENT	KG/MO	PERCENT
0-100	0	0.0	0.	0.0
100-200	0	0.0	0.	0.0
200-300	0	0.0	0.	0.0
300-400	0	0.0	0.	0.0
400-500	0	0.0	0.	0.0
500-600	0	0.0	0.	0.0
600-700	122	49.0	79300.	34.3
700-800	20	8.0	15000.	6.5
800-900	20	6.0	17000.	7.3
900-1000	19	7.6	18050.	7.8
1000-2000	68	27.3	102000.	44.1
2000-5000	0	0.0	0.	0.0
> 5000	0	0.0	0.	0.0
TOTAL	249	100.0	231350.	100.0

INDUSTRY: Transportation by Air SIC: 45

DESCRIPTION OF INDUSTRY:

Major group 45, Transportation by Air, includes establishments which are engaged in furnishing domestic and foreign transportation by air (SIC 4511, Certified Carriers and SIC 4521, Noncertificated Carriers) as well as those operating airports and flying fields (SIC 4582) and furnishing terminal services (SIC 4583). Of the four SIC's covered by major group 45, all are generators of hazardous wastes.

SIC 4511 includes companies holding certificates under the Civil Aeronautics Act. They operate over fixed routes and schedules, and are primarily engaged in the transport of passengers or freight for revenue. Certificated air passenger carriers, air cargo carriers and helicopter carriers are included in SIC 4511. Certified carriers generally operate out of a "home base" airport (a large city for most major airlines), but will have satellite service facilities available at many other airports that they service. Hazardous wastes generated by these companies are primarily associated with maintenance of aircraft and ground equipment. Major airlines certificated in the U.S. and their home bases are shown in the table below.

Carrier(3)	Number of Airports Serviced(1)	Home Base City(1)
United	97	Chicago
Delta	90	Atlanta
American	62	New York
Eastern	115	Miami/Atlanta
Northwest	40	Minneapolis
TWA	40	Los Angeles
Continental	34	Los Angeles
Western	46	Los Angeles
Braniff	56	Dallas/Ft. Worth
National	40	Miami
Pan Am	6	New York

There are 200 commuter airlines in the U.S. operating 1200 aircrafts. Commuter airlines also have a similar maintenance set up as the large airlines, only on a smaller scale. There is a home base of operation where major maintenance will be done. In some cases this maintenance may be contracted out to a local aircraft service company. At points away from "home" any maintenance or repair required will generally be contracted out, depending on whether or not the airline operates a maintenance facility at that point[2].

Helicopter engine overhauls are required after 50 hours of operation and are performed primarily at six centralized facilities in the U.S. These overhaul facilities are classified in SIC 372.

SIC 4521 consists of companies not holding certificates of Public Convenience and Necessity under the Civil Aeronautics Act. Noncertificated air passenger carriers, air cargo carriers, fixed-base air operators, air taxis, flying charter services and airplane sightseeing services are included in SIC 4521. These establishments are located nationwide at large and small airports and flying fields. Hazardous wastes generated by these establishments are associated with aircraft maintenance and is covered under SIC 4582.

SIC 4582 includes establishments primarily engaged in the operation and maintenance of airports and/or the servicing, repairing (except on a factory basis), and storing of aircraft. Hazardous wastes generated by the establishments under this SIC are primarily a result of aircraft maintenance. As of January 1, 1979 there were 14,574 airports located in all regions of the U.S.[1]. In 1977 total repair stations at airports numbered 3304[1]. This may include service facilities for all establishments in major group 45.

SIC 4583 consists of establishments primarily engaged in furnishing coordinated handling services for passengers or freight at airport terminals. Hazardous wastes generated by these establishments are a result of maintenance of ground equipment.

CHARACTERISTICS OF HAZARDOUS WASTES PRODUCED:

At "home bases" the major certificated carriers (SIC 4511) are likely to be large volume hazardous waste generators. At these home bases the airline will have major maintenance operations performing major repairs, preventative maintenance, engine and airframe rebuilding and overhaul, painting, component cleaning, plating and aircraft washing. Wastes resulting from maintenance and repair of aircraft as well as company-owned ground service vehicles and equipment includes waste oil and hydraulic fuilds from engine maintenance; waste paint and solvents from painting operations; and waste containing heavy metals (such as chromium, copper, nickel, silver, cadmium and zinc) and cyanide, alkaline wastes, chromium acid waste and other acid and alkali wastes from plating operations. Waste solvents and detergents result from use of solvents and detergents to remove oxidation, scaling and carbon residues from aircraft exteriors and components.

One major certificated carrier surveyed as to waste volumes and disposal methods at its home base indicated that waste oils are held in a 1000-gallon underground storage tank and is hauled away for reclamation about every two months. The average generation of waste oil at this site is estimated at 1500 kg/mo. The company also maintains two 2000-gallon holding tanks for other chemical wastes including solvents, paint waste, plating waste, oils, etc. Approximately 1000 gallons per week is generated (13,100 kg/mo)[2]. Total waste stream from this "home base" maintenance station is 14,600 kg/mo. Assuming that this quantity is typical, the total waste quantity generated by major airlines' home bases is estimated at 161,000 kg/mo. Significantly smaller waste quantities are expected from home base maintenance facilities for the 200 commuter airlines. The waste quantities for these facilities are estimated to be similar in magnitude to these for SIC 4582.

At many other airports that are serviced by the major certificated carriers, a "satellite" service center is maintained for ramp service (replenishing food supplies, fuel, oil and hydraulic fluid and cleaning of the interior of the aircraft), maintenance inspection and minor repairs. If the service required is beyond the capability of a particular station, maintenance personnel may be flown in to perform repairs, or satellite service may be contracted to another airline or an aircraft service company having a more comprehensive service capability. Depending on the extent of satellite service performed, such services may result in the generation of little or no hazardous waste. Ground service equipment may or may not be owned and serviced by the airlines. When such equipment are owned by an airline, maintenance service of such equipment would be part of the satellite service[2].

One major airline company's satellite facility at an international airport uses a 300-gallon tank for storage of waste oil, solvents, etc. Assuming a quarterly removal of wastes from the storage tank (when the tank is about half full), an average waste generation rate of 150 kg/mo is estimated for this facility. This rate may not be representative of satellite facilities for other airlines. In estimating the total waste quantity, it is assumed that only 1/3 of the 616 satellite service facilities[3] produce hazardous waste and that a waste generation rate of close to 100 kg/mo or less would be more representative of the operations at most satellite centers.

Aircraft maintenance companies (SIC 4582) operate at both large and small airports. These establishments provide services to airlines and other aircraft owners including airline schools, private aircraft, small charter lines, air cargo carriers, air taxis, sightseeing airplane services, etc (SIC 4521). At the large airports these services may produce large amounts of hazardous waste depending on the volume of business, kind of aircraft serviced and size of operation. One service company at a large airport which maintains only private jet aircraft, generates over 2000 gallons (6000 kg) of waste oil, hydraulic fluids and lacquer thinner per month[4]. At small airports these service companies will generally be small volume waste generators. According to California state data, of 7 operations surveyed all were small waste generators producing from 126 to 3381 kg/mo of hazardous wastes with an average of 793 kg/mo. Hazardous wastes reported at the 7 sites include paint thinner, scrap paint, sodium cyanide, perchloroethylene, trichloroethylene, methylene chloride, oil, mild acid, alkaline solution, solvents and paint stripping waste[5].

Ground service companies (SIC 4583) can also generate hazardous wastes. A large ground service company at a major international airport which supplies ground vehicles and equipment to contracting airlines indicates that it generates waste oil, coolant, grease, solvents, degreasers, hydraulic fluid and washwater. About 670 kg of oils and other chemical wastes are generated per month[6].

Ground service companies are located at the major airports (hubs) as well as most of the middle size hubs airports. There are an average of at least two of these establishments at the 25 major airports and about one at each of the middle size ones (there are about 100 middle size hubs). These airports are located in all regions throughout the U.S.[4].

The waste generation of 670 kg/mo mentioned above is assumed to be applicable to the approximately 50 service companies serving the major hubs; companies serving the remaining 100 hubs would be much smaller in size and are assumed to be in the 100 to 200 kg/mo waste generation rate.

WASTE TREATMENT, STORAGE AND DISPOSAL PRACTICES:

Waste oil and chemicals generated by larger aircraft maintenance facilities are generally stored in underground holding tanks. Sometimes the waste oils are stored in separate tanks and sometimes they are mixed with other waste chemicals. If the waste oils are stored separately they can be recycled (via waste oil reclaimers). Chemical wastes are collected by contract haulers whose disposal method is unknown[2]. Smaller waste generators may store waste oils and chemicals in 55-gallon drums. These wastes will be removed periodically by an outside disposal company[6]. One company in the state data reports that the waste is disposed of in a hazardous waste landfill.

CURRENT DISPOSAL COST:

ALTERNATIVE DISPOSAL METHOD:

Segregation of wastes at the source (i.e., separate collection of waste oils, solvents, etc.) should enable reclamation of waste oil and solvents by commercial reclaimers. Other hazardous wastes can be disposed of in facilities designed to handle such wastes.

ASSESSMENT OF THE QUALITY OF THE DATA BASE:

From the standpoint of location and number of hazardous waste generators and the quantities of hazardous waste generated, the air transportation industry appears to be one of the least studied industries. Despite contacts with a large number of agencies, airlines, trade associations, etc., only very little relevant quantitative data could be obtained in this study. Because of the relatively small number of generators in the industry (compared to those in other industries), any error in the estimates for the air transportation industry will not make a measurable impact on the overall picture of the small volume generators.

INDUSTRY PROFILE:

(See tables)

SOURCES OF DATA USED AND EXPLANATORY NOTES:

(1) FAA

(2) Twelve airline companies

(3) Air Transport Association

(4) Three aircraft maintenance companies

(5) California state data

(6) Two ground service companies

(7) LAX Authority

11/27/79. 08.43.27.

INDUSTRY PROFILE SIC: 4511 NATION

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	200	48.7	17600.	4.3
100-200	0	0.0	0.	0.0
200-300	0	0.0	0.	0.0
300-400	0	0.0	0.	0.0
400-500	0	0.0	0.	0.0
500-600	0	0.0	0.	0.0
600-700	175	42.6	113750.	28.1
700-800	0	0.0	0.	0.0
800-900	0	0.0	0.	0.0
900-1000	0	0.0	0.	0.0
1000-2000	0	0.0	0.	0.0
2000-5000	0	0.0	0.	0.0
> 5000	36	8.8	273600.	67.6
TOTAL	411	100.0	404950.	100.0

11/27/79. 08.43.27.

INDUSTRY PROFILE SIC: 4582 NATION

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	270	10.0	15390.	.5
100-200	378	14.0	56700.	1.9
200-300	297	11.0	74250.	2.5
300-400	243	9.0	85050.	2.9
400-500	189	7.0	85050.	2.9
500-600	162	6.0	89100.	3.0
600-700	108	4.0	70200.	2.4
700-800	108	4.0	81000.	2.8
800-900	81	3.0	68850.	2.4
900-1000	81	3.0	76950.	2.6
1000-2000	416	15.4	624000.	21.3
2000-5000	259	9.6	906500.	31.0
> 5000	108	4.0	693792.	23.7
TOTAL	2700	100.0	2926832.	100.0

11/27/79.   08.43.27.

INDUSTRY PROFILE   SIC: 4583   NATION

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	0	0.0	0.	0.0
100-200	100	66.7	15000.	31.6
200-300	0	0.0	0.	0.0
300-400	0	0.0	0.	0.0
400-500	0	0.0	0.	0.0
500-600	0	0.0	0.	0.0
600-700	50	33.3	32500.	68.4
700-800	0	0.0	0.	0.0
800-900	0	0.0	0.	0.0
900-1000	0	0.0	0.	0.0
1000-2000	0	0.0	0.	0.0
2000-5000	0	0.0	0.	0.0
> 5000	0	0.0	0.	0.0
TOTAL	150	100.0	47500.	100.0

INDUSTRY: Drugs, Drug Proprietaries and Druggists' Supplies (Wholesale) SIC: 5122

DESCRIPTION OF INDUSTRY:

This SIC category includes establishments primarily engaged in the wholesale distribution of drugs, drug proprietaries, druggists' sundries, and toiletries.

According to the census data (see computer printout) there are a total of 3475 establishments in the subject SIC with 43%, 58% and 73% of the establishments having less than 5, 10 and 20 employees, respectively. The establishments are distributed throughout the U.S., with the greatest numbers in EPA Regions II (20%), V (17%), IV (15%) and IX (15%).

CHARACTERISTICS OF HAZARDOUS WASTES PRODUCED:

Drug wholesalers occasionally dispose of out-of-date, recalled pharmaceuticals. The materials disposed of are approximately 85% glass and waste packaging material and about 15% product(1). The discarded materials are estimated to contain about 20% active ingredient(1). A previous study(1) estimated that the U.S. parmaceutical industry disposes of approximately 10,000 metric tons of returned goods annually; about 500 metric tons of this waste is considered hazardous enough to warrant special disposal. Based on the data obtained in this study(2), only a maximum of 10% of the recalled and out-of-date pharmaceuticals are disposed of by wholesale druggists (and not sent back to the manufacturer for final disposal). Therefore, a maximum of about 50 metric tons of hazardous wastes are disposed of annually by wholesale druggists across the nation.

WASTE TREATMENT, STORAGE, AND DISPOSAL PRACTICES:

Approximately 90% of damaged, recalled, and out-of-date pharmaceuticals are returned to the formulation plant for disposition. Some controlled drugs are sent to the nearest Federal Drug Enforcement Agency (DEA) office for destruction. (The L.A. office has the drugs incinerated.) Other waste pharmaceuticals are either sent to the sewer system or are disposed of along with other municipal refuse. No information is available on the quantities of material sent to the DEA, the sewer, or municipal refuse management systems.

CURRENT DISPOSAL COST:

Since hazardous wastes are a small percentage of the total wastes generated by wholesale druggists, no additional cost is attributed to the hazardous wastes disposed of by comingling with nonhazardous wastes. The cost of sending drugs to the DEA depends on local shipping costs.

ALTERNATIVE DISPOSAL METHODS:

INDUSTRY PROFILE:

(See table)

ASSESSMENT OF QUALITY OF DATA BASE:

SOURCES OF DATA USED AND EXPLANATORY NOTES:

(1) Arthur D. Little, Inc., "Hazardous Waste Generation, Treatment, and Disposal in the Pharmaceutical Industry," EPA Contract No. 68-01-2684, July 1975

(2) National Wholesale Druggists' Association

(3) Census data

(4) Based on the estimated maximum waste generation quantity of 50 metric ton/yr for the industry; based on the information obtained from trade associations (References 2, 5, and 6), the average establishment disposes of considerably less than 100 kg/mo, and it is possible, although rare, that a wholesaler may dispose of more than 100 kg of waste in a month's time

(5) The Proprietary Association

(6) American Pharmaceutical Association

(7) Federal Drug Enforcement Agency

(8) Food and Drug Administration

11/27/79. 08.43.27.

INDUSTRY PROFILE[4] SIC: 5122 NATION

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS		WASTE QUANTITY	
	NUMBER	PERCENT	KG/MO	PERCENT
0-100	3475	100.0	4170.	100.0
100-200	0	0.0	0.	0.0
200-300	0	0.0	0.	0.0
300-400	0	0.0	0.	0.0
400-500	0	0.0	0.	0.0
500-600	0	0.0	0.	0.0
600-700	0	0.0	0.	0.0
700-800	0	0.0	0.	0.0
800-900	0	0.0	0.	0.0
900-1000	0	0.0	0.	0.0
1000-2000	0	0.0	0.	0.0
2000-5000	0	0.0	0.	0.0
> 5000	0	0.0	0.	0.0
TOTAL	3475[3]	100.0	4170.	100.0

11/29/79. 13.49.57.

BREAKDOWN OF PLANTS IN EMPLOYMENT SIZE CATEGORIES BY EPA REGION IN SIC 5122

NUMBER OF PLANTS IN EACH CATEGORY

REGION	TOTAL	1-4	5-9	10-19	20-49	50-99	100-249	250-499	500-999	>1000
I	151	64	23	17	19	15	11	1	1	0
II	678	321	92	112	78	38	30	5	2	0
III	271	101	51	33	49	22	13	1	1	0
IV	509	196	90	69	71	58	20	2	1	0
V	595	229	80	99	105	50	24	5	2	1
VI	378	169	50	53	64	31	10	0	1	0
VII	194	82	37	31	20	17	6	0	0	1
VIII	99	48	14	14	12	9	2	0	0	0
IX	506	232	86	85	60	32	8	1	2	0
X	91	37	11	15	20	5	2	1	0	0
NATION	3472	1481	534	528	498	277	126	16	10	2

INDUSTRY: Chemicals and Allied Products - Chemical Wholesalers SIC: 5161

DESCRIPTION OF INDUSTRY:

The establishments in this industry are primarily engaged in the wholesale distribution of chemicals and allied products including acids, industrial and heavy chemicals, dyestuffs, industrial salts, resin and turpentine. Wholesalers buy and sell merchandise in addition to providing transportation, storage, market information, financing and some product disposal services to their customers. The census data indicate a total of 6760 establishments for this SIC of which 70% employing less than 10 persons. The industry is distributed throughout the country although over half of the establishments are located along the east coast and upper midwest[1,2].

CHARACTERISTICS OF HAZARDOUS WASTES PRODUCED:

Potentially hazardous wastes are generated routinely only by those firms which repackage chemicals. Dry chemicals are generally not repackaged. Liquids received in 55-gallon drums are often repackaged and account for most of the waste generated[2]. Waste types generated include organic and inorganic solvents which may be flammable or toxic, and corrosive or reactive acid and alkaline solutions. The estimated amount of hazardous waste generated by the subject SIC is 400,000 kg/mo, or an average rate of 1093 kg/mo per generator (see Industry Profile). It is estimated that almost 95% of the establishments in this SIC do not generate hazardous wastes[2].

WASTE TREATMENT, STORAGE AND DISPOSAL PRACTICES:

Approximately 20% of the establishments store their hazardous wastes in drums and send them to off-site disposal facilities. The remainder flush their wastes to dry wells, sewer lines, or watercourses[2]. There is some reclamation of chemicals, particularly of solvents which are returned to the wholesaler by customers.

CURRENT DISPOSAL COST:

ALTERNATIVE DISPOSAL METHODS:

INDUSTRY PROFILE:

(See table)

ASSESSMENT OF QUALITY OF DATA BASE:

SOURCES OF DATA USED AND EXPLANATORY NOTES:

(1) Census data

(2) U.S. EPA Office of Solid Waste, "Economic Impact Analysis of Hazardous Waste Management Regulations on Selected Generating Industries," Contract No. 68-01-4819, Energy Resource Co., December 1978

(3) Based on the estimated total waste quantity for the industry reported in Reference 2 and the census data on distribution of establishments by employment size category. (The approach assumes a direct correlation between waste quantity from an establishment and its number of employees.)

(4) Census data adjusted for the estimated number of "zero" generators (about 95%, based on Reference 2).

11/27/79.   08.43.27.

INDUSTRY PROFILE[3]   SIC: 5161   NATION

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	62	17.0	3100.	.8
100-200	47	12.9	7050.	1.8
200-300	37	10.1	9250.	2.3
300-400	26	7.1	9100.	2.3
400-500	22	6.0	9900.	2.5
500-600	18	4.9	9900.	2.5
600-700	15	4.1	9750.	2.4
700-800	15	4.1	11250.	2.8
800-900	11	3.0	9350.	2.3
900-1000	11	3.0	10450.	2.6
1000-2000	51	14.0	76500.	19.2
2000-5000	37	10.1	129500.	32.4
> 5000	13	3.6	104000.	26.1
TOTAL	365[4]	100.0	399100.[2]	100.0

11/29/79. 13.49.57.

BREAKDOWN OF PLANTS IN EMPLOYMENT SIZE CATEGORIES BY EPA REGION IN SIC 5161

NUMBER OF PLANTS IN EACH CATEGORY

REGION	TOTAL	1-4	5-9	10-19	20-49	50-99	100-249	250-499	500-999	>1000
I	401	193	83	77	30	10	8	0	0	0
II	1189	584	250	172	127	36	18	2	0	0
III	502	216	108	94	64	10	10	0	0	0
IV	1022	491	231	155	114	18	11	1	1	0
V	1407	661	314	230	135	45	18	3	0	1
VI	810	381	151	144	97	19	15	2	0	1
VII	311	140	80	57	23	5	4	2	0	0
VIII	173	89	33	26	17	5	3	0	0	0
IX	796	370	207	129	69	15	5	1	0	0
X	149	69	40	24	12	2	2	0	0	0
NATION	6760	3194	1497	1108	688	165	94	11	1	2

INDUSTRY: Motor Vehicles (New and Used) SIC: 5511

DESCRIPTION OF INDUSTRY:

The establishments in this industry are primarily engaged in the retail sale of new automobiles, or new and used automobiles. These establishments generally operate vehicle service centers which generate hazardous wastes. The establishments vary in size (see census data computer printout for number distribution of establishments by EPA region and employment size) and are distributed throughout the country with heaviest concentration (particularly the large dealers) in or near the urban centers.

CHARACTERISTICS OF HAZARDOUS WASTE PRODUCED:

Waste oil, a "listed" waste based on toxicity consideration, is the primary hazardous waste generated by the car service centers. The second most predominant waste is used oil filters (which would also be considered toxic). Other hazardous wastes include various toxic and ignitable solvents, corrosive wastes from radiator flushings and contaminated rags. The estimated generation rates per establishment are as follows:

Waste	Estimated Quantity, kg/mo
oils and oil filters	<5000[1]
solvents	0 - 45[2]
radiator flushings	<100[3]
contaminated rags	--

The total amount of non-oil hazardous waste generated by the subject SIC is estimated at 15.7 million kg/mo (see Industry Profile), with an average rate of 436 kg/mo per generator. Waste lube oil is estimated at 320 million kg/mo (see Industry Profile). Oil filters are estimated at 23 million kg/mo[4].

WASTE TREATMENT, STORAGE AND DISPOSAL PRACTICES:

Waste treatment, storage and disposal practices in the industry are generally as follows[1,2]:

- Waste oils drained from vehicles (mainly engines, transmissions and differentials) are generally collected in underground storage tanks. A small percentage of the shops store the waste oil in 55-gallon drums above ground. 80 to 90 percent of the shops are turning waste oils over to waste oil collectors. The waste oil is used for the following purposes: fuel, road oil, re-refining, dust and weed control and other miscellaneous uses. The remaining 10 to 20 percent of the waste oil is disposed of in landfills, sewers, or dumped on the nearest open ground.

- The disposal practices for other hazardous wastes generated are as follows:

  Oil filters:

  Generally disposed of with nonhazardous refuse.

  Solvents:

  - 40% of the establishments dump waste solvents into oil holding tanks
  - 40% contract out to solvent reclaimers
  - the remaining 20 percent dump the waste solvent down the sewer or use other methods of disposal

  Acids, caustics and radiator chemical flushes:

  Generally are dumped down the sewer. Some may clarify by settling before dumping in sewer.

  Contaminated rags or towels:

  Generally collected and cleaned by supplier. A small amount of rags are disposed jointly with nonhazardous refuse generated onsite.

Although the majority of establishments dispose of waste oil via waste oil collectors, a small percentage of the generators currently dispose of waste oil in an environmentally unacceptable manner (e.g., dumping on open ground).

CURRENT DISPOSAL COST:

The disposal of the waste oil via waste oil collectors is generally at no cost to the generators; larger quantities of waste oil are usually sold to the waste oil collectors. With the continuous rise in oil prices, the practice of waste disposal via waste oil collectors would be expected to become more attractive in the future, thus reducing the number of generators which currently dispose of wastes by other methods (e.g., landfills, sewers or dumping on open grounds).

ALTERNATIVE DISPOSAL METHODS:

Waste oil disposal via waste oil collectors is environmentally more acceptable than other disposal methods currently used by some generators (see Current Disposal Cost, above).

INDUSTRY PROFILE:

(See tables)

ASSESSMENT OF QUALITY OF DATA BASE:

The 32 million kg/mo of waste oil generation rate estimated for SIC 5511 is in reasonable accord with a reported estimate of 36 million kg/mo of waste oil for the vehicle dealers in the U.S. (1970-1971)[6]. The latter estimate is based on the total quantity of new oil sold to dealers and the assumption that about 90% of the oil is collected as waste oil at the service centers; the 32 million kg/mo estimate arrived at in this study is based on waste generation rate reported by individual establishments. Another study[2] estimates the quantity of waste oil produced by SIC 5511 at 18 million kg/mo.

SOURCES OF DATA USED AND EXPLANATORY NOTES:

(1) Based on the state data for SIC 5511, 5541 and 7538

(2) "Economic Impact Analysis of Hazardous Waste Management Regulations on Selected Generating Industries," Draft Report, Contract No. 68-01-4819, December 1978

(3) Based on state data for .ll radiator shops (SIC 7539)

(4) The quantity of oil filters was estimated based on an assumed weight of 1 kg/oil filter and (a) the reported number of oil changes of 153.9 x 10^6 per year for all service centers (repair garages, service centers, new car dealers, etc.); and (b) a reported percentage of 17.4% of the total oil filter changes carried out at new and used vehicle dealers (based on Reference 7).

(5) Based on state data on waste oil generation quantities to which estimated waste oil filter quantities (see Reference 4) were added, and the information on number of dealers reported in Reference (7).

(6) Weinstein, Norman J., "Waste Oil Recycling and Disposal," Recon Systems Inc., August 1974

(7) "MVMA Motor Vehicle Facts and Figures '78," Motor Vehicle Manufacturing Association

(8) Based on an assumed waste solvent generation rate of 30 kg/mo per generator and an estimated number of establishments from Reference 7.

11/27/79. 08.43.27.

INDUSTRY PROFILE[4,8] SIC: 5511 NATION

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	15120	42.5	514080.	3.3
100-200	5760	16.2	864000.	5.5
200-300	3240	9.1	810000.	5.2
300-400	1980	5.6	693000.	4.4
400-500	1548	4.3	696600.	4.4
500-600	1152	3.2	633600.	4.0
600-700	900	2.5	585000.	3.7
700-800	720	2.0	540000.	3.4
800-900	540	1.5	459000.	2.9
900-1000	504	1.4	478800.	3.0
1000-2000	2520	7.1	3780000.	24.0
2000-5000	1620	4.6	5670000.	36.1
> 5000	0	0.0	0.	0.0
TOTAL	35604[7]	100.0	15724080.	100.0

INDUSTRY PROFILE: ESTIMATED NUMBER OF PLANTS AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION RANGE CATEGORIES[5] (waste oil)

Waste Generation Ranges (kg/mo)	Establishments		Waste Quantity	
	Number	% Total	kg/mo	% Total
less than 100	7,120	18	0.35	1.1
100 - 200	4,750	13	0.71	2.2
200 - 300	3,360	9.4	0.84	2.6
300 - 400	2,570	7.2	0.90	2.8
400 - 500	1,980	5.6	0.89	2.8
500 - 600	1,540	4.4	0.87	2.7
600 - 700	1,270	3.6	0.82	2.6
700 - 800	1,190	3.3	0.89	2.8
800 - 900	990	2.8	0.84	2.6
900 - 1000	910	2.6	0.87	2.7
1000 - 2000	5,140	14.4	7.69	24
2000 - 5000	4,750	13.3	16.5	52
more than 5000	0	0	0	0
U.S. Total	36,000	100	3.2×10^7	100

11/29/79. 13.49.57.

BREAKDOWN OF PLANTS IN EMPLOYMENT SIZE CATEGORIES BY EPA REGION IN SIC 5511

NUMBER OF PLANTS IN EACH CATEGORY

REGION	TOTAL	1-4	5-9	10-19	20-49	50-99	100-249	250-499	500-999	>1000
I	1920	230	237	642	695	107	9	0	0	0
II	2694	336	365	765	1044	165	19	0	0	0
III	3413	444	461	955	1122	358	70	3	0	0
IV	4647	675	523	1394	1438	482	132	3	0	0
V	6601	984	1052	1874	1889	700	102	0	0	0
VI	3147	502	488	888	834	279	153	3	0	0
VII	2441	474	508	759	531	144	25	0	0	0
VIII	1278	250	235	342	330	98	22	1	0	0
IX	2307	275	124	392	949	467	97	3	0	0
X	1071	132	130	302	384	109	13	1	0	0
NATION	29519	4302	4123	8313	9216	2909	642	14	0	0

INDUSTRY: Gasoline Service Stations

DESCRIPTION OF INDUSTRY:

Establishments primarily engaged in selling gasoline and lubricating oils. These establishments frequently perform minor repair work, are generally small in size (69% are in the 1-4 employee size range; see census data computer print-out for number distribution of establishments by EPA region and employment size) and are distributed throughout the country with the heaviest concentration in or near urban centers.

CHARACTERISTICS OF HAZARDOUS WASTES PRODUCED:

Waste oil, a "listed" waste based on toxicity consideration, is the primary hazardous waste generated by the car service centers. The second most predominant waste is used oil filters (which would also be considered toxic). Other hazardous wastes include various toxic and ignitable solvents, corrosive wastes from radiator flushings and contaminated rags.

The total amount of non-oil hazardous wastes generated by service stations is estimated at 15.7 million kg/mo (see Industry Profile), with an average rate of 123 kg/mo per generator. Waste lube oil is estimated at 62 million kg/mo (see Industry Profile). Oil filters account for 10% (7.9×10^6 kg/mo) of the total waste[1].

WASTE TREATMENT, STORAGE AND DISPOSAL PRACTICES:

(See SIC 5511)

CURRENT DISPOSAL COST:

(See SIC 5511)

ALTERNATIVE DISPOSAL METHODS:

(See SIC 5511)

ASSESSMENT OF QUALITY OF DATA BASE:

The 62 million kg/mo of waste oil generation rate estimated for SIC 5541 is higher than two reported estimates of (1) 33 million kg/mo (1978)[2] based on 4.25 liters of oil per oil change times an estimated 115 million oil changes and (2) 43 million kg/mo (1970-71)[3] based on the total quantity of oil sold to service stations and the assumption that 63% of the oil is collected as waste oil at the service station. The 62 million kg/mo estimate arrived at in this study is based on actual waste generation rates reported by individual establishments.

SOURCES OF DATA USED AND EXPLANATORY NOTES:

(1) The quantity of oil filters was estimated based on an assumed weight of 1 kg/oil filter and (a) the reported number of oil changes of 153.9×10^6 per year for all service centers (repair garages, service centers, new car dealers, etc.); and (b) a reported percentage of 61.8% of the total oil filter changes carried out at gasoline service stations (based on Reference 5).

(2) "Economic Impact Analysis of Hazardous Waste Management Regulations on Selected Generating Industries," Draft Report, Contract No. 68-01-4819, December 1978

(3) Weinstein, Norman J., "Waste Oil Recycling and Disposal," Recon Systems Inc., August 1974

(4) Based on state data for 20 service stations on waste generation quantities and the information on number of gasoline service stations reported in Reference (2).

(5) "MVMA Motor Vehicle FActs and Figures '78," Motor Vehicle Manufacturing Association

(6) Based on an assumed solvent waste generation rate of 30 kg/mo per generator and an estimated number of establishments from Reference 2.

(7) Based on data in Reference (2), adjusted for the estimated "zero" generators (23%)

11/27/79. 08.43.27.

INDUSTRY PROFILE[1,6] SIC: 5541 NATION

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	72419	56.6	3620950.	23.0
100-200	32918	25.7	4937700.	31.4
200-300	13167	10.3	3291750.	20.9
300-400	5267	4.1	1843450.	11.7
400-500	2897	2.3	1303650.	8.3
500-600	1317	1.0	724350.	4.6
600-700	0	0.0	0.	0.0
700-800	0	0.0	0.	0.0
800-900	0	0.0	0.	0.0
900-1000	0	0.0	0.	0.0
1000-2000	0	0.0	0.	0.0
2000-5000	0	0.0	0.	0.0
> 5000	0	0.0	0.	0.0
TOTAL	127985[7]	100.0	15721850.	100.0

INDUSTRY PROFILE: ESTIMATED NUMBER OF PLANTS AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION RANGE CATEGORIES[4]
(waste oil)

Waste Generation Ranges (kg/mo)	Establishments		Waste Quantity	
	Number	% Total	kg/mo	% Total
less than 100	16,600	13	1.2	1.9
100 - 200	26,000	20	3.9	6.3
200 - 300	21,400	17	5.3	8.6
300 - 400	14,100	11	4.9	7.9
400 - 500	10,900	8.5	4.9	7.9
500 - 600	8,320	6.5	4.6	7.5
600 - 700	5,760	4.5	3.7	6.0
700 - 800	5,760	4.5	4.3	7.0
800 - 900	3,580	2.8	3.0	4.9
900 - 1000	2,820	2.2	2.7	4.4
1000 - 2000	10,700	8.4	16	26
2000 - 5000	2,050	1.6	7.2	12
more than 5000	0	0	0	0
U.S. Total	128,000	100	62	100

11/29/79. 13.49.57.

BREAKDOWN OF PLANTS IN EMPLOYMENT SIZE CATEGORIES BY EPA REGION IN SIC 5541

NUMBER OF PLANTS IN EACH CATEGORY

REGION	TOTAL	1-4	5-9	10-19	20-49	50-99	100-249	250-499	500-999	>1000
I	7611	5563	1670	320	53	4	1	0	0	0
II	11795	8457	2531	685	116	5	1	0	0	0
III	14368	9134	3768	1216	219	25	6	0	0	0
IV	25150	18710	4939	1240	220	34	7	0	0	0
V	30410	19261	8534	2151	376	74	12	1	0	1
VI	16831	12390	3168	994	239	34	6	0	0	0
VII	9935	7142	2122	492	144	28	7	0	0	0
VIII	5340	3741	1156	350	77	14	2	0	0	0
IX	15422	9707	4404	1051	232	23	4	1	0	0
X	5163	3727	1143	237	48	8	0	0	0	0
NATION	142025	97832	33435	8736	1724	249	46	2	0	1

INDUSTRY: Dry Cleaning SIC: 7215,7216, 7218

DESCRIPTION OF THE INDUSTRY:

The dry cleaning industry is covered by three 4-digit SIC's:

7215 - Coin-operated laundries and dry cleaning

7216 - Dry cleaning plants, except rug cleaning

7218 - Industrial launderers

Dry cleaning involves the use of solvents to remove soil, grease, etc. from clothes with subsequent purification of the dirty solvent via filtration and/ or distillation. Three solvents which are commonly employed for dry cleaning are perchloroethylene ("perc"), "petroleum," and "F-113." A breakdown of the estimated numbers of establishments using these solvents in the three industry sectors is as follows[1]:

Solvent	Coin-Op	Dry Cleaning Plants	Industrial Launderies
Perc	15,000	18,000	270
Petroleum	N/A	6,000	270
F-113	300 - 400	250 - 900	N/A
TOTAL	~15,400	~25,000	540

The total number of plants conducting dry cleaning cannot be directly determined from census data since the census data do not provide a breakdown of the plants in SIC's 7215 and 7218 which conduct or do not conduct dry cleaning (some plants in these SIC's provide only other laundry services). Hence, the industry/trade organization data shown above are used here as the best available estimates of the numbers of dry cleaning establishments in the three industry categories. Census data indicate that 85% of coin-op dry cleaners and 59% of dry cleaning plants employ less than 4 persons, while only 15% of industrial launderers employ less than 4 persons.

CHARACTERISTICS OF HAZARDOUS WASTES PRODUCED:

Hazardous wastes are generated by dry cleaning operations during processing of "dirty" solvents for solvent recovery. These wastes consist of distillation residues, spent filter media and filter cleaning residues, and residues settled in settling tanks (primarily used by industrial launderers). Based on data from operating establishments, from 11 to 33 kg of hazardous wastes are generated per 1000 kg of clothes cleaned, depending on the type of soil removed, type of filter system used, and degree of solvent recovery attained[2].

About 80% of the waste quantities reported by dry cleaners is distillation residues and 20% filtration wastes. Industry sources estimate distillation residues at about 17 kg per 1000 kg clothes cleaned[5], a figure in good agreement with the average of about 18 kg/1000 kg clothes based on survey information[2].

Distillation residues from properly operated stills typically contain 60% solvent (wet weight basis)[6]. Residues from diatomaceous earth filters contain about 25% solvent after "cooking" to reduce solvent content[6].

The estimated total hazardous waste quantity for the dry cleaning industry is 5.6 x 10^6 kg/mo of which about 10% is contributed by coin-ops, 35% by industrial launderers, and 54% by dry cleaning plants. The "average" coin-ops, dry cleaning plants and industrial laundering plants generate about 38, 120 and 3600 kg/mo of waste, respectively (see Industry Profile).

WASTE TREATMENT, STORAGE AND DISPOSAL PRACTICES:

Both distillation and filter residues are reportedly disposed to sanitary landfills in most cases, commonly via municipal trash pickup. A few industrial launderers (about 15%) report pickup of distillation residues by commercial reclaimers; larger launderers tend to dispose of wastes via contract hauling. Residues are "cooked-down" prior to disposal by over half of the firms in order to reduce solvent content (and recover solvent).

CURRENT DISPOSAL COST:

The majority of firms responding to the TRW inquiry indicated no additional costs associated with hazardous waste disposal since solvent recovery is necessary for efficient operation and solvent containing residues are disposed most commonly with other refuse at no incremental cost. For six firms which reported contract hauling of all or part of plant wastes (1 dry cleaning plant and 5 industrial launderers) the costs range from 36 to 175 dollars per 1000 kg, with an average of $100 per 1000 kg of waste.

ALTERNATIVE DISPOSAL METHODS:

Prior to disposal, residual solvent levels can be reduced by "cooking" of distillation and filtration residues, as is practiced at present by many firms.

INDUSTRY PROFILE:

(See tables)

ASSESSMENT OF QUALITY OF DATA BASE:

The data base used for preparing this assessment has been one of the most comprehensive ones available to this study. The trade associations and the individual establishments contacted were most cooperative in providing statistics on waste generation quantities and disposal practices in the industry.

SOURCES OF DATA USED AND EXPLANATORY NOTES:

(1) International Fabricare Institute, Fabricare News, Vol. 7, No. 11, November 1978

(2) Based upon California state hazardous waste survey data and data supplied by 20 firms responding to a TRW inquiry on hazardous waste generation and disposal practices in the dry cleaning industry

(3) Information supplied by the National Automatic Laundry and Cleaning Association, January 1979

(4) U.S. Dept. of Commerce, Census of Selected Services, 1972 USGPO, 1976

(5) Information provided by International Fabricare Institute, Silver Springs, MD, May 1979

(6) International Fabricare Institute, Fabricare News, Vol. 8, No. 2, February 1979

(7) Based on (a) a waste generation factor of 22 kg/1000 kg of clothes dry cleaned (from Reference 2), (b) 32% of an individual coin-op's receipts are from dry cleaning (based on Reference 3); (c) average revenue of $1.10/kg of clothes (from Reference 3), and (d) the financial profile of establishment size from the 1972 census, assumed to be applicable to 1976 after adjustment for inflation (References 3 and 4).

(8) Based upon data for 24 establishments from California state data files and 6 establishments from other states which responded to a TRW inquiry.

(9) Based upon state data for 2 plants in California and 18 plants nationwide which responded to the TRW inquiry.

11/27/79.   08.43.27.

INDUSTRY PROFILE[7]   SIC: 7215   NATION

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	14480	94.0	434400.	74.8
100-200	847	5.5	127050.	21.9
200-300	77	.5	19250.	3.3
300-400	0	0.0	0.	0.0
400-500	0	0.0	0.	0.0
500-600	0	0.0	0.	0.0
600-700	0	0.0	0.	0.0
700-800	0	0.0	0.	0.0
800-900	0	0.0	0.	0.0
900-1000	0	0.0	0.	0.0
1000-2000	0	0.0	0.	0.0
2000-5000	0	0.0	0.	0.0
> 5000	0	0.0	0.	0.0
TOTAL	15404	100.0	580700.	100.0

11/27/79. 08.43.27.

INDUSTRY PROFILE[8] SIC: 7216 NATION

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	18550	74.2	927500.	30.5
100-200	3075	12.3	461250.	15.2
200-300	1050	4.2	262500.	8.6
300-400	625	2.5	218750.	7.2
400-500	450	1.8	202500.	6.7
500-600	375	1.5	206250.	6.8
600-700	250	1.0	162500.	5.3
700-800	250	1.0	187500.	6.2
800-900	125	.5	106250.	3.5
900-1000	125	.5	118750.	3.9
1000-2000	125	.5	187500.	6.2
2000-5000	0	0.0	0.	0.0
> 5000	0	0.0	0.	0.0
TOTAL	25000	100.0	3041250.	100.0

11/27/79. 08.43.27.

INDUSTRY PROFILE[9] SIC: 7218 NATION

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	43	8.0	2150.	.1
100-200	38	7.1	5700.	.3
200-300	27	5.0	6750.	.3
300-400	27	5.0	9450.	.5
400-500	16	3.0	7200.	.4
500-600	22	4.1	12100.	.6
600-700	16	3.0	10400.	.5
700-800	16	3.0	12000.	.6
800-900	16	3.0	13600.	.7
900-1000	5	.9	4750.	.2
1000-2000	81	15.0	121500.	6.2
2000-5000	86	16.0	301000.	15.3
> 5000	146	27.1	1460000.	74.2
TOTAL	539	100.0	1966600.	100.0

11/29/79. 13.49.57.

BREAKDOWN OF PLANTS IN EMPLOYMENT SIZE CATEGORIES BY EPA REGION IN SIC 7215

NUMBER OF PLANTS IN EACH CATEGORY

REGION	TOTAL	1-4	5-9	10-19	20-49	50-99	100-249	250-499	500-999	>1000
I	558	486	61	7	4	0	0	0	0	0
II	1183	1062	79	30	11	0	1	C	0	0
III	1102	914	148	24	12	4	0	0	0	0
IV	2293	2052	190	38	9	1	3	0	0	0
V	2922	2277	538	83	22	2	0	0	0	0
VI	1509	1374	105	23	5	1	1	0	0	0
VII	697	601	74	21	1	0	0	0	0	0
VIII	361	314	39	5	2	1	0	0	0	0
IX	816	657	115	31	11	0	1	1	0	0
X	363	285	59	14	4	1	0	0	0	0
NATION	11804	10022	1408	276	81	10	6	1	0	0

11/29/79. 13.49.57.

BREAKDOWN OF PLANTS IN EMPLOYMENT SIZE CATEGORIES BY EPA REGION IN SIC 7216

NUMBER OF PLANTS IN EACH CATEGORY

REGION	TOTAL	1-4	5-9	10-19	20-49	50-99	100-249	250-499	500-999	>1000
I	1092	637	268	143	38	5	1	0	0	0
II	2920	2019	617	213	56	9	6	0	0	0
III	2115	1076	609	298	120	12	0	0	0	0
IV	3664	1949	1077	468	148	20	2	0	0	0
V	3680	2067	959	468	157	20	9	0	0	0
VI	2292	1388	515	273	92	21	3	0	0	0
VII	1000	630	242	91	34	2	1	0	0	0
VIII	579	344	161	47	24	3	0	0	0	0
IX	2049	1193	528	239	75	11	3	0	0	0
X	562	373	130	44	11	3	1	0	0	0
NATION	19953	11676	5106	2284	755	106	26	0	0	0

11/29/79. 13.49.57.

BREAKDOWN OF PLANTS IN EMPLOYMENT SIZE CATEGORIES BY EPA REGION IN SIC 7218

NUMBER OF PLANTS IN EACH CATEGORY

REGION	TOTAL	1-4	5-9	10-19	20-49	50-99	100-249	250-499	500-999	>1000
I	40	4	2	6	12	12	3	1	0	0
II	91	17	12	11	27	19	5	0	0	0
III	83	15	6	9	17	28	8	0	0	0
IV	182	22	14	30	58	38	19	1	0	0
V	192	30	27	34	47	27	25	2	0	0
VI	112	9	8	11	43	32	7	2	0	0
VII	53	10	8	6	14	12	3	0	0	0
VIII	18	4	2	4	4	4	0	0	0	0
IX	119	20	4	13	40	27	15	0	0	0
X	23	4	2	7	8	0	2	0	0	0
NATION	913	135	85	131	270	199	87	6	0	0

INDUSTRY: Carpet and Upholstery Cleaning SIC: 7217

DESCRIPTION OF INDUSTRY:

The establishments covered under SIC 7217 are primarily engaged in cleaning carpets and upholstered furniture at a plant or customer's premises. The census data indicate a total of 3024 establishments in SIC 7217 with about 75% in the 1 to 4 employment size category (see census data computer printout for number distribution of establishments by EPA region and employment size category).

CHARACTERISTICS OF HAZARDOUS WASTES PRODUCED:[(1)]

At carpet and upholstery cleaners chemicals such as phosphate rug cleaners and solvent upholstery cleaners are utilized. These substances may be toxic and in some cases flammable. These chemicals are purchased in boxes, cardboard drums, metal containers and plastic bottles. Information provided by four establishments with 4 to 9 employees indicate that quantity of waste containers is approximately 4 kg/per month per employee.

WASTE TREATMENT, STORAGE AND DISPOSAL PRACTICES:[(1)]

At most establishments waste containers are disposed of with the regular trash. Most carpet and upholstery cleaners will employ disposal companies for hauling services.

CURRENT DISPOSAL COST:

Disposal cost for these containers is considered minimal since containers are a very small fraction of the total refuse produced.

SOURCES OF DATA:

(1) Four carpet and upholstery cleaning establishments
(2) Based on the census data and an estimated waste generation rate of 4 kg/mo/employee
(3) Census data

11/27/79. 08.43.27.

INDUSTRY PROFILE[2] SIC: 7217 NATION

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	2985	98.7	22387.	76.4
100-200	27	.9	4050.	13.8
200-300	10	.3	2500.	8.5
300-400	1	.0	350.	1.2
400-500	0	0.0	0.	0.0
500-600	0	0.0	0.	0.0
600-700	0	0.0	0.	0.0
700-800	0	0.0	0.	0.0
800-900	0	0.0	0.	0.0
900-1000	0	0.0	0.	0.0
1000-2000	0	0.0	0.	0.0
2000-5000	0	0.0	0.	0.0
> 5000	0	0.0	0.	0.0
TOTAL	3023[3]	100.0	29288.	100.0

11/29/79. 13.49.57.

BREAKDOWN OF PLANTS IN EMPLOYMENT SIZE CATEGORIES BY EPA REGION IN SIC 7217

NUMBER OF PLANTS IN EACH CATEGORY

REGION	TOTAL	1-4	5-9	10-19	20-49	50-99	100-249	250-499	500-999	>1000
I	162	121	26	9	4	1	1	0	0	0
II	245	184	39	16	4	2	0	0	0	0
III	321	240	45	24	9	2	1	0	0	0
IV	505	382	79	35	9	0	0	0	0	0
V	693	530	93	49	14	6	1	0	0	0
VI	254	192	43	12	5	1	1	0	0	0
VII	144	102	23	15	4	0	0	0	0	0
VIII	128	95	20	11	2	0	0	0	0	0
IX	461	353	67	31	10	0	0	0	0	0
X	111	82	17	8	2	1	1	0	0	0
NATION	3024	2281	452	210	63	13	5	0	0	0

INDUSTRY: Photoprocessing Laboratories SIC: 7221,7333, 7395,7819

DESCRIPTION OF INDUSTRY:

The establishment included in the subject industry category (the photoprocessing laboratories) are photographic studios and portrait studios (SIC 7221); commercial photography, art and graphics (SIC 7333); photofinishing laboratories (SIC 7395); and services allied to motion picture production (SIC 7819). Based on the census data, there are a total of 14,040 establishments in SIC's 7221, 7333, 7395 and 7819.

The following data on industry structure are based on an industry survey conducted by EPA/EGD[1]. There are approximately 650 establishments in the subject industry specializing in work for professional and industrial photography. There are an estimated additional 3,000 captive shops engaged in photoprocessing activities which are associated with other business and industrial firms. Photoprocessing laboratories range in size from the small operations with a few employees and processing 20 sq. m of film and paper per day to the major professional laboratories processing as much as 10,000 sq. m of film and paper per day. A profile of the plant size based on 200 plants surveyed is as follows:

# of Plants	Estimated Production sq.m/day	Wastewater, gpd
27	below 25	less than 1,000
92	25 - 250	1,000 - 10,000
64	250 - 1250	10,000 - 50,000
28	over 1,250	over 50,000
26	unknown	

Based on 1972 data, 10% of the establishments have annual sales of over $300,000 and total U.S. production is 170,000,000 sq. m of film and paper per year.

CHARACTERISTICS OF HAZARDOUS WASTES PRODUCED:

The total quantity of potentially land-destined wastes generated by the photoprocessing industry is estimated in this study at 30.4 million kg/mo, with an average generation rate of 2,165 kg/mo/generator (see Industry Profile). The land-destined hazardous wastes include biosludges, settling tank sludges, chemical sludges from wastewater treatment, silver recovery sludges sent to reclaimers and empty containers.

Based on EPA/EGD data[1], about 5% of the photoprocessing laboratories (the larger plants) practice end-of-pipe wastewater treatment (prior to discharge into the natural waters) and generate wastewater treatment sludges. The sludge from biological treatment at one photoprocessing plant reportedly contains silver in concentrations of 1,000 to 3,400 mg/kg on a dry weight basis.

At some facilities, ferrous sulfate is added to the 'waste bleach' and 'fix' to precipitate complex cyanide. This results in the production of a Prussian Blue ferri-ferrocyanide sludge.

For economical reasons, silver recovery from spent photoprocessing plants is integrated into the photoprocessing procedures. The resultant sludges contain high concentrations of silver which is reclaimed at commercial facilities.

The photoprocessing industry utilizes a considerable volume of chemicals which are shipped in glass, plastic or paper containers. The empty containers which contain chemical residues is produced at an estimated rate of 1 gram per sq. ft. of paper or film processed[2].

WASTE TREATMENT, STORAGE AND DISPOSAL PRACTICES:

EPA/EGD pretreatment regulations exempt plants handling less than 150 sq. m/day of film and paper (about 95% of establishments); only 5% of the plants (the plants handling more than 150 sq. m/day of film and paper) are required to use end-of-pipe treatment prior to discharge to POTW's or natural waters. The end-of-pipe treatment at these larger plants generates sludges. In 1977 EPA/EGD conducted a survey of 130 plants which included a greater proportion of larger establishments[3]. This was followed by a more in-depth follow-on survey of 20 plants that reported some form of wastewater treatment. Fifteen plants contracted for hauling the sludges to off-site disposal sites. The treatment type breakdown was as follows:

Treatment Process	No. of Plants
Precipitation	7
Settling	6
Clarification	2
Filtration	2
Reverse Osmosis	2

The 95% of the photoprocessing plants which are exempted from EPA/EGD pretreatment regulations generally integrate the silver recovery and cyanide bleach regeneration into the production processes for economic reasons. In-plant silver recovery methods include metallic replacement, electrolytic plating, ion exchange and chemical precipitation. The recovered silver sludges are subsequently sent to commercial reclaimers. One treatment system for waste bleach/fix containing complexed cyanide which is employed at some small plants is precipitation of complexed cyanides with hydrated ferrous sulfate. The treatment system produces a "Prussian Blue" cyanide sludge. No sludge is generated when other treatment methods (e.g., ozonation or persulfate addition) are used for the treatment of wastes containing complexed cyanide.

Empty containers for chemicals used in the photoprocessing operations are reportedly triple rinsed prior to disposal with the municipal refuse[4].

CURRENT DISPOSAL COST:

The cost for in-plant pollution abatement, which is part of the production procedures, cannot be separated from the overall production cost. The trade association and the individual establishments contacted declined to provide specific cost data on pollution control.

ASSESSMENT OF QUALITY OF DATA BASE:

The photoprocessing industry has been studied extensively by EPA/EGD[1,3]. The EGD development document and the EGD data file provide the major sources of information for this study.

Additional information are provided by the state data. At the request of TRW the National Association of Photographic Manufacturers, Inc. (NAPM) conducted a survey for 20 of its members on solid waste production and disposal practices. However, the responses received contained very little waste generation quantity data and no data on the cost of waste treatment and disposal.

SOURCES OF DATA USED:

(1) Development Document for Interim Final Effluent Limitations Guidelines and Proposed New Source Performance Standards for the Photographic Processing Subcategory of the Photographic Point Source Category, EPA 440/1-76/0601

(2) Eastman Kodak, Rochester, N.Y.

(3) Raw data on file in EGD/EPA collected by Versar, Inc. in 1977

(4) NAPM (National Association of Photographic Manufacturers, Inc.), Harrison, N.Y.

(5) Based on waste quantity data for four plants covered in the state data base and six plants covered in Reference 3, and the census data

(6) Census data

11/27/79. 08.43.27.

INDUSTRY PROFILE[5] SIC: 7221 NATION
7333, 7395 and 7819

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	8190	58.3	409500.	1.3
100-200	1960	14.0	294000.	1.0
200-300	640	4.6	160000.	.5
300-400	520	3.7	182000.	.6
400-500	320	2.3	144000.	.5
500-600	270	1.9	148500.	.5
600-700	190	1.4	123500.	.4
700-800	180	1.3	135000.	.4
800-900	130	.9	110500.	.4
900-1000	90	.6	85500.	.3
1000-2000	310	2.2	465000.	1.5
2000-5000	380	2.7	1330000.	4.4
> 5000	860	6.1	26813080.	88.2
TOTAL	14040[6]	100.0	30400580.	100.0

INDUSTRY: Barber and Beauty Shops SIC: 7231, 7241

DESCRIPTION OF INDUSTRY:

This SIC includes establishments primarily engaged in furnishing beauty and barber services. Establishments for SIC 7231 include: beauty and barber shops (combined), beauty shops, hairdressers and beauty culture schools; establishments for SIC 7241 include barber colleges, barber shops and hair stylists (men's). Based on the census data, there are a total of 81,695 establishments in the subject SIC's, of which 78% and 94% employ less than 5 and 10 persons, respectively. The establishments are distributed throughout the country is approximate proportion to the population. The census figure of 81,695 is considered low compared to a figure of 120,000 provided to TRW by Clairol, a major supplier of beauty products (see Reference 1). The industry-supplied data has been used in estimating the waste generation profile.

Empty hair dye and certain spray containers may be considered hazardous in the light of recent data indicating that certain chemicals used in these containers may be carcinogenic. Each shop disposes of an average of 2.7 kg/mo of empty dye containers[1].

WASTE TREATMENT, STORAGE, AND DISPOSAL PRACTICE:

Hair dye bottles are reported to be disposed of along with other non-hazardous shop refuse.

CURRENT DISPOSAL COST:

No additional waste disposal costs are ascribed to empty hair dye bottles.

ALTERNATIVE DISPOSAL METHODS:

This waste could be reduced or eliminated through the use of refillable bottles. Rinsing of containers prior to disposal should render containers less hazardous.

INDUSTRY PROFILE:

(See table)

ASSESSMENT OF QUALITY OF DATA BASE:

SOURCES OF DATA USED AND EXPLANATORY NOTES:

(1) Based on an estimated 8 million professional hair dye applications per month and one 40-gm empty plastic bottle generated per application; these estimates are based on chemical sales data and survey results provided by Clairol (Clairol holds 33% of the market share of hair dyes sold to professional beauty and barber shops).

(2) Estimate provided by Clairol

(3) All establishments are assumed to generate less than 100 kg/mo; the average waste generation rate is estimated at 2.7 kg/mo/establishment; a 100 kg/mo waste generation rate would correspond to 2500 hair dye applications per month/establishment; such a high number of applications per month is unlikely for any single establishment.

(4) Barbers, Beauticians and Allied Industries Association

(5) Associated Master Barbers and Beauticians of America

11/27/79. 08.43.27.

INDUSTRY PROFILE[3] SIC: 7231 NATION
7241

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	120000	100.0	324000.	100.0
100-200	0	0.0	0.	0.0
200-300	0	0.0	0.	0.0
300-400	0	0.0	0.	0.0
400-500	0	0.0	0.	0.0
500-600	0	0.0	0.	0.0
600-700	0	0.0	0.	0.0
700-800	0	0.0	0.	0.0
800-900	0	0.0	0.	0.0
900-1000	0	0.0	0.	0.0
1000-2000	0	0.0	0.	0.0
2000-5000	0	0.0	0.	0.0
> 5000	0	0.0	0.	0.0
TOTAL	120000[2]	100.0	324000.	100.0

11/29/79. 13.58.19.

BREAKDOWN OF PLANTS IN EMPLOYMENT SIZE CATEGORIES BY EPA REGION IN SICS 7230 and 7240

NUMBER OF PLANTS IN EACH CATEGORY

REGION	TOTAL	1-4	5-9	10-19	20-49	50-99	100-249	250-499	500-999	>1000
I	5256	4338	711	175	29	3	0	0	0	0
II	9254	7499	1336	339	65	17	3	0	0	0
III	8907	6657	1439	510	93	9	0	0	0	0
IV	14293	11489	2161	554	84	5	0	0	0	0
V	15322	11540	2796	822	153	11	0	0	0	0
VI	8494	6725	1298	372	91	8	0	0	0	0
VII	4952	3956	745	208	41	2	0	0	0	0
VIII	2307	1729	440	118	18	2	0	0	0	0
IX	10007	7322	1896	643	133	13	0	0	0	0
X	2903	2189	541	144	25	4	0	0	0	0
NATION	61695	63644	13362	3885	732	69	3	0	0	0

INDUSTRY: Funeral Services and Crematories SIC: 7261

DESCRIPTION OF INDUSTRY:

This SIC consists of establishments primarily engaged in preparing the dead for burial, conducting funerals, and cremating the dead. The establishments include crematories, funeral directors, funeral homes or parlors, morticians and undertakers. According to the census data (see computer printout) there are a total of 14,472 establishments in the subject SIC, with 64%, 89% and 98% having employment sizes of less than 5, 10 and 20, respectively. The establishments are located throughout the U.S. with the greatest concentrations in the most populus EPA regions.

CHARACTERISTICS OF HAZARDOUS WASTES PRODUCED:

Based on the data obtained from References 1 through 4, mortuaries dispose of empty containers which held embalming fluids. These fluids contain formaldehyde, water, wetting agents, and humectants (chemicals added to retain moisture in the treated bodies). The range of formaldehyde concentration is approximately 18 to 30% with a mean concentration of roughly 23%. The containers are most commonly one pint plastic bottles weighing approximately 65 gm apiece. Approximately 3 pints of embalming fluid are used per body. Roughly 3.5 million pints of fluid are used annually in the U.S.

The range of cases handled per year in the U.S. is approximately 12 to 500 per mortuary with a mean of 81 to 86. Thus, mortuaries would be expected to dispose of 36 to 1500 empty bottles per year, with a mean of about 250. This corresponds to a mean of 1.3 kg/mo from each establishment.

WASTE TREATMENT, STORAGE, AND DISPOSAL PRACTICE:

Disposal of empty containers most commonly involves throwing them out with office and other non-hazardous wastes. Some mortuaries are reported to rinse the containers before final disposal.

CURRENT DISPOSAL COST:

No additional waste disposal costs can be ascribed to empty embalming fluid containers which are co-disposed with regular refuse.

ALTERNATIVE DISPOSAL METHODS:

This waste could be reduced or eliminated through the use of refillable bottles; rinsing of bottles prior to disposal can render bottles less hazardous.

INDUSTRY PROFILE:

(See table)

ASSESSMENT OF QUALITY OF DATA BASE:

The average number of cases per month is based on statistics collected by the National Funeral Directors Association. The amount of embalming fluid used per body and nationwide is based on sales data collected by the Embalming Chemical Manufacturer's Association. The information provided by these sources appear very reasonable.

SOURCES OF DATA USED AND EXPLANATORY NOTES:

(1) Cremation Association of North America

(2) Embalming Chemical Manufacturers Association

(3) National Funeral Directors Association

(4) National Funeral Directors and Morticians Association

(5) Census data

(6) Waste quantity estimated based on the reported mean waste generation rate of 1.3 kg/mo/establishment

11/27/79. 08.43.27.

INDUSTRY PROFILE[5] SIC: 7261 NATION

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	14472	100.0	18814.	100.0
100-200	0	0.0	0.	0.0
200-300	0	0.0	0.	0.0
300-400	0	0.0	0.	0.0
400-500	0	0.0	0.	0.0
500-600	0	0.0	0.	0.0
600-700	0	0.0	0.	0.0
700-800	0	0.0	0.	0.0
800-900	0	0.0	0.	0.0
900-1000	0	0.0	0.	0.0
1000-2000	0	0.0	0.	0.0
2000-5000	0	0.0	0.	0.0
> 5000	0	0.0	0.	0.0
TOTAL	14472[5]	100.0	18814.	100.0

11/29/79. 13.49.57.

BREAKDOWN OF PLANTS IN EMPLOYMENT SIZE CATEGORIES BY EPA REGION IN SIC 7261

NUMBER OF PLANTS IN EACH CATEGORY

REGION	TOTAL	1-4	5-9	10-19	20-49	50-99	100-249	250-499	500-999	>1000
I	1002	725	232	42	3	0	0	C	0	0
II	1718	1229	365	100	21	3	0	0	0	0
III	1770	1230	395	105	36	4	0	0	0	0
IV	2533	1383	767	319	61	3	0	0	0	0
V	3328	2244	769	271	41	3	0	C	0	0
VI	1429	765	394	216	51	2	1	C	0	0
VII	1172	813	273	62	20	4	0	C	0	0
VIII	350	231	85	25	7	2	0	0	0	0
IX	828	399	269	121	36	3	0	0	0	0
X	342	203	93	41	5	0	0	0	0	C
NATION	14472	9222	3642	1302	281	24	1	0	0	0

INDUSTRY: Blueprinting and Photocopying Services SIC: 7332

DESCRIPTION OF INDUSTRY:

Establishments covered under the subject SIC are primarily engaged in reproducing drawings, plans, maps, etc. by blueprinting or photocopying. Geographically, this type of business is located nationwide. The census data inciates a total of 2081 establishments for SIC 7332, of which 1361 (65%) are in the 1-4 employee size category (see census data computer printout for number distribution of establishments by EPA Region and employment size category).

CHARACTERISTICS OF HAZARDOUS WASTES PRODUCED:

Hazardous wastes resulting from the blueprinting and photocopying operations include ammonia containers from the blueprint process and tone (dry ink) from photocopying. Some establishments do only blueprinting work or only photocopying and some have the capability to do both.

An estimated one-third of the blueprinting establishments (primarily the older establishments) use the liquid ammonia process; this process generates empty plastic containers containing residual ammonia. The remaining two-thirds of blueprinting establishments utilize the anhydrous (gaseous) ammonia process which leaves no residual ammonia in the empty containers, and the containers are recycled. Establishments that do photocopying will generate toner (dry ink) containers. One large establishment employing 65 employees and providing both blueprinting and photocopying service reported a generation of 6.5 kg/mo of toner containers and 149 kg/mo of waste ammonia in some 48 2-gallon containers (43 kg/mo weight of bottles without ammonia)[(1)], for a total waste of 198 kg/mo (or 3 kg/mo/employee). The total hazardous waste generated by SIC 7332 is estimated at 12,000 kg/mo (see Industry Profile).

WASTE TREATMENT, STORAGE AND DISPOSAL PRACTICES[(1)]:

Liquid and anhydrous ammonia containers are returned to suppliers. Toner bottles are disposed of with the general refuse.

CURRENT DISPOSAL COST:

There is no cost for returning containers to suppliers, and disposal cost for toner bottles is minimal since they are a very small part of the overall refuse quantity.

ALTERNATIVE DISPOSAL METHODS:

The current practice of returning containers to suppliers is an environmentally acceptable method.

INDUSTRY PROFILE:

(See table)

ASSESSMENT OF QUALITY OF DATA BASE:

SOURCES OF DATA USED AND EXPLANATORY NOTES:

(1) Four blueprint/photocopying establishments

(2) Calculated based on the following assumptions: 1/3 of the establishments generate both blueprinting and photocopying wastes at a rate of 3 kg/mo/employee, 2/3 of the establishments generate photocopying waste at a rate of 0.07 kg/mo/employee and that the size distribution of both types of establishments are the same as the composite distribution for the SIC.

(3) Census data

11/27/79. 06.43.27.

INDUSTRY PROFILE[2] SIC: 7332 NATION

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	2076	99.8	11210.	93.7
100-200	5	.2	750.	6.3
200-300	0	0.0	0.	0.0
300-400	0	0.0	0.	0.0
400-500	0	0.0	0.	0.0
500-600	0	0.0	0.	0.0
600-700	0	0.0	0.	0.0
700-800	0	0.0	0.	0.0
800-900	0	0.0	0.	0.0
900-1000	0	0.0	0.	0.0
1000-2000	0	0.0	0.	0.0
2000-5000	0	0.0	0.	0.0
> 5000	0	0.0	0.	0.0
TOTAL	2081[3]	100.0	11960.	100.0

11/29/79.   13.49.57.

BREAKDOWN OF PLANTS IN EMPLOYMENT SIZE CATEGORIES BY EPA REGION IN SIC 7332

NUMBER OF PLANTS IN EACH CATEGORY

REGION	TOTAL	1-4	5-9	10-19	20-49	50-99	100-249	250-499	500-999	>1000
I	128	102	13	7	4	2	0	0	0	0
II	255	143	46	42	16	5	3	0	0	0
III	166	102	33	19	10	2	0	0	0	0
IV	269	185	54	21	8	1	0	0	0	0
V	362	237	60	40	18	6	1	0	0	0
VI	255	163	53	25	12	2	0	0	0	0
VII	54	33	9	7	5	0	0	0	0	0
VIII	70	52	12	6	0	0	0	0	0	0
IX	466	313	67	61	23	1	1	0	0	0
X	56	31	14	6	4	1	0	0	0	0
NATION	2081	1361	361	234	100	20	5	0	0	0

ZB-327

INDUSTRY: Commercial Cleaning and Janitorial Services SIC: 7341,7349

DESCRIPTION OF INDUSTRY:

The establishments in this industry are primarily engaged in providing cleaning and maintenance services to dwellings and other buildings. Included are firms engaged in activities such as window cleaning, floor waxing, hospital housekeeping, office cleaning, lighting maintenance services and service station cleaning and degreasing. The census data indicate a total of 17,546 establishments for this SIC of which 75% employ less than 10 persons. These establishments are distributed throughout the U.S. in approximate proportion to the population of the region.

CHARACTERISTICS OF HAZARDOUS WASTES PRODUCED:

Various chemicals and cleaning agents are used in the maintenance industry including solvents, soaps, waxes, ammonia, chlorine, and detergents. State survey data indicate that the primary wastes produced are detergents, alkaline wastes and organic wastes. Non-aqueous wastes from cleaning operations are usually non-hazardous and consist of dirt, hair, dust, fibers, etc. Empty containers may be hazardous depending on the original contents. Where cleaning involves removal of hazardous substances such as oil and grease, the cleaning agent will contain these substances. Some maintenance industries contacted indicate that, in many cases, the building being serviced provides the chemicals used and therefore the wastes produced may not be known to the maintenance crew[1]. Based on state survey data and telephone communications, it is estimated that the amount of hazardous waste generated by the subject SIC is 1.8 million kg/mo, or an average of 100 kg/mo per generator (see Industry Profile). All establishments in the industry are expected to generate less than 500 kg/mo of hazardous waste.

WASTE TREATMENT, STORAGE AND DISPOSAL PRACTICES:

Liquid wastes generated by the maintenance industry are eventually disposed of in municipal sewers. Non-aqueous wastes are disposed of with general refuse (generally at the sites being serviced). Some of the establishments contacted indicate that their employees followed the disposal procedures of the building being serviced but that they do not keep records regarding these procedures[1,2].

CURRENT DISPOSAL COST:

ALTERNATIVE DISPOSAL METHODS:

INDUSTRY PROFILE:

(See table)

ASSESSMENT OF QUALITY OF DATA BASE:

Very little quantitative data on waste generation by establishments in the subject industry appear to exist. The waste generation profile presented here is based on data for two establishments covered in the state data and an estimate provided by one of the many plants contacted in this study.

SOURCES OF DATA USED AND EXPLANATORY NOTES:

(1) Eight individual establishments
(2) International Sanitary Supply Association
(3) Based on state data for two establishments, an estimate provided by one of the establishments contacted and the census data
(4) Census data

11/27/79. 08.43.27.

INDUSTRY PROFILE[3] SIC: 7341 NATION
7349

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	12107	69.0	484280.	27.3
100-200	2632	15.0	394800.	22.3
200-300	1404	8.0	351000.	19.8
300-400	877	5.0	306950.	17.3
400-500	526	3.0	236700.	13.3
500-600	0	0.0	0.	0.0
600-700	0	0.0	0.	0.0
700-800	0	0.0	0.	0.0
800-900	0	0.0	0.	0.0
900-1000	0	0.0	0.	0.0
1000-2000	0	0.0	0.	0.0
2000-5000	0	0.0	0.	0.0
> 5000	0	0.0	0.	0.0
TOTAL	17546[4]	100.0	1773730.	100.0

11/29/79. 13.58.19.

BREAKDOWN OF PLANTS IN EMPLOYMENT SIZE CATEGORIES BY EPA REGION IN SICS 7341 and 7349

NUMBER OF PLANTS IN EACH CATEGORY

REGION	TOTAL	1-4	5-9	10-19	20-49	50-99	100-249	250-499	500-999	>1000
I	1150	741	170	105	76	26	24	5	3	0
II	1947	1129	284	184	146	87	75	23	11	8
III	1752	935	292	197	161	70	59	25	10	3
IV	2344	1371	396	236	168	92	55	17	7	2
V	3004	2148	587	386	265	107	76	24	9	2
VI	1553	861	257	145	143	64	58	18	5	2
VII	884	540	145	77	61	27	21	11	2	0
VIII	675	416	115	65	41	21	11	6	0	0
IX	2765	1727	466	257	188	60	52	9	4	2
X	871	568	144	79	45	22	11	1	1	0
NATION	17545	10436	2856	1731	1294	576	442	139	52	19

INDUSTRY: Disinfecting and Exterminating Services SIC: 7342

DESCRIPTION OF INDUSTRY:

This SIC covers establishments primarily engaged in disinfecting dwellings and other buildings, and in exterminating insects, rodents and other pests. According to one trade association[1] there are approximately 10,000 operators in the U.S. engaged in structural pest control. Based on the census data, however, there are 5104 establishments in this SIC of which 56% employ less than 5 persons, 76% employ less than 10 persons and 91% employ less than 20 persons.

CHARACTERISTICS OF HAZARDOUS WASTE PRODUCED:

Based on 19 small generator plants in the state data base, 63% report pesticide wastes and 47% report "non-hazardous but toxic" wastes. Representatives of the National Pest Control Association indicate that potentially hazardous wastes in the pest control industry consist of pesticide/chemical containers and contaminated materials resulting from spills and leaks. Major chemicals used by exterminators in approximate order of aggregate quantity are chlordane, methyl bromide, Vikane ($SOCl_2$), aluminum phosphide, Diazinon, Dursban, and Dichlorovos. One estimate of aggregate pesticide use by the industry is 3.5% of total use in the U.S.

A survey of pesticide use by firms in the subject industry in Nebraska reports the approximate following use (52 firms reporting):[2]

liquid/aqueous products - 200,000 lbs/yr
(active ingredients)

solid products - 15,000 lbs/yr

gaseous fumigants - 65,000 lbs/yr

For the liquid products, an average of about 1730 kg/firm/yr is indicated from these data. This would represent about 200 5-gallon containers or about 750 kg/yr of empty containers containing a total of about 10 kg of active pesticide(s). Residues in empty solid containers would add only a small amount to the liquid product waste container quantities. Gaseous fumigants are handled in reusable cylinders and thus do not present a container disposal problem. Thus, an "average" firm in Nebraska would generate less than 100 kg/mo of waste containers. Since several of the firms in the survey have a number of field offices, the survey data would likely yield an "average for firms "higher than an average per field office". These conclusions are supported by statements from trade industry sources who indicate that essentially all "field offices" in the USA would be small hazardous waste generators (less than 100 kg/mo of empty containers).

Based on discussions with one establishment in this SIC, firms engaged in sanitary and disinfecting services generally use products similar to those employed for household and light industrial cleaning applications. Refuse containing such empty chemical containers is not likely to be dramatically different in character than general household/office refuse. Disinfecting of hospitals and related facilities is commonly done by "in house" personnel using phenolic and/or quarternary ammonia based disinfectants.

WASTE TREATMENT, STORAGE AND DISPOSAL PRACTICES:

Disposal practices employed by the 19 small generator plants in the state data base and the percent of plants employing each disposal method are shown below:

Disposal Method	% of plants*
Landfill	63
Recycling	42
Unknown	16
Landspreading	5
Onsite land burial	5

In many states the user of many of the chemicals (the "restricted" pesticides) must be registered under state program and such registration includes adherence to proper disposal techniques. Pest control operators commonly dispose of rinsed containers via general refuse systems. Rinsings are either used as solvent for the next batch of spray or in some cases are poured "down the drain." Some operators reportedly use dry wells on site for liquids disposal. Solid wastes and containers are generally disposed of via general refuse systems.

Empty containers from firms engaged in sanitary and disinfecting services are commonly disposed of at the use site along with general refuse. Disposal of chemical containers from hospitals is generally via municipal

*Column sums to more than 100% since some plants report using more than one disposal method.

refuse collection systems. In many hospitals empty containers are used for disposal of hypodermic needles via autoclaving prior to final disposal.

CURRENT DISPOSAL COST:

ALTERNATIVE DISPOSAL METHODS:

INDUSTRY PROFILE:

(See table)

ASSESSMENT OF QUALITY OF DATA BASE:

The state survey data used to establish the industry profile includes 19 plants from California. Based on the data, 68% of the plants in this SIC generate less than 100 kg/mo of hazardous waste. Although California may not be representative of all states, the results are similar to those obtained in Nebraska where an "average" firm is expected to generate less than 100 kg/mo.

SOURCES OF DATA USED AND EXPLANATORY NOTES:

1. National Pest Control Association
2. University of Nebraska Extension Service
3. Based on state survey data for 19 establishments in California
4. National Association of Pesticide Control Officials
5. Agricultural Commissioner, California State Dept. of Food and Agriculture (Pesticide Regulation and Safety)
6. Rockwell International
7. International Sanitary Supply Association
8. Harbor General Hospital
9. U.S. Department of Agriculture
10. Census data

11/27/79. 08.43.27.

INDUSTRY PROFILE[3] SIC: 7342 NATION

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	3512	68.8	129944.	34.2
100-200	1488	29.1	223200.	58.8
200-300	104	2.0	26000.	6.9
300-400	1	.0	350.	.1
400-500	0	0.0	0.	0.0
500-600	0	0.0	0.	0.0
600-700	0	0.0	0.	0.0
700-800	0	0.0	0.	0.0
800-900	0	0.0	0.	0.0
900-1000	0	0.0	0.	0.0
1000-2000	0	0.0	0.	0.0
2000-5000	0	0.0	0.	0.0
> 5000	0	0.0	0.	0.0
TOTAL	5105[10]	100.0	379494.	100.0

12/06/79. 12.33.08.

BREAKDOWN OF PLANTS IN EMPLOYMENT SIZE CATEGORIES BY EPA REGION IN SIC 7342

NUMBER OF PLANTS IN EACH CATEGORY

REGION	TOTAL	1-4	5-9	10-19	20-49	50-99	100-249	250-499	500-999	>1000
I	110	73	20	9	7	1	0	0	0	0
II	449	306	65	47	27	3	1	0	0	0
III	444	242	103	59	33	5	2	0	0	0
IV	1443	696	303	251	159	32	1	1	0	0
V	549	306	112	98	33	0	0	0	0	0
VI	811	511	144	94	51	9	1	1	0	0
VII	264	161	47	45	11	0	0	0	0	0
VIII	45	30	4	7	2	1	1	0	0	0
IX	925	499	210	139	68	7	2	0	0	0
X	64	49	8	6	1	0	0	0	0	0
NATION	5104	2873	1016	755	392	58	8	2	0	0

INDUSTRY: Research and Development Laboratories SIC: 7391

DESCRIPTION OF INDUSTRY:

The establishments in this industry are primarily engaged in laboratory or other physical research and development on a contract or fee basis. The industry carries on a variety of research activities including agricultural research, food research, development of computer technology, and physical research and development. Also included are chemical, engineering, and industrial laboratories. The establishments vary in size and are distributed throughout the country. The census data indicate a total of 2004 establishments for this SIC of which 1020 (or 51%) employ less than 4 persons (see census data computer printout for number distribution of establishments by employment size range category and EPA region).

CHARACTERISTICS OF HAZARDOUS WASTES PRODUCED:

Because of the heterogenity of the industry, a variety of hazardous wastes are produced. Infectious biological wastes, corrosive wastes such as caustic soda and acids, and toxic or flammable wastes including oils, solvents, heavy metals, and miscellaneous organic and inorganic chemicals are generated by these establishments. The estimated amount of hazardous waste generated by the subject SIC is 3,097,000 kg/mo, or an average rate of 1545 kg/mo per generator (see Industry Profile). Based on state survey data about 90% of the research and development laboratories produce less than 5000 kg/mo of hazardous waste.

WASTE TREATMENT, STORAGE AND DISPOSAL PRACTICES: (1)

Based on the state data, more than 80% of the firms surveyed use landfill for the disposal of some or all of their hazardous wastes. Waste is generally taken to landfills by commercial haulers. Other disposal methods used include incineration (for infectious wastes), deep well injection (for disposal of acid wastes in Oklahoma) and sewer disposal (for acidic and alkaline wastes).

CURRENT DISPOSAL COST:

ALTERNATIVE DISPOSAL METHODS:

Segregation of wastes at the source (e.g., separation of chlorinated solvents from non-chlorinated solvents and other hazardous wastes) can enable some degree of waste recycling in the industry. Disposal of wastes in Subtitle C facilities would be an environmentally acceptable method for the management of many hazardous wastes which are currently disposed by other methods (e.g., disposal in sewers).

INDUSTRY PROFILE:

(See table)

ASSESSMENT OF QUALITY OF DATA BASE:

SOURCES OF DATA USED AND EXPLANATORY NOTES:

(1) Based on state survey data for eight small generators

(2) Census data

11/27/79. 08.43.27.

INDUSTRY PROFILE[1]   SIC: 7391   NATION

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	668	33.3	33400.	1.1
100-200	253	12.6	37950.	1.2
200-300	144	7.2	36000.	1.2
300-400	90	4.5	31500.	1.0
400-500	72	3.6	32400.	1.0
500-600	72	3.6	39600.	1.3
600-700	36	1.8	23400.	.8
700-800	54	2.7	40500.	1.3
800-900	36	1.8	30600.	1.0
900-1000	36	1.8	34200.	1.1
1000-2000	126	6.3	189000.	6.1
2000-5000	217	10.8	759500.	24.5
> 5000	201	10.0	1809000.	58.4
TOTAL	2005[2]	100.0	3097050.	100.0

B-339

11/29/79. 13.49.57.

BREAKDOWN OF PLANTS IN EMPLOYMENT SIZE CATEGORIES BY EPA REGION IN SIC 7391

NUMBER OF PLANTS IN EACH CATEGORY

REGION	TOTAL	1-4	5-9	10-19	20-49	50-99	100-249	250-499	500-999	>1000
I	226	122	35	32	21	9	6	1	0	0
II	271	154	44	28	19	11	9	2	2	2
III	261	96	42	38	37	21	17	7	2	1
IV	170	96	24	25	16	4	4	0	1	0
V	293	149	49	44	31	6	7	2	1	4
VI	175	98	24	16	18	8	8	2	0	1
VII	54	25	14	6	5	3	0	1	0	0
VIII	85	46	15	11	8	4	1	0	0	0
IX	405	200	74	48	45	18	12	4	3	1
X	64	34	9	9	2	2	3	0	3	2
NATION	2004	1020	330	257	202	86	67	19	12	11

INDUSTRY: Commercial Testing Laboratories SIC: 7397

DESCRIPTION OF INDUSTRY:

Establishments in this industry are primarily engaged in product testing on a fee or contract basis. Included are assaying services, automobile testing, calibration and certification testing, radiation dosimetry and detection services and food testing services. These establishments are distributed throughout the country. The census data indicate a total of 1826 establishments for SIC 7397 of which 1218 (or 67%) have less than 9 employees (see census data computer printout for number distribution of establishments by employment size range category and EPA region).

CHARACTERISTICS OF HAZARDOUS WASTES PRODUCED:

Establishments in the subject SIC will generate a variety of wastes due to the heterogeneity of services provided. State survey data, which includes seven establishments in SIC 7397, indicate that toxic or flammable wastes including petrochemicals, solvents, organic and inorganic compounds and corrosive acidic wastes are generated. Based on state survey data the total waste quantity generated by establishments in this SIC is estimated at 451,000 kg/mo, or an average rate of 329 kg/mo per generator (see Industry Profile). The data indicate that all establishment in this SIC generate less than 5000 kg/mo of hazardous waste.

WASTE TREATMENT, STORAGE AND DISPOSAL PRACTICES:

Based on the state data, about 40% of establishments dispose of general laboratory wastes to the sewer and about 30% use landfill disposal.

CURRENT DISPOSAL COST:

ALTERNATIVE DISPOSAL METHODS:

Segregation of wastes at the source can enable some degree of waste recycling.

INDUSTRY PROFILE:

(See table)

ASSESSMENT OF QUALITY OF DATA BASE:

SOURCES OF DATA USED AND EXPLANATORY NOTES:

(1) Based on waste generation data for 7 establishments covered in the state data base and the census data

(2) Census data adjusted for the estimated number of "zero" generators

11/27/79. 08.43.27.

INDUSTRY PROFILE[1] SIC: 7397 NATION

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	575	42.0	28750.	6.4
100-200	178	13.0	26700.	5.9
200-300	260	19.0	65000.	14.4
300-400	68	5.0	23800.	5.3
400-500	55	4.0	24750.	5.5
500-600	27	2.0	14850.	3.3
600-700	41	3.0	26650.	5.9
700-800	27	2.0	20250.	4.5
800-900	27	2.0	22950.	5.1
900-1000	27	2.0	25650.	5.7
1000-2000	63	4.6	94500.	21.0
2000-5000	22	1.6	77000.	17.1
> 5000	0	0.0	0.	0.0
TOTAL	1370[2]	100.0	450850.	100.0

11/29/79. 13.49.57.

BREAKDOWN OF PLANTS IN EMPLOYMENT SIZE CATEGORIES BY EPA REGION IN SIC 7397

NUMBER OF PLANTS IN EACH CATEGORY

REGION	TOTAL	1-4	5-9	10-19	20-49	50-99	100-249	250-499	500-999	>1000
I	99	57	19	10	10	2	1	0	0	0
II	185	81	36	33	28	4	1	2	0	0
III	152	63	28	35	16	7	1	2	0	0
IV	270	127	61	48	29	3	2	0	0	0
V	316	145	71	50	34	6	8	1	1	0
VI	305	129	66	57	44	5	3	1	0	0
VII	69	34	13	11	11	0	0	0	0	0
VIII	86	47	15	16	7	1	0	0	0	0
IX	276	128	51	51	31	9	5	1	0	0
X	68	31	16	9	10	2	0	0	0	0
NATION	1826	842	376	320	220	39	21	7	1	0

INDUSTRY: Miscellaneous Business Services, Not Elsewhere Classified

SIC: 7399 (swimming pool cleaning and maintenance only)

DESCRIPTION OF INDUSTRY:

SIC 7399 includes establishments primarily engaged in furnishing business services not elsewhere classified, such as bondsmen, bottle exchanges, drafting service, hotel reservation service, welcome wagon service, etc. Based on the census data, there are a total of 21,375 establishments in SIC 7399 of which 76% have less than 10 employees. Most of the services listed in this SIC which appear to be potential generators of hazardous waste were found to be integrated with and secondary activities of other businesses. For example, bronzing of baby shoes is performed by electroplating shops, servicing of fire extinguishers is performed by fire extinguisher sales shops, etc.

The only type of establishments in the subject SIC which would generate potentially hazardous waste, which would not be regulated elsewhere and which are not largely associated with product sales are the swimming pool cleaning and maintenance services. This assessment summary sheet addresses only the swimming pool cleaning and maintenance service segment of SIC 7399 which encompasses an estimated 2500 establishments[1].

CHARACTERISTICS OF HAZARDOUS WASTES PRODUCED:

Hazardous wastes from swimming pool maintenance include empty containers of chemicals, primarily chlorine but also acid, algicides and other chemicals. Based on the data obtained from the staff at a trade journal ("Swimming Pool Weekly"), an average pool maintenance company is estimated to use about 1000 lbs/mo of chemicals, mostly from 50-lb. containers. Each empty container is estimated to weigh roughly 0.5 kg. Thus, an average pool maintenance company is estimated to dispose of roughly 10 kg/mo of empty chemical containers.

WASTE TREATMENT, STORAGE, AND DISPOSAL PRACTICE:

Most of the empty chemical containers are disposed of with other municipal refuse. Reuse is reported to be a common practice but it is not known what fraction of the waste receives this treatment.

CURRENT DISPOSAL COST:

ALTERNATIVE DISPOSAL METHODS:

Increased use of refillable containers could reduce or eliminate the hazardous wastes from swimming pool maintenance companies.

INDUSTRY PROFILE:

(See table)

ASSESSMENT OF QUALITY OF DATA BASE:

The number of independent swimming pool maintenance companies and the average amount of hazardous waste generated by each company are rough estimates based on a spokesman for a trade journal's knowledge of the industry. No hard technical data are available on waste generation and disposal for the industry.

SOURCES OF DATA USED AND EXPLANATORY NOTES:

(1) Data provided by a representative of Swimming Pool Weekly

(2) All establishments are estimated to produce less than 100 kg/mo of waste. A swimming pool maintenance company would have to use 10 tons/mo of chemical in order to generate 100 kg/mo of empty containers. In the light of an industry average of 1 ton/mo, establishments generating more than 100 kg/mo would be expected to be very few. The amount of waste generated will be greater in the warmer months than in the cooler months but, based on the data provided from Reference 1, it will still be less than 100 kg/mo from any one establishment.

(3) Number of generators in each EPA region (used to derive the aggregate profiles presented in Volume I) is estimated. Based on trade association membership, it is estimated that half of the establishments are in EPA Region IX and the remainder are distributed in proportion to population in other regions.

11/27/79.   08.43.27.

INDUSTRY PROFILE[1,2]   SIC: 7399   NATION
(Swimming pool cleaning and maintenance segment)

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	2500	100.0	50000.	100.0
100-200	0	0.0	0.	0.0
200-300	0	0.0	0.	0.0
300-400	0	0.0	0.	0.0
400-500	0	0.0	0.	0.0
500-600	0	0.0	0.	0.0
600-700	0	0.0	0.	0.0
700-800	0	0.0	0.	0.0
800-900	0	0.0	0.	0.0
900-1000	0	0.0	0.	0.0
1000-2000	0	0.0	0.	0.0
2000-5000	0	0.0	0.	0.0
> 5000	0	0.0	0.	0.0
TOTAL	2500	100.0	50000.	100.0

11/29/79. 13.49.57.

BREAKDOWN OF PLANTS IN EMPLOYMENT SIZE CATEGORIES BY EPA REGION IN SIC 7399

NUMBER OF PLANTS IN EACH CATEGORY

REGION	TOTAL	1-4	5-9	10-19	20-49	50-99	100-249	250-499	500-999	>1000
I	1127	681	183	146	93	18	5	1	0	0
II	3775	2220	623	482	310	83	37	16	2	2
III	1948	1142	356	241	140	41	21	6	0	1
IV	2818	1760	495	310	175	57	16	3	1	1
V	3935	2205	719	538	331	76	50	12	3	1
VI	1970	1149	359	237	152	41	25	5	2	0
VII	965	597	161	112	67	12	11	3	2	0
VIII	602	373	105	65	48	8	2	1	0	0
IX	3545	1961	669	513	301	66	28	6	0	1
X	690	419	128	78	45	10	7	3	0	0
NATION	21375	12507	3799	2722	1662	412	202	56	10	6

ZB-348

INDUSTRY: Automotive Rental and Leasing, Without Drivers SIC: 751

DESCRIPTION OF INDUSTRY:

Establishments primarily engaged in short-term rental or extended term leasing (with or without maintenance) of vehicles without drivers. As with service stations, these establishments will generally service vehicles and will generate similar hazardous wastes. These establishments vary in size (55% have 1-4 employees; see census data computer printout for number distribution of establishments by EPA Region and employment size) and are distributed throughout the country in or near urban centers.

CHARACTERISTICS OF HAZARDOUS WASTES PRODUCED:

Waste oil, a "listed" waste based on toxicity consideration, is the primary hazardous waste generated by the car service centers. The second most predominant waste is used oil filters (which would also be considered toxic). Other hazardous wastes include various toxic and ignitable solvents, corrosive wastes from radiator flushings and contaminated rags.

The total amount of non-oil hazardous waste generated by the subject SIC is estimated at 1.5×10^5 kg/mo (see Industry Profile) with an average rate of 66 kg/mo per generator. Waste lube oil is estimated at 6.2×10^5 kg/mo (see Industry Profile). Oil filters are estimated at 6.1% (5.64×10^4 kg/mo) of the total hazardous waste generated[1].

WASTE TREATMENT, STORAGE AND DISPOSAL PRACTICES:

(See SIC 5511)

CURRENT DISPOSAL COST:

(See SIC 5511)

ALTERNATIVE DISPOSAL METHODS:

(See SIC 5511)

ASSESSMENT OF QUALITY OF DATA BASE:

The waste quantity estimates arrived at in this analysis is based on unit waste generation rates for the service stations (SIC 5511); discussions with one very large vehicle leasing/rental company with numberous service centers throughout the country indicated considerable similarity between the operations of the service stations and vehicle rental/leasing service centers. No independent estimate of wastes for this SIC are available.

SOURCES OF DATA USED AND EXPLANATORY NOTES:

(1) The quantity of oil filters was estimated based on an assumed weight of 1 kg/oil filter and (a) the reported number of oil changes of 153.9×10^6 per year for all service centers (repair garages, service centers, new car dealers, etc.); (b) a reported percentage of 6.8% of the total oil filter changes carried out at service shops; and (c) 6.8% of shops associated with rental/leasing (based on Reference 5).

(2) Based on the state data for SIC 5511

(3) "Economic Impact Analysis of Hazardous Waste Management Regulations on Selected Generating Industries," Draft Report, Contract No. 68-01-4819, December 1978

(4) Based on state data on waste generation quantities[(2)] and the information on number of fleet associated with rental and leasing reported in Reference (5).

(5) "MVMA Motor Vehicle Facts and Figures '78," Motor Vehicle Manufacturing Association

(6) Based on an assumed median waste solvent generation rate of 30 kg/mo per generator and estimated number of establishments from Reference 7.

(7) Based on census data, adjusted for estimated "zero" generators (84%).

INDUSTRY PROFILE[1,6] SIC: 751 NATION

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	1879	82.5	90192.	60.2
100-200	398	17.5	59700.	39.8
200-300	0	0.0	0.	0.0
300-400	0	0.0	0.	0.0
400-500	0	0.0	0.	0.0
500-600	0	0.0	0.	0.0
600-700	0	0.0	0.	0.0
700-800	0	0.0	0.	0.0
800-900	0	0.0	0.	0.0
900-1000	0	0.0	0.	0.0
1000-2000	0	0.0	0.	0.0
2000-5000	0	0.0	0.	0.0
> 5000	0	0.0	0.	0.0
TOTAL	2277[7]	100.0	149892.	100.0

INDUSTRY PROFILE: ESTIMATED NUMBER OF PLANTS AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION RANGE CATEGORIES[4]
(waste oil)

Waste Generation Ranges (kg/mo)	Establishments		Waste Quantity	
	Number	% Total	kg/mo	% Total
less than 100	200	8.8	16,000	2.6
100 - 200	676	30	101,000	16.3
200 - 300	717	31	179,000	28.9
300 - 400	287	13	100,000	16.2
400 - 500	164	7.2	73,800	11.9
500 - 600	112	4.9	61,600	10.0
600 - 700	61	2.7	39,700	6.4
700 - 800	37	1.6	27,750	4.5
800 - 900	24	1.1	20,400	3.3
900 - 1000	0	0	0	0
1000 - 2000	0	0	0	0
2000 - 5000	0	0	0	0
more than 5000	0	0	0	0
U.S. Total	2277[7]	100	6.2×10^5	100

11/29/79.   13.49.57.

BREAKDOWN OF PLANTS IN EMPLOYMENT SIZE CATEGORIES BY EPA REGION IN SICS 7511 TO 7519

NUMBER OF PLANTS IN EACH CATEGORY

REGION	TOTAL	1-4	5-9	10-19	20-49	50-99	100-249	250-499	500-999	>1000
I	369	216	70	37	33	10	2	1	0	0
II	917	558	169	90	64	28	7	1	0	0
III	676	360	146	94	53	21	2	0	0	0
IV	1251	637	248	193	118	47	7	0	1	0
V	1380	773	270	175	118	34	7	2	1	0
VI	646	350	134	68	62	23	8	1	0	0
VII	482	302	91	40	40	9	0	0	0	0
VIII	219	123	49	26	13	6	2	0	0	0
IX	946	477	216	137	85	21	9	1	0	0
X	208	121	43	25	15	4	0	0	0	0
NATION	7094	3917	1436	885	601	203	44	6	2	0

INDUSTRY: Automotive Repair SIC: 7531,7534, 7535

DESCRIPTION OF INDUSTRY:

The establishments covered under the subject SIC's are top and body repair shops (SIC 7531), tire retreading and repair shops (SIC 7534), and paint shops (SIC 7535). These establishments are distributed throughout the country with heaviest concentration in or near urban centers. Majority of the establishments are small, with 70% in the 1-4 employment size range (see census data computer printout for number distribution of establishments by EPA Region and employment size).

CHARACTERISTICS OF HAZARDOUS WASTES PRODUCED:

Hazardous wastes produced from the subject SIC's consist of various toxic and ignitable solvents, toxic paint or glue wastes and sludges, contaminated rags and empty containers[1,2].

The total amount of hazardous waste generated by the subject SIC's is estimated at 820,000 kg/mo with an average generation rate of 35 kg/mo per generator.

WASTE TREATMENT, STORAGE AND DISPOSAL PRACTICES:

Based on contact with a number of establishments[2] the following are the prevalent disposal practices in the industry: waste solvents are usually discharged into the sewer or disposed of on open ground; a smaller number of the larger waste solvent generators use the services of commercial reclaimers for solvent waste disposal. Paint waste, glue waste and sludges are generally disposed of with the nonhazardous waste refuse.

CURRENT DISPOSAL COSTS:

Due to the majority of establishments disposing wastes with regular refuse or via sewer, disposal costs attributed to hazardous wastes are expected to be minimal. The total cost due to hazardous waste disposal should be a very small fraction of the total waste disposal cost for any one generator.

ALTERNATIVE DISPOSAL METHODS:

Environmentally more acceptable waste disposal methods for the subject SIC include: storage and disposal of waste solvents via solvent reclaimers; segregation and separate disposal (e.g., via commercial waste disposal services) of other hazardous wastes from regular refuse; where appropriate, cleaning of the empty containers for recycling or co-disposal with regular refuse.

INDUSTRY PROFILE:

(See table)

SOURCES OF DATA USED AND EXPLANATORY NOTES:

(1) State survey data for six small generators in SIC's 7531-7535

(2) Discussions with five individual establishments in the Los Angeles area

(3) Census data

11/27/79.   08.43.27.

INDUSTRY PROFILE[1]   SIC: 7531   NATION
7534
7535

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	23058	99.0	783972.	95.7
100-200	233	1.0	34950.	4.3
200-300	0	0.0	0.	0.0
300-400	0	0.0	0.	0.0
400-500	0	0.0	0.	0.0
500-600	0	0.0	0.	0.0
600-700	0	0.0	0.	0.0
700-800	0	0.0	0.	0.0
800-900	0	0.0	0.	0.0
900-1000	0	0.0	0.	0.0
1000-2000	0	0.0	0.	0.0
2000-5000	0	0.0	0.	0.0
> 5000	0	0.0	0.	0.0
TOTAL	23291[3]	100.0	818922.	100.0

11/29/79.   13.49.57.

BREAKDOWN OF PLANTS IN EMPLOYMENT SIZE CATEGORIES BY EPA REGION IN SICS 7531 TO 7535

NUMBER OF PLANTS IN EACH CATEGORY

REGION	TOTAL	1-4	5-9	10-19	20-49	50-99	100-249	250-499	500-999	>1000
I	1638	1177	332	109	16	3	1	0	0	0
II	2528	1775	523	179	48	3	0	0	0	0
III	2516	1807	469	190	46	2	2	0	0	0
IV	3749	2674	733	298	47	7	0	0	0	0
V	4660	3331	945	312	64	3	4	1	0	0
VI	2133	1561	395	136	37	4	0	0	0	0
VII	1566	1152	293	99	19	3	0	0	0	0
VIII	815	554	180	63	15	2	0	0	0	0
IX	2852	1802	660	300	80	7	3	0	0	0
X	834	546	185	88	14	0	1	0	0	0
NATION	23291	16379	4715	1764	387	34	11	1	0	0

INDUSTRY: Automotive Repair Garages SIC: 7538

DESCRIPTION OF INDUSTRY:

The establishments in this industry are engaged in general automotive repair (primarily engine repair). The establishments are distributed throughout the country with heaviest concentration near urban centers; the majority of establishments are small in size (80% have 1-4 employees; see census data computer printout for number distribution of establishments by EPA Region and employment size).

CHARACTERISTICS OF HAZARDOUS WASTES PRODUCED:

Waste oil, a "listed" waste based on toxicity consideration, is the primary hazardous waste generated by the car service centers. The second most predominant waste is used oil filters (which would also be considered toxic). Other hazardous wastes include various toxic and ignitable solvents, corrosive wastes from radiator flushings and contaminated rags.

The total amount of hazardous waste generated by the subject SIC is estimated at 30 million kg/mo (see Industry Profile) with an average rate of 940 kg/mo per generator. It is also estimated that non-oil wastes account for 14% of 4.2×10^6 kg/mo of the total hazardous waste generated. The average non-oil hazardous waste generation rate is estimated at 130 kg/mo per generator. Oil filters account for 6.9% (2.1 million kg/mo) of the total hazardous waste[(1)].

WASTE TREATMENT, STORAGE AND DISPOSAL PRACTICES:

(See SIC 5511)

CURRENT DISPOSAL COST:

(See SIC 5511)

ALTERNATIVE DISPOSAL METHODS

(See SIC 5511)

INDUSTRY PROFILE:

(See tables)

ASSESSMENT OF QUALITY OF DATA BASE:

Based on this assessment, 2.6×10^7 kg/mo of waste oil is produced by the subject SIC. Two other reported estimates of waste oil are (a) 9.6×10^6

kg/mo (1970-71)[4] based on the assumption that 63% of oil sold at repair garages is collected as waste oil, and (b) 1.37 x 10^7 kg/mo (1978)[5] based on 9 oil changes per week per establishment and 4.25 liters of waste oil produced per oil change. The 2.6 x 10^7 kg/mo of waste oil arrived at in this study is based on waste oil generation reported by individual establishments.

SOURCES OF DATA USED AND EXPLANATORY NOTES:

(1) The quantity of oil filters was estimated based on an assumed weight of 1 kg/oil filter and (a) the reported number of oil changes of 153.9 x 10^6 per year for all service centers (repair garages, service centers, new car dealers, etc.); and (b) a reported percentage of 14.0% of the total oil filter changes carried out at automotive repair garages (based on Reference 6).

(2) Based on state data for six small generators and information on number of repair garages reported in census data.

(3) Census data

(4) Weinstein, Norman J., "Waste Oil Recycling and Disposal," Recon Systems Inc., August 1974

(5) "Economic Impact Analysis of Hazardous Waste Management Regulations on Selected Generating Industries," Draft Report, Contract No. 68-01-4819, December 1978

(6) "MVMA Motor Vehicles Facts and Figures '78," Motor Vehicle Manufacturers Association

11/27/79. 08.43.27.

INDUSTRY PROFILE[1,6] SIC: 7538 NATION

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	18370	57.5	826650.	19.7
100-200	7316	22.9	1097400.	26.1
200-300	2926	9.2	731500.	17.4
300-400	1463	4.6	512050.	12.2
400-500	813	2.5	365850.	8.7
500-600	390	1.2	214500.	5.1
600-700	325	1.0	211250.	5.0
700-800	325	1.0	243750.	5.8
800-900	0	0.0	0.	0.0
900-1000	0	0.0	0.	0.0
1000-2000	0	0.0	0.	0.0
2000-5000	0	0.0	0.	0.0
> 5000	0	0.0	0.	0.0
TOTAL	31928[3]	100.0	4202950.	100.0

INDUSTRY PROFILE: ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES (WASTE OIL) (2)

Waste Generation Ranges (kg/mo)	Establishments		Waste Quantity	
	Number	% Total	10^6 kg/mo	% Total
less than 100	3,100	9.4	0.20	0.76
100 - 200	5,000	15	0.75	2.9
200 - 300	4,100	12	1.0	3.8
300 - 400	3,400	10	1.2	4.6
400 - 500	2,600	7.9	1.2	4.6
500 - 600	2,000	6.1	1.1	4.2
600 - 700	1,800	5.5	1.2	4.6
700 - 800	1,300	3.9	1.0	3.8
800 - 900	1,300	3.9	1.1	4.2
900 - 1000	970	3.0	1.0	3.8
1000 - 2000	4,500	14	6.8	2.6
2000 - 5000	2,800	8.5	9.7	37
more than 5000	0	0	0	0
U.S. Total	33,000	100	26	100

11/29/79.   13.49.57.

BREAKDOWN OF PLANTS IN EMPLOYMENT SIZE CATEGORIES BY EPA REGION IN SIC 7538

NUMBER OF PLANTS IN EACH CATEGORY

REGION	TOTAL	1-4	5-9	10-19	20-49	50-99	100-249	250-499	500-999	>1000
I	1833	1467	263	79	22	1	1	0	0	0
II	3209	2494	502	168	43	2	0	0	0	0
III	3726	2978	542	169	32	4	1	0	0	0
IV	5403	4333	778	236	50	4	2	0	0	0
V	4815	3754	724	262	66	6	3	0	0	0
VI	4460	3616	606	178	55	3	2	0	0	0
VII	1930	1618	240	53	19	0	0	0	0	0
VIII	1180	955	162	47	14	1	1	0	0	0
IX	4736	3723	727	233	47	3	2	1	0	0
X	1222	981	173	59	9	0	0	0	0	0
NATION	32514	25919	4717	1484	357	24	12	1	0	0

ZB-362

INDUSTRY: General Automotive Repair, Not Elsewhere Classified SIC: 7539

DESCRIPTION OF INDUSTRY:

The establishments in this industry are primarily engaged in specialized automotive repair. Brake, carburetor, radiator and transmission repair shops generate the majority of hazardous waste in SIC 7539. Brake repairing which generates asbestos waste is not covered in this assessment because the management of asbestos waste is regulated by federal clean air and water acts.

The majority of establishments in the subject SIC are small in size (69% 1-4 employees; see census data computer printout for number distribution of establishments by EPA Region and employment size) and are distributed throughout the country with the heaviest concentration in or near urban areas.

CHARACTERISTICS OF HAZARDOUS WASTES PRODUCED:

Potentially hazardous wastes generated by radiator and carburetor repair shops are toxic and corrosive radiator flushings and acids from parts cleaning. The major hazardous wastes generated by transmission repair shops is waste hydraulic fluid which is considered toxic. Contaminated solvents (considered toxic and ignitable) may also be generated by any of the establishments in the subject SIC.

The total amount of hazardous waste generated by the subject SIC is estimated at 3.0×10^6 kg/mo. Radiator and carburetor repair shops account for 5.2×10^5 kg/mo (see Industry Profile) of the total waste, with an average rate of 128 kg/mo per generator. Transmission repair shops account for the remaining 2.5×10^6 kg/mo (see Industry Profile) of waste, with an average rate of 931 kg/mo per generator.

WASTE TREATMENT STORAGE AND DISPOSAL:

Based on the state data, it is estimated that the majority of radiator and carburetor repair shops dispose of hazardous wastes by land disposal (i.e., landfills, land spreading or onsite burial) or via sewer with land disposal being the predominant practice.

Transmission shops generally dispose of waste hydraulic oil via commercial reclaimers[1].

CURRENT DISPOSAL COST:

ALTERNATIVE DISPOSAL METHODS:

Some disposal practices used by small generators (e.g., on-site burial, disposal on open grounds or discharge to sewer) would not be environmentally acceptable. Disposal in hazardous waste management facilities and returning the hydraulic oil and solvents to reclaimers would be considered preferred alternative disposals.

INDUSTRY PROFILE:

(See tables)

ASSESSMENT OF QUALITY OF DATA BASE:

SOURCES OF DATA USED AND EXPLANATORY NOTES:

(1) Based on industry contact in the Los Angeles area

(2) Based on state data for 36 small generators in SIC 7539

(3) Based on state data and estimated number of radiator and carburetor repair shops from Reference (4)

(4) Based on 1976 census data for SIC 7539 and 30%[(5)] of the total repair shops in SIC 7539 being associated with radiator and carburetor repair shops

(5) 1972 Census of Selected Service Industries, U.S. Department of Commerce Publication 5672-A-52

(6) Based on discussions with five individual establishments in the Los Angeles area and estimated number of transmission repair shops from Reference (7)

(7) Based on the census data for SIC 7539 and a reported estimate (Reference 5) that about 20% of the total repair shops in SIC 7539 are involved in transmission repair

11/27/79.   08.43.27.

INDUSTRY PROFILE(2,3)   SIC: 7539   NATION
(Carburetor and radiator repair shops)

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN
VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	2415	59.4	60375.	11.6
100-200	725	17.8	108750.	20.8
200-300	362	8.9	90500.	17.3
300-400	201	4.9	70350.	13.5
400-500	161	4.0	72450.	13.9
500-600	121	3.0	66550.	12.8
600-700	81	2.0	52650.	10.1
700-800	0	0.0	0.	0.0
800-900	0	0.0	0.	0.0
900-1000	0	0.0	0.	0.0
1000-2000	0	0.0	0.	0.0
2000-5000	0	0.0	0.	0.0
> 5000	0	0.0	0.	0.0
TOTAL	4066(4)	100.0	521625.	100.0

SIC: 7539

INDUSTRY PROFILE: ESTIMATED NUMBER OF PLANTS AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION RANGE CATEGORIES (6) (transmission shops only; waste oil)

Waste Generation Ranges (kg/mo)	Establishments		Waste Quantity	
	Number	% Total	kg/mo	% Total
less than 100	215	8	10,750	.4
100 - 200	376	14	56,400	2.2
200 - 300	349	13	87,250	3.5
300 - 400	242	9	87,700	3.3
400 - 500	188	7	84,600	3.3
500 - 600	161	6	88,550	3.5
600 - 700	134	5	87,100	3.4
700 - 800	107	4	80,250	3.2
800 - 900	81	3	68,850	2.7
900 - 1000	81	3	76,950	3.0
1000 - 2000	403	15	604,500	23.9
2000 - 5000	247	9.2	864,500	34.2
more than 5000	48	1.8	336,000	13.3
U.S. Total	2,684 (7)	100	2.5×10^6	100

11/29/79.   13.49.57.

BREAKDOWN OF PLANTS IN EMPLOYMENT SIZE CATEGORIES BY EPA REGION IN SIC 7539

NUMBER OF PLANTS IN EACH CATEGORY

REGION	TOTAL	1-4	5-9	10-19	20-49	50-99	100-249	250-499	500-999	>1000
I	624	419	147	50	7	1	0	0	0	0
II	1362	854	379	109	19	1	0	0	0	0
III	1131	728	300	91	12	0	0	0	0	0
IV	2323	1687	467	149	18	2	0	0	0	0
V	2399	1550	583	217	42	7	0	0	0	0
VI	1765	1231	365	141	21	6	1	0	0	0
VII	701	515	133	44	8	1	0	0	0	0
VIII	431	302	83	40	6	0	0	0	0	0
IX	2165	1594	405	137	27	2	0	0	0	0
X	520	367	116	30	6	1	0	0	0	0
NATION	13421	9247	2978	1008	166	21	1	0	0	0

INDUSTRY: Car Washes SIC: 7542

DESCRIPTION OF INDUSTRY:

The establishments covered under SIC 7542 are primarily engaged in washing cars or in furnishing facilities for the self-service washing of cars. There are 5286 of these establishments in the nation. Distribution of car washes appear to correlate with population density in each EPA region. (See census data computer printout on the distribution of establishments by employment size and EPA region).

CHARACTERISTICS OF HAZARDOUS WASTES PRODUCED:

Cleaning agents, waxes, polishes, rubbing compounds, etc. are the major chemicals used at car washes. Containers from these products can be considered as hazardous waste. Quantity of waste will depend on how large the establishment is as well as how much business it handles. Most car washes purchase cleaning agents in 55-gallon drums which are recycled by the supplier. Smaller wax, polish and rubbing compound containers are those of special concern since they must be disposed of by other means. Based on waste information provided by five car wash establishments ranging in size from 6 to 20 employees, a waste generation rate of 1.5 lb (0.7 kg) per month per employee can be calculated(1).

WASTE TREATMENT, STORAGE AND DISPOSAL PRACTICES:

Other than cleaning agent containers, waste containers from waxes, polishes and rubbing compounds are disposed of in the regular trash. Most car washes will employ private disposal companies for collection services. The major waste at car washes is, of course, the wash water. Some establishments practice partial recycling, but most will discharge the entire effluent to the public sewer(1).

CURRENT DISPOSAL COST:

ALTERNATIVE DISPOSAL METHODS:

Where appropriate, containers may be rinsed prior to co-disposal with nonhazardous refuse.

SIC: 7542

ASSESSMENT OF QUALITY OF DATA BASE:

SOURCES OF DATA USED:

(1) Five car wash establishments

(2) Census data

11/27/79. 06.43.27.

INDUSTRY PROFILE SIC: 7542 NATION

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	5270	99.7	12648.	84.1
100-200	16	.3	2400.	15.9
200-300	0	0.0	0.	0.0
300-400	0	0.0	0.	0.0
400-500	0	0.0	0.	0.0
500-600	0	0.0	0.	0.0
600-700	0	0.0	0.	0.0
700-800	0	0.0	0.	0.0
800-900	0	0.0	0.	0.0
900-1000	0	0.0	0.	0.0
1000-2000	0	0.0	0.	0.0
2000-5000	0	0.0	0.	0.0
> 5000	0	0.0	0.	0.0
TOTAL	5286(2)	100.0	15048.	100.0

11/29/79.   13.49.57.

BREAKDOWN OF PLANTS IN EMPLOYMENT SIZE CATEGORIES BY EPA REGION IN SIC 7542

NUMBER OF PLANTS IN EACH CATEGORY

REGION	TOTAL	1-4	5-9	10-19	20-49	50-99	100-249	250-499	500-999	>1000
I	284	161	54	45	21	1	1	0	0	0
II	581	362	145	54	20	0	0	0	0	0
III	547	307	78	93	60	9	0	0	0	0
IV	763	481	120	94	64	4	0	0	0	0
V	1345	724	308	182	116	12	2	1	0	0
VI	468	346	53	43	22	3	1	0	0	0
VII	333	230	53	32	16	2	0	0	0	0
VIII	148	109	22	13	4	0	0	0	0	0
IX	677	364	108	120	75	8	2	0	0	0
X	140	87	22	17	12	2	0	0	0	0
NATION	5286	3191	943	694	410	41	6	1	0	0

INDUSTRY: Miscellaneous Repair Services SIC: 76

DESCRIPTION OF INDUSTRY:

This major group includes establishments engaged in miscellaneous repair services, not including automotive repair (SIC 753), clothing repair (SIC 7219) and shoe repair (SIC 7251). The eight 4-digit industrial categories which make up this group are:

SIC 7622, Radio and Television Repair Shops
7623, Refrigeration and Air Conditioning Service and Repair Shops
7629, Electrical and Electronic Repair Shops, not elsewhere classified
7631, Watch, Clock, and Jewelry Repair
7641, Reupholstery and Furniture Repair
7692, Welding Repair
7694, Armature Rewinding Shops
7699, Repair Shops and Related Services, not elsewhere classified

Based on the census data, the 47,000 miscellaneous repair service establishemnts are distributed across the nation approximately in proportion to population. These are mostly small establishments with 70% having fewer than 5 employees and 97% having fewer than 30 employees.

CHARACTERISTICS OF HAZARDOUS WASTES PRODUCED:

The non-oil hazardous wastes from repair services reported in the "state" data file include solvents, acid and alkaline cleaners, paint sludges, heavy metal compounds, unspecified toxic organics, and miscellaneous chemicals from tank and barge washings. Of these wastes, solvents are the most common, being reported in one-third of the cases.

WASTE TREATMENT, STORAGE, AND DISPOSAL PRACTICE:

Off-site landfill is the most commonly reported means of waste disposal for all waste types. One establishment reported that it deep well injected its caustic wastes.

Telephone discussions with a number of establishments indicated that the smaller users of solvents (e.g., lawn mower repair shops) got rid of their waste solvents by either land disposal onsite or by taking it to a local service station where the waste is picked up by a commercial recycler. Larger users of solvents (e.g., motorcycle repair shops) tend to have a solvent recycling service pick up their waste solvent.

CURRENT DISPOSAL COST:

None of the repair shops contacted (6) reported any additional waste disposal costs for their hazardous wastes. Some wastes (e.g., paint sludges) are disposed of along with municipal refuse. Solvent recycling service at the motorcycle repair shops generally is part of the purchase price of new solvent. The solvent supplier brings new solvent and takes the used solvent away.

ALTERNATIVE DISPOSAL METHODS:

Solvent recycling could be more widely practiced than is currently the case.

INDUSTRY PROFILE:

(See table)

SOURCES OF DATA USED AND EXPLANATORY NOTES:

(1) Based on state data for 12 establishments

(2) Census data adjusted for "zero" generators. The "zero" generators were assumed to be the establishments in SIC's 7622, 7629, 7631 and 7692. Percentage of large generators were estimated by extrapolating the Plot of generators vs. waste generation rate to the 5000 Kg/mo waste generation rate.

(3) National Alliance of Television and Electronic Service Associations

(4) Refrigeration Service Engineers Society

(5) Electric Apparatus Service Association

(6) Twelve individual establishments in Southern California

11/27/79.   08.43.27.

INDUSTRY PROFILE[1]   SIC: 7600   NATION

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	7358	28.5	367900.	1.3
100-200	4384	17.0	657600.	2.3
200-300	2673	10.3	668250.	2.4
300-400	1831	7.1	640850.	2.3
400-500	1324	5.1	595800.	2.1
500-600	1001	3.9	550550.	1.9
600-700	784	3.0	509600.	1.8
700-800	630	2.4	472500.	1.7
800-900	517	2.0	439450.	1.6
900-1000	431	1.7	409450.	1.5
1000-2000	2123	8.2	3184500.	11.3
2000-5000	1263	4.9	4420500.	15.7
> 5000	1532	5.9	15320000.	54.3
TOTAL	25851[2]	100.0	28236950.	100.0

11/29/79. 13.49.57.

BREAKDOWN OF PLANTS IN EMPLOYMENT SIZE CATEGORIES BY EPA REGION IN SIC 7600

NUMBER OF PLANTS IN EACH CATEGORY

REGION	TOTAL	1-4	5-9	10-19	20-49	50-99	100-249	250-499	500-999	>1000
I	2445	1839	393	140	58	12	3	0	0	0
II	5150	3814	779	323	175	40	17	2	0	0
III	4575	3250	762	356	165	28	12	2	0	0
IV	8340	6252	1316	543	194	19	14	2	0	0
V	8444	6069	1397	634	272	55	15	1	0	1
VI	6466	4683	1051	470	207	39	15	1	0	0
VII	2745	2095	439	152	48	6	5	0	0	0
VIII	1618	1219	240	108	46	3	2	0	0	0
IX	6269	4552	1045	476	142	41	11	2	0	0
X	1822	1336	317	125	39	4	0	1	0	0
NATION	47874	35109	7739	3327	1346	247	94	11	0	1

INDUSTRY: Bowling Alleys SIC: 7933

DESCRIPTION OF INDUSTRY:

The establishments in SIC 7933 include businesses known as bowling alleys or lanes. These establishments also frequently sell meals and refreshments. Bowling alleys are distributed in all regions throughout the nation. Most bowling alleys are in the small size employment range category. (See the census data computer printout for number distribution of bowling alleys by EPA Region and employment size category.)

CHARACTERISTICS OF HAZARDOUS WASTES PRODUCED[1]:

Hazardous wastes generated in connection with alley/lane operation and maintenance include sandings and waste containers which may contain some potentially hazardous substances depending on the type of surface coating used on the alleys. For many years the most widely used alley coating was lacquer. This is increasingly being replaced in recent years because lacquer is flammable and does not condition the lane wood. In recent years lacquer has been replaced by methane coatings which are also now phasing out in favor of a Brunswick epoxy coating conditioner called Astro Lane. Astro Lane has the consistency of a paste and is applied in two units - a base coat and a top coat. It takes approximately 1.9 liters (2 quarts) of base coat and 0.9 liters (2 pints) of top coat per lane. Astro Lane is reportedly not flammable, but, as an epoxy, it may be toxic. At a representative 24- to 32-lane bowling alley, lanes are resurfaced about once every two years. During resurfacing about 0.16 cm (1/16 in) of surface coating is removed by sanding, and dry sandings average about 6.8 kg (15 lb) per lane. At an establishment with 32 lanes this amounts to 218 kg (480 lb). Based on an estimated Astro Lane waste container generation rate of 0.28 kg (5/8 lb) per lane, about 9 kg (20 lb) of waste containers would result from resurfacing of 32 lanes. Thus, the total waste resulting from resurfacing 32 lanes is 227 kg (503 lb) every two years or about 9 kg (21 lb) per month. Assuming this waste generation rate is typical of the establishments in SIC 7933, the total waste quantity produced by the industry is estimated at 56,200 kg/mo.

WASTE TREATMENT, STORAGE AND DISPOSAL PRACTICES:

Resurfacing of bowling lanes is most often performed by an outside company on a contract basis. All resulting wastes are disposed of along with the regular wastes of the establishment. Wastes are generally collected either by a private disposal company or municipal refuse collection[(1)].

CURRENT DISPOSAL COST:

No incremental cost; the quantity of hazardous waste (sandings and containers) is a very minute fraction of the total refuse generated by an establishment and the disposal of this waste with the nonhazardous waste makes no measurable impact on the total cost of waste disposal.

INDUSTRY PROFILE:

(See table)

ALTERNATIVE DISPOSAL METHODS:

Segregation of hazardous waste from regular refuse and disposal of hazardous wastes in a hazardous waste management facility.

ASSESSMENT OF OUALITY OF DATA BASE:

SOURCES OF DATA USED AND EXPLANATORY NOTES:

(1) Two bowling establishments, two lane refinishing companies, two bowling associations, and three bowling supply companies

(2) Census data

11/27/79.   06.43.27.

INDUSTRY PROFILE   SIC: 7933   NATION

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	6247	100.0	56223.	100.0
100-200	0	0.0	0.	0.0
200-300	0	0.0	0.	0.0
300-400	0	0.0	0.	0.0
400-500	0	0.0	0.	0.0
500-600	0	0.0	0.	0.0
600-700	0	0.0	0.	0.0
700-800	0	0.0	0.	0.0
800-900	0	0.0	0.	0.0
900-1000	0	0.0	0.	0.0
1000-2000	0	0.0	0.	0.0
2000-5000	0	0.0	0.	0.0
> 5000	0	0.0	0.	0.0
TOTAL	6247[2]	100.0	56223.	100.0

11/29/79. 13.49.57.

BREAKDOWN OF PLANTS IN EMPLOYMENT SIZE CATEGORIES BY EPA REGION IN SIC 7933

NUMBER OF PLANTS IN EACH CATEGORY

REGION	TOTAL	1-4	5-9	10-19	20-49	50-99	100-249	250-499	500-999	>1000
I	384	149	97	88	49	1	0	0	0	0
II	721	155	151	232	167	16	0	0	0	0
III	612	154	133	170	147	6	2	0	0	0
IV	465	91	85	152	119	17	1	0	0	0
V	2045	599	395	500	482	66	2	0	1	0
VI	349	83	66	78	107	13	2	0	0	0
VII	607	251	106	122	121	5	2	0	0	0
VIII	332	136	70	65	53	7	1	0	0	0
IX	448	85	40	82	196	41	4	0	0	0
X	284	85	60	63	65	10	1	0	0	0
NATION	6247	1788	1203	1552	1506	182	15	0	1	0

INDUSTRY: Racing, Including Track Operations SIC: 7948

DESCRIPTION OF INDUSTRY:

Establishments included in the subject SIC are promoters and participants in racing activities, including race track operations; operators of racing stables, jockeys, race horse trainers, and race car owners and operators. The census data indicate a total of 1782 establishments for SIC 7948 of which 1169 (66%) are in the 1-4 employee size category (see census data computer printout for number distribution of establishments by EPA Region and employment size category).

In the United States there are 114 thoroughbred race tracks distributed in 31 states(1). California has the largest number at 13 and Kentucky, Louisiana, Illinois and New Jersey each have 5. Thoroughbred tracks are licensed by the state which determines how many days per year the track will have racing activity, so operation time is variable(1).

There are approximately 1670 motor tracks throughout the U.S.(2), varying in size ranging from small dirt tracks to larger operations racing everything from motorcycles to "Indianapolis-type" cars(1). Motor tracks are also variable in operation. Those in mild climates may race year-around while those in other areas may be more limited.

CHARACTERISTICS OF HAZARDOUS WASTES PRODUCED:

Wastes of a hazardous nature generated by establishments under SIC 7948 include pesticides, pesticide containers and paint containers resulting from landscaping and maintenance, and waste oil from the maintenance of motor vehicles at motor tracks.

Quantity of waste pesticide containers generated at horse tracks also will vary, but one of the largest tracks was able to provide an estimate of 54 kg/mo of pesticide containers generated during racing season. Based on estimated employment of 1000 for this particular race track, a waste generation rate of 0.05 kg/mo/employee can be expected for horse race tracks (a total waste quantity of 1070 kg/mo). The quantity of waste oil expected from a motor track which provides waste oil collection facility onsite is estimated at 225 kg/mo(3).

WASTE TREATMENT, STORAGE AND DISPOSAL PRACTICES:

Pesticide containers are either disposed of with the general refuse or accumulated and taken to a hazardous waste disposal site[1]. One track reportedly cleans and flushes the pesticide containers and then hauls them to a state disposal installation.

Based on a sampling of six motor tracks, approximately half of the tracks provide holding tanks for the purpose of storing waste oils and hydraulic fluids until this is hauled away by a private disposal company. The other half of tracks do not provide such service and the vehicle owners either maintain the autos elsewhere or take the waste oil with them.

CURRENT DISPOSAL COST:

The disposal of the waste oil via waste oil collectors is generally at no cost to the generators; larger quantities of waste oil are usually sold to the waste oil collectors. With the continuous rise in oil prices, the practice of waste disposal via waste oil collectors would be expected to become more attractive in the future, thus reducing the number of generators which currently dispose of wastes by other methods (e.g., landfills, sewers or dumping on open grounds).

No incremental disposal cost would be associated with co-disposal of hazardous wastes with the regular refuse because the quantity of hazardous waste (paint and pesticide containers) is a very minute fraction of the total refuse generated by an establishment.

ALTERNATIVE DISPOSAL METHODS:

Provided that waste collectors carry out environmentally acceptable operations, the disposal of waste oil via waste collectors is environmentally more acceptable than other disposal methods currently used by some generators (see Current Disposal Cost, above).

Provided that the pesticide containers are properly rinsed and the rinsate is disposed of in an environmentally acceptable manner, pesticide containers can be co-disposed with regular refuse in sanitary landfills.

INDUSTRY PROFILE:

(See table)

ASSESSMENT OF THE QUALITY OF DATA BASE:

Only a few of the establishments contacted had data on waste generation quantities. Because of the differences in the operation of various tracks, variations would be expected in waste quantities among different tracks. The estimated generation rates used, which are for specific tracks, may not be entirely representative of all tracks.

SOURCES OF DATA USED AND EXPLANATORY NOTES:

(1) A total of nine race tracks and racing associations

(2) Based on the census data which indicate a total of 1782 establishments having SIC 7948 as primary activity and allowing for the reported 114 thoroughbred racing tracks in the U.S.

(3) Calculated based on 30 vehicles in a race, 9.4 liters (10 quarts) of waste oil generated per car per race and an average of one race per month

(4) Assuming that all 114 horse tracks are in the 20 to >1000 employment categories and the number of tracks in each census data employment category is distributed in proportion to the ratio of 114 tracks to the total of 190 establishments given in the census data for the 20 to >1000 employment categories.

(5) This number represents half the total number of race tracks; only 50% of the race tracks are assumed to generate waste oil onsite (see text).

INDUSTRY PROFILE (4) SIC: 7948 NATION
(Horse Track)

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	114	100.0	1072.	100.0
100-200	0	0.0	0.	0.0
200-300	0	0.0	0.	0.0
300-400	0	0.0	0.	0.0
400-500	0	0.0	0.	0.0
500-600	0	0.0	0.	0.0
600-700	0	0.0	0.	0.0
700-800	0	0.0	0.	0.0
800-900	0	0.0	0.	0.0
900-1000	0	0.0	0.	0.0
1000-2000	0	0.0	0.	0.0
2000-5000	0	0.0	0.	0.0
> 5000	0	0.0	0.	0.0
TOTAL	114	100.0	1072.	100.0

SIC: 7948
(motor track)

INDUSTRY PROFILE: ESTIMATED NUMBER OF PLANTS AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION RANGE CATEGORIES (WASTE OIL)

Waste Generation Ranges (kg/mo)	Establishments		Waste Quantity	
	Number	% Total	kg/mo	% Total
less than 100				
100 - 200				
200 - 300	835	100	188,000	100
300 - 400				
400 - 500				
500 - 600				
600 - 700				
700 - 800				
800 - 900				
900 - 1000				
1000 - 2000				
2000 - 5000				
more than 5000				
U.S. Total	835 (5)	100	188,000	100

11/29/79.   13.49.57.

BREAKDOWN OF PLANTS IN EMPLOYMENT SIZE CATEGORIES BY EPA REGION IN SIC 7948

NUMBER OF PLANTS IN EACH CATEGORY

REGION	TOTAL	1-4	5-9	10-19	20-49	50-99	100-249	250-499	500-999	>1000
I	105	68	15	11	4	3	0	4	0	0
II	266	185	35	22	13	4	1	2	1	3
III	229	144	28	27	15	5	1	6	3	0
IV	328	197	50	37	19	5	9	6	4	1
V	356	246	48	36	9	1	14	2	0	0
VI	137	86	18	19	9	0	1	2	2	0
VII	66	50	9	3	2	0	2	0	0	0
VIII	28	21	2	2	1	0	1	1	0	0
IX	225	147	27	22	14	2	4	7	1	1
X	42	25	9	3	2	1	1	1	0	0
NATION	1782	1169	241	182	88	21	34	31	11	5

INDUSTRY: Amusement Parks SIC: 7996

DESCRIPTION OF INDUSTRY:

Included within SIC 7996 are establishments known as amusement parks, kiddie parks, etc., which group together and operate in whole or part a number of attractions such as mechanical rides, amusement devices, refreshment stands and picnic grounds. Amusement parks are located throughout the country and are generally in proportion to population. Based on the census data, there are 522 amusement parks in the U.S. with slightly over half of them employing 1-4 persons. The number distribution of amusement parks by EPA Region and employment size are shown in the census data computer printout.

CHARACTERISTICS OF HAZARDOUS WASTES PRODUCED:

Hazardous wastes generated at amusement parks can include waste oil from the maintenance of vehicles and mechanical equipment, paint containers and waste solvents from maintenance operations, and pesticide containers from landscape maintenance. Quantities will vary from park to park depending on size and type of park. The following waste quantity data were provided by one of the largest amusement parks in the country: waste oil (a "listed" waste based on toxicity considerations) 3338 kg/mo, paint solvent (toxic and ignitable organic wastes) 668 kg/mo and paint and pesticide containers (toxic wastes) 227 kg/mo (a total waste quantity of 4233 kg/mo). Based on an estimated employment of 1000 for this particular amusement park, waste generation rates of 3.3 kg/mo/employee for waste oil and 0.9 kg/mo/employee for other hazardous wastes can be expected for amusement parks.

WASTE TREATMENT, STORAGE AND DISPOSAL PRACTICES:

At the large park mentioned above, the waste is recycled onsite as much as possible. Up to half of the waste oil is recycled and re-used onsite; the rest is collected by vendors for recycling. This may not be the case for most parks, however, other disposal methods such as landfills, discharge to sewer or dumping on open grounds is probably practiced at some of the smaller amusement parks. At all three establishments contacted, waste solvents are sold to a vendor for recycling, and paint and pesticide containers are disposed of along with nonhazardous wastes[1].

CURRENT DISPOSAL COST:

The disposal of the waste oil via waste oil collectors is generally at no cost to the generators; larger quantities of waste oil are usually sold to the waste oil collectors. With the continuous rise in oil prices, the practice of waste disposal via waste oil collectors would be expected to become more attractive in the future, thus reducing the number of generators which currently dispose of wastes by other methods (e.g., landfills, sewers or dumping on open grounds).

No incremental disposal cost would be associated with co-disposal of hazardous wastes with the regular refuse because the quantity of hazardous waste (paint and pesticide containers) is a very minute fraction of the total refuse generated by an amusement park.

ALTERNATIVE DISPOSAL METHODS:

Disposal of waste oil and solvents via waste collectors is environmentally more acceptable than other disposal methods currently used by some generators (see Current Disposal Cost, above).

INDUSTRY PROFILE:

(See tables)

ASSESSMENT OF THE QUALITY OF DATA BASE:

Except for the one very large amusement park, the establishments contacted had no data on waste generation quantities for their operations. The estimated waste generation rates for the large park may not be representative of the smaller parks.

SOURCES OF DATA USED:

(1) Three amusement parks

(2) From U.S. census data

(3) Calculated based on estimated waste generation rates of 0.9 kg/mo/employee and the census data on number of establishments in various employment size categories.

(4) Calculated based on estimated waste and generation rate of 3.3 kg/mo/employee and the census data on number of establishment in various employment size categories

11/27/79. 08.43.27.

INDUSTRY PROFILE[3] SIC: 7996 NATION

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	509	96.8	3767.	56.1
100-200	13	2.5	1950.	29.0
200-300	4	.8	1000.	14.9
300-400	0	0.0	0.	0.0
400-500	0	0.0	0.	0.0
500-600	0	0.0	0.	0.0
600-700	0	0.0	0.	0.0
700-800	0	0.0	0.	0.0
800-900	0	0.0	0.	0.0
900-1000	0	0.0	0.	0.0
1000-2000	0	0.0	0.	0.0
2000-5000	0	0.0	0.	0.0
> 5000	0	0.0	0.	0.0
TOTAL	526[2]	100.0	6717.	100.0

SIC: 7996

INDUSTRY PROFILE: ESTIMATED NUMBER OF PLANTS AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION RANGE CATEGORIES (4) (WASTE OIL)

Waste Generation Ranges (kg/mo)	Establishments		Waste Quantity	
	Number	% Total	kg/mo	% Total
less than 100	509	96.8	13,355	56.1
100 - 200	13	2.5	6,914	29
200 - 300	4	0.8	3,545	14.9
300 - 400	0	0	0	0
400 - 500	0	0	0	0
500 - 600	0	0	0	0
600 - 700	0	0	0	0
700 - 800	0	0	0	0
800 - 900	0	0	0	0
900 - 1000	0	0	0	0
1000 - 2000	0	0	0	0
2000 - 5000	0	0	0	0
more than 5000	0	0	0	0
U.S. Total	526 (2)	100	23,815	100

11/29/79.   13.49.57.

BREAKDOWN OF PLANTS IN EMPLOYMENT SIZE CATEGORIES BY EPA REGION IN SIC 7996

NUMBER OF PLANTS IN EACH CATEGORY

REGION	TOTAL	1-4	5-9	10-19	20-49	50-99	100-249	250-499	500-999	>1000
I	40	16	9	10	4	0	1	0	0	0
II	67	35	12	13	7	0	0	0	0	0
III	54	27	12	6	4	4	0	1	0	0
IV	62	43	11	8	7	4	6	0	2	1
V	88	54	14	7	9	2	0	2	0	0
VI	53	24	7	10	7	2	1	0	0	2
VII	27	16	2	3	2	0	1	3	0	0
VIII	22	15	1	1	1	2	1	1	0	0
IX	67	30	10	6	10	4	2	1	1	3
X	22	17	1	0	1	3	0	0	0	0
NATION	522	277	79	64	52	21	12	8	3	6

INDUSTRY: Hospitals SIC: 806

DESCRIPTION OF INDUSTRY:

Hospitals include establishments primarily engaged in providing diagnostic services, extensive medical treatment (including surgical services), as well as continuous nursing services. These establishments have an organized medical staff, inpatient beds and the necessary equipment and facilities to provide complete health care. Hospitals are classified as either short-stay (average per patient occupancy of less than 30 days) or long-stay (average stay of more than 30 days per patient). Specific types of hospitals include general medical and surgical hospitals (SIC 8062, usually short-stay), psychiatric hospitals (SIC 8063, usually long-stay) and specialty hospitals, except psychiatric (SIC 8069, specialties include children's diseases, chronic diseases, geriatrics, orthopedics, etc. and hospitals can be either long- or short-stay depending on specialty). Data for 1973 shows that the overwhelming majority (87%) of the nations hospitals are in the general medical and surgical category(1). The remaining facilities are split between psychiatric hospitals (7%) and other specialty hospitals (6%)(1).

In recent years there has been a decrease in the number of hospitals (and hospital beds)(1). The decline in hospital beds has been entirely within the specialty hospitals; the number of beds in general medical and surgical hospitals has, in fact, increased(1).

The number of general hospital beds appear to be well distributed between urban and rural areas. In 1974 there were 4.4 and 4.7 short-stay beds per 1000 people in large metropolitan areas and in "rural" counties (i.e., counties which were not adjacent to standard metropolitan statistical areas), respectively(1).

Census data (for 1976) indicate 5333 establishments in the U.S. in SIC 806 with about 81%, 67% and 26% of the facilities having greater than 50, 100 and 500 employees, respectively.

Other sources of data do not corroborate the census figure for the number of hospitals. One source (HEW) gives the total number of hospitals for 1973 as 7438[1]. The American Hospital Association (AHA) gives the number of hospitals approved by the AHA as 7082 for 1976 and 7123 for 1973. For the purpose of this assessment, the HEW data for 1973 have been used, with adjustment made to 1976 based on the decrease in the number of AHA-approved hospitals reported for 1976 compared to 1973.

CHARACTERISTICS OF HAZARDOUS WASTES PRODUCED:

Potentially hazardous wastes generated in hospitals include: (a) chemicals from X-ray laboratories, (b) pathological, infectious and chemical wastes from general laboratories, (c) pathological wastes consisting of tissue material from biopsies, autopsies and surgery, (d) infectious wastes from contagion wards and (e) radiological materials from radioisotope treatment and diagnostic studies.

General medical and surgical hospitals (SIC 8062) generate wastes in all the categories listed above. Psychiatric or mental hospitals (SIC 8063) generate only very small amounts of hypodermic needles and syringes ("sharps") and X-ray laboratory wastes. Possible exceptions are the very large veterans psychiatric hospitals which have surgery wings and isolation wards and thus will also generate pathological and infectious waste. Specialty hospitals (SIC 8069) which treat specified types of patients or illnesses (i.e., children; chronic disease; eye, ear, nose and throat; maternity; orthopedics; and tuberculosis) generate wastes in most, but not necessarily all, of the categories of hazardous wastes listed above.

Data on hospital waste quantities and disposal procedures are available from hospital surveys conducted by a limited number of states. About 18% of the hospitals in Kansas covered in the state data base are small volume generators with an average hazardous waste output of 400 kg/mo. A 1976 Iowa survey[3] shows 90% of the hospitals returning questionnaires to be small volume generators with an average output of 57 kg/mo. The U.S. Center for Disease Control concurs with estimates obtained for the Los Angeles area that the average quantity of infectious wastes generated by a 500-bed hospital amounts to approximately 400-500 kg/mo.

The total hazardous waste quantity produced by hospitals nationwide is estimated at 3.0 million kg/mo (see Industry Profile).

WASTE TREATMENT, STORAGE AND DISPOSAL PRACTICES:

There are a variety of regulations and standards which apply to the handling of pathological, infectious and radioactive wastes produced by hospitals. The Joint Commission on Accreditation of Hospitals (JCAH) provides accreditation for hospitals which meet specified standards, including recommended methods of handling pathological, infectious and laboratory wastes. Hospitals which are certified to participate in the medicare health insurance program also have to meet certain Department of Health, Education and Welfare (HEW) established guidelines regarding waste disposal practices. The states of California and Iowa (and many other states) have specific regulations which control the manner in which hospital-generated wastes are to be handled. In addition, there are also business and professional codes which prescribe the correct manner to dispose of hospital wastes. These methods are generally in line with those described below, based on contacts with five hospitals in the Los Angeles area.

- X-ray waste - film is sent to a contractor for recovery of the silver and disposal of the film residues. Spent developer is sent directly to the sewer and fixer is treated at the hospital for silver recovery and the residue sent to the sewer.
- General laboratory waste - solvents are collected separately and incinerated, either by contractor or onsite. Pathological and infectious wastes may be incinerated. Sharps are clipped or ground and incinerated. Bacteriological cultures are often autoclaved prior to disposal.
- Pathological wastes from surgeries, biopsies and autopsies are incinerated onsite by the hospital or by a contractor at an approved private facility.
- Infectious wastes are double-bagged, autoclaved to sterility and disposed of in a landfill by a contractor at an approved facility.
- Radiological wastes are stored separately from other wastes and disposed through licensed contractors or in an approved manner (e.g., dilution and discharge to sewer for certain specified wastes). It is understood that these wastes are not incinerated nor sent with other waste residues to a common landfill.
- In cases involving recognizable limbs and human specimens, landfilling is deleted as a possible disposal method due to aesthetic criteria as opposed to direct public health considerations.

For the purpose of this study, infectious wastes are not considered as hazardous if they are sterilized or incinerated prior to disposal. Although hospitals may report that their "infectious" wastes are incinerated, varying definitions of infectious waste make it difficult to determine if all of the infectious waste is actually incinerated. Based on state survey data of 32 hospital facilities, 9% indicated onsite incineration as a disposal method for body tissues; 88% indicated that for some or all of the wastes generated, including "infectious" waste, their disposal method was unknown. A University of Minnesota study of 80 general hospitals found that 35% of the total waste from all hospitals is incinerated onsite[(8)]. However, this study did not obtain data on the percentage of pathological or infectious waste being processed by a specific disposal method. Another study on disposal methods for infectious waste estimated that less than 5% of the total hospital waste was incinerated onsite[(4)]. This waste was identified by the facilities as "infectious" or "pathological." Because of the discrepancies in the data, all wastes described as "infectious" have been included in the total hazardous waste quantity produced by hospitals regardless of the method of disposal.

CURRENT DISPOSAL COSTS:

Disposal costs for hospital wastes have been the subject of a number of studies[(4)]. However, due to widely differing timeframes, basic assumptions and methods of presenting data, the reported costs vary over a wide range. The overall cost of disposal of hospital wastes is dependent on a number of percentages including:

- amount of pretreatment (compaction, autoclaving, shredding, etc.)
- method of disposal (landfill, incineration, etc.)
- distance to disposal site

ALTERNATIVE DISPOSAL METHODS:

One alternative hospital waste disposal method which has been tested in the Los Angeles area which would decrease the quantity of waste destined for offsite disposal is to use a heavy duty garbage disposal to grind certain wastes and discharge them to the sewer. Based on preliminary results, the method is considered of questionable success.

SIC: 806

INDUSTRY PROFILE:

(See table)

ASSESSMENT OF THE QUALITY OF DATA BASE:

SOURCES OF DATA USED AND EXPLANATORY NOTES:

(1) U.S. Department of Health Education and Welfare, Health, United States 1976-1977

(2) Hospital Statistics, 1977 ed., American Hospital Association

(3) Iowa Hospital Survey results; survey conducted by the Department of Environmental Quality of State of Iowa

(4) Enviro Control, Inc., Evaluation of Treatment, Storage and Disposal Methods for Infectious Waste, Draft Final Report submitted to EPA, May 1979

(5) Based on waste quality data for 29 establishments covered in the state data base

(6) Estimated based on HEW/AHA data (see text)

(7) Census data

(8) Kiefer, I., 1974. Hospital Wastes, publication SW-129, U.S. EPA, Washington, D.C.

11/27/79. 08.43.27.

INDUSTRY PROFILE[5] SIC: 8060 NATION

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	5119	69.2	255950.	8.4
100-200	647	8.7	97050.	3.2
200-300	325	4.4	81250.	2.7
300-400	206	2.8	72100.	2.4
400-500	145	2.0	65250.	2.1
500-600	109	1.5	59950.	2.0
600-700	86	1.2	55900.	1.8
700-800	70	.9	52500.	1.7
800-900	58	.8	49300.	1.6
900-1000	49	.7	46550.	1.5
1000-2000	261	3.5	391500.	12.8
2000-5000	209	2.8	731500.	23.9
> 5000	111	1.5	1098900.	35.9
TOTAL	7395[6]	100.0	3057700.	100.0

11/29/79.   13.49.57.

BREAKDOWN OF PLANTS IN EMPLOYMENT SIZE CATEGORIES BY EPA REGION IN SIC 8060

NUMBER OF PLANTS IN EACH CATEGORY

REGION	TOTAL	1-4	5-9	10-19	20-49	50-99	100-249	250-499	500-999	>1000
I	351	19	12	5	22	36	88	54	63	52
II	445	21	13	1	11	27	68	96	116	92
III	582	34	12	14	25	43	125	133	116	80
IV	796	60	36	28	59	127	196	137	95	58
V	973	38	23	17	41	108	241	160	175	170
VI	674	67	23	22	82	139	149	98	57	37
VII	376	19	12	6	44	62	100	55	39	39
VIII	283	15	6	8	58	74	56	29	22	15
IX	665	54	16	14	43	119	170	120	88	41
X	188	6	6	6	22	28	39	45	25	11
NATION	5333	333	159	121	407	763	1232	927	796	595

INDUSTRY: Medical Laboratories SIC: 8071

DESCRIPTION OF INDUSTRY:

This SIC covers establishments primarily engaged in providing professional analytic or diagnostic services to the medical profession, or to the patient on prescription of a physician. The category includes the following specific types of laboratories: bacteriological laboratories (not manufacturing); biological laboratories (not manufacturing); biological chemists (not manufacturing) laboratories, medical laboratories (clinical); pathological laboratories; and X-ray laboratories (not manufacturing). These facilities usually receive specimens from other health care facilities (e.g., hospitals, physician's offices, nursing homes, etc.) and perform the required chemical, bacteriological or pathological analyses or examination on a systematic mass-produced basis. X-ray laboratories are facilities that take X-ray photographs of specified areas of ambulatory patients upon request from health personnel (e.g., doctors, chiropractors, etc.). X-ray labs are used by those health professionals who require X-ray photographs for diagnostic purposes, but who do not have their own onsite X-ray facilities.

Census data indicate a nationwide total of 3921 establishments within SIC 9071, with about 54% and 74% of the establishments having less than 5 and 10 employees, respectively. Based on the census data, about 19% and 22% of the establishments are located in EPA Regions V and IX, respectively.

CHARACTERISTICS OF HAZARDOUS WASTESPRODUCED:

Hazardous wastes generated by medical labs generally fall within one of the following four categories:

- radioactive wastes
- biological and contagious materials (cultures of pathological organisms, pathological tissue specimens, stool samples from infected individuals, etc.)
- clinical specimens for routine analysis procedures (blood, urine, vomit, etc.)
- waste chemical reagents (buffers, acids, alkalis, salts, organic compounds, etc.) from normal laboratory operations and waste X-ray processing fluids

Many of the specimens received by a laboratory are in 10 milliliter quantities and one lab (with 35 employees) reportedly processes 300 such specimens per day.

Information obtained from (a) state survey data (a total of five facilities in Kansas and California) and (b) phone contacts with two individual facilities in the Los Angeles area indicates hazardous waste generation rates ranging from 3 kg/mo to 488 kg/mo. The information on these seven establishments provide the basis for this assessment.

WASTE TREATMENT, STORAGE, AND DISPOSAL PRACTICES:

Disposal practices vary with the type of wastes and are generally as follows:

- If a laboratory generates a "large" amount of radioactive waste, it employs services of a commercial waste disposal company to handle the radioactive wastes. Small amounts of "weakly" radioactive wastes are flushed down the sink with large amounts of water.
- Biological and contagious wastes are generally autoclaved to destroy infectious agents; these wastes are then disposed of as normal trash.
- Clinical specimens which remain after samples have been subjected to required analyses are disposed of by different means, depending on the waste. Urine and blood are flushed down the sink. Other specimens are either discharged to the sewer system or doubled bagged and deposited with the regular trash. Some specimens may be autoclaved prior to being discarded.
- Aqueous reagent wastes (e.g., inorganic buffers, acids, bases, enzyme solutions, etc.) are usually discharged to the municipal sewer. Automated analytical equipment reportedly uses small amounts of reagents, so labs with this type of equipment should not have large quantities of this type of waste. According to personnel at one lab, organic solvents are collected by a commercial disposal company.
- X-ray laboratories will likely use enough processing fluids to make it economical to reclaim silver from waste fixer solutions. The waste fixer will most likely be taken away in the form of a silver reclamation cartridge. The "de-silvered" fixer solution is discharged to the municipal sewer. The waste developer solutions are generally discharged directly to the sewer.

Medical labs in California are subject to regulations governing disposal of radioactive, microbiological, and contaminated specimen wastes. State regulatory agencies also provide recommendations and guidelines concerning the disposal of waste chemical reagents and specimen wastes from procedures such as routine blood and urine work. In addition to state regulations, there are also Federal Medicare regulations which cover disposal of certain infectious wastes, and other Federal or state administered regulations for specified radioactive materials. There are certain waste categories which evade control by either set of nationwide regulations. The extent to which wastes from medical labs are controlled in individual states will depend primarily on (a) whether the state is an "Agreement State" (i.e., states which have approved plans and an agreement with the Federal Nuclear Regulatory Commission (NRC) concerning the control of radioactive substances) and (b) the comprehensiveness of state regulations with respect to which wastes and which facilities are covered.

CURRENT DISPOSAL COSTS:

No specific cost data for the disposal/treatment of wastes from the medical laboratory industry could be identified, and it is not clear whether such data actually exist. One company which provides commercial waste pickup and disposal service to hospitals, nursing homes and other facilities generating infectious wastes indicated that it charges 8 cents to 11 cents per pound (depending on distance travelled) with a minimum service charge of $20 per waste pickup.

ALTERNATIVE DISPOSAL METHODS:

INDUSTRY PROFILE:

(See table)

ASSESSMENT OF QUALITY OF DATA BASE:

SOURCES OF DATA USED AND EXPLANATORY NOTES:

(1) Based on waste quantity data reported by five facilities in Kansas and California in the state data base and discussions with two individual facilities in the Los Angeles area

(2) Census data

(3) Discussion with one company providing waste pickup and disposal services to the health service industry and three medical laboratories in the Southern California area. The three medical

laboratories contacted employ 35, 235 and 500 persons; the laboratory with 500 employees in one of a number of laboratories throughout the country which are owned by the same company.

(4) Enviro Control, Inc., "Evaluation of Treatment, Storage and Disposal Methods for Infectious Waste," report prepared for EPA, May 1979

11/27/79. 08.43.27.

INDUSTRY PROFILE[1] SIC: 8071 NATION

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	3098	79.0	52666.	14.3
100-200	353	9.0	52950.	14.4
200-300	196	5.0	49000.	13.3
300-400	118	3.0	41300.	11.2
400-500	20	.5	9000.	2.4
500-600	20	.5	11000.	3.0
600-700	39	1.0	25350.	6.9
700-800	12	.3	9000.	2.4
800-900	12	.3	10200.	2.8
900-1000	8	.2	7600.	2.1
1000-2000	27	.7	40500.	11.0
2000-5000	17	.4	59500.	16.2
> 5000	1	.0	0.	0.0
TOTAL	3921[2]	100.0	368066.	100.0

11/29/79.   13.49.57.

BREAKDOWN OF PLANTS IN EMPLOYMENT SIZE CATEGORIES BY EPA REGION IN SIC 8071

NUMBER OF PLANTS IN EACH CATEGORY

REGION	TOTAL	1-4	5-9	10-19	20-49	50-99	100-249	250-499	500-999	>1000
I	222	118	49	31	17	5	2	0	0	0
II	434	222	104	67	24	14	2	0	1	0
III	294	146	55	51	29	5	5	2	1	0
IV	451	264	62	45	35	14	8	3	0	0
V	754	409	145	91	69	30	6	3	1	0
VI	513	317	74	67	39	11	4	0	0	1
VII	153	76	29	21	13	9	4	0	1	0
VIII	90	45	18	14	9	4	0	0	0	0
IX	853	437	185	118	70	21	21	1	0	0
X	157	71	28	29	23	4	1	0	1	0
NATION	3921	2105	769	534	328	117	53	9	5	1

INDUSTRY: Elementary and Secondary Schools SIC: 8211

DESCRIPTION OF INDUSTRY:

This SIC includes all public, denominational and sectarian elementary and secondary schools below the university level. Kindergartens and military academies are also included. They are distributed throughout the country with size and density dependent on population size and density. According to the Department of Health, Education and Welfare, in 1976-77 there were 106,022 elementary and secondary schools in the U.S. with elementary schools accounting for 72% and secondary schools accounting for 28% of the total.*[1]

CHARACTERISTICS OF HAZARDOUS WASTES PRODUCED:

Any potentially hazardous wastes produced in elementary and secondary schools will result primarily from laboratories. State survey data on secondary schools in California indicate generation of wastes containing compounds such as solvents and pesticides. There are also general lab wastes, organic and inorganic compounds, corrosive acids and alkalis, and waste oil. Because elementary schools do not generally have laboratories containing hazardous compounds, it is assumed that they do not generate hazardous wastes. The estimated amount of hazardous waste generated by the subject SIC is estimated at 500,000 kg/mo or an average of 23 kg/mo per generator (see Industry Profile). Based on state survey data, 99% of the schools generate less than 100 kg/mo of hazardous waste.

WASTE TREATMENT, STORAGE AND DISPOSAL PRACTICES:

Based on state survey data over 90% of the schools dispose of some of their wastes including detergents, photographic wastes, general lab wastes and dilute acids and alkalis in the sewer; almost 40% dispose of general laboratory wastes in landfills and over 20% employ landfill disposal for pesticide wastes. Other disposal methods used include lagoons or ponds (for solvents), landspreading (for oils, pesticides, solvents, and inorganic wastes), onsite burial (for solvents), and recycling (for oil soaked solids).

CURRENT DISPOSAL COST:

---

*The census data indicate a total of only 14,007 establishments in SIC 8211; because of the tax-exempt status of many of the establishments, the census data are very low; the HEW figure of 106,022 has been used in this assessment with proper adjustment made for the estimated "zero" generators.

ALTERNATIVE DISPOSAL METHODS:

Segregation of waste at the source can enable some degree of waste recycling.

INDUSTRY PROFILE:

(See table)

ASSESSMENT OF QUALITY OF DATA BASE:

SOURCES OF DATA USED AND EXPLANATORY NOTES:

(1) Telephone communication with a technical staff at HEW Educational Statistics Department

(2) Based on state survey data for 12 establishments

(3) HEW data on number of establishments, adjusted for the estimated "zero" generators (80%)

INDUSTRY PROFILE[2] SIC: 8211 NATION

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	20144	95.0	342448.	68.3
100-200	1060	5.0	159000.	31.7
200-300	0	0.0	0.	0.0
300-400	0	0.0	0.	0.0
400-500	0	0.0	0.	0.0
500-600	0	0.0	0.	0.0
600-700	0	0.0	0.	0.0
700-800	0	0.0	0.	0.0
800-900	0	0.0	0.	0.0
900-1000	0	0.0	0.	0.0
1000-2000	0	0.0	0.	0.0
2000-5000	0	0.0	0.	0.0
> 5000	0	0.0	0.	0.0
TOTAL	21204[3]	100.0	501448.	100.0

INDUSTRY: Colleges, Universities, Professional Schools and Junior Colleges SIC: 8221,8222

DESCRIPTION OF INDUSTRY:

This SIC covers educational institutions granting academic degrees and requiring a high school diploma or equivalent training for admission. It includes colleges, professional schools, service academies, theological seminaries, universities, junior and community colleges, and technical institutes. The census data indicate a total of 2319 establishments in the subject SIC. These institutions vary in size and are distributed throughout the U.S. (see census data computer printout on the distribution of establishments by employment size category and EPA region).

CHARACTERISTICS OF HAZARDOUS WASTES PRODUCED:

Hazardous wastes generated by institutions in the subject SIC result primarily from laboratories. Based on state survey data, types of waste generated are flammable or toxic wastes including solvents and pesticides, miscellaneous organic and inorganic chemicals, corrosive acids and alkalis, and waste oil. Some institutions generate infectious wastes including needles, syringes, and other biological wastes, radioactive waste and carcinogens. Based on discussions with the environmental health and safety offices at two large universities, it is estimated that all establishments in the subject SIC generate less than 2000 kg/mo of hazardous waste. It is assumed that about 10% of the institutions (e.g., theological institutions) do not generate hazardous wastes[1]. The estimated amount of hazardous waste generated by the subject SIC is 630,000 kg/mo, or an average rate of 300 kg/mo per generator (see Industry Profile).

WASTE TREATMENT, STORAGE, AND DISPOSAL PRACTICES:

Based on the state data, more than 35% of the establishments surveyed disposed of some wastes including detergents, laboratory wastes, and photographic wastes in the sewer. Over 60% of the institutions use landfill disposal for for some or all of their hazardous wastes. Other disposal methods reported include landspreading (for pesticides). At two major universities contacted the majority of the hazardous wastes are taken to landfills by commercial haulers. These wastes are stored onsite and packed in drums prior to disposal. One institution indicates limited recycling of some solvents.

CURRENT DISPOSAL COST:

ALTERNATIVE DISPOSAL METHODS:

Separation of wastes at the source or prior to storage for disposal would enable some wastes such as solvents and other chemicals to be recycled.

INDUSTRY PROFILE:

(See table)

ASSESSMENT OF QUALITY OF DATA BASE:

SOURCES OF DATA USED AND EXPLANATORY NOTES:

(1) Based on state survey data and communication with the Association of Theological Schools (ATS). It is assumed that theological schools do not have hazardous waste. ATS provided information on the number of theological schools in the U.S. so that the percentage of zero generators in the subject SIC could be determined.

(2) Discussions with the Environmental Health and Safety officers in two major universities

(3) Based on the state data on waste quantity generation distribution on 4 establishments in subject SIC's and the information on "zero" generators and maximum anticipated waste production rate from References 1 and 2.

(4) Census data adjusted for the estimated "zero" generators (10%)

11/27/79. 08.43.27.

INDUSTRY PROFILE[3] SIC: 8221 8222 NATION

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES	ESTABLISHMENTS		WASTE QUANTITY	
KG/MO	NUMBER	PERCENT	KG/MO	PERCENT
0-100	1345	64.4	33625.	5.3
100-200	162	7.8	24300.	3.9
200-300	70	3.4	17500.	2.8
300-400	46	2.2	16100.	2.6
400-500	46	2.2	20700.	3.3
500-600	46	2.2	25300.	4.0
600-700	23	1.1	14950.	2.4
700-800	23	1.1	17250.	2.7
800-900	23	1.1	19550.	3.1
900-1000	23	1.1	21850.	3.5
1000-2000	280	13.4	420000.	66.5
2000-5000	0	0.0	0.	0.0
> 5000	0	0.0	0.	0.0
TOTAL	2087[4]	100.0	631125.	100.0

BREAKDOWN OF PLANTS IN EMPLOYMENT SIZE CATEGORIES BY EPA REGION IN SIC 8220

NUMBER OF PLANTS IN EACH CATEGORY

REGION	TOTAL	1-4	5-9	10-19	20-49	50-99	100-249	250-499	500-999	>1000
I	210	30	17	11	24	28	44	31	12	13
II	304	61	27	28	36	25	50	30	24	23
III	332	60	24	29	50	36	69	38	12	14
IV	340	42	17	23	45	64	93	32	4	10
V	437	71	30	43	68	53	88	52	17	15
VI	147	20	10	21	20	14	40	8	7	7
VII	161	15	7	17	22	26	51	17	2	4
VIII	53	9	3	11	9	10	6	3	0	2
IX	261	64	26	34	55	29	29	10	10	4
X	72	15	10	10	5	10	6	9	5	0
NATION	2319	388	174	239	335	295	478	230	93	92

INDUSTRY: Museums SIC: 8411

DESCRIPTION OF INDUSTRY:

Establishments covered under the subject SIC include museums and art galleries. These establishments are located in all regions of the United States with the greatest concentrations in large urban centers. While few art galleries generate hazardous wastes[1], most museums generate small amounts of waste chemicals, oil waste, paint wastes, etc[2]. There are reportedly 1821 museums in the United States[3].*

CHARACTERISTICS OF HAZARDOUS WASTES PRODUCED:

Most large museums of natural history will have taxidermy operations on site and generate wastes which include meat and organs from animals. Hides and skins are generally treated with a dilute solution of arsenic to prevent insects from eating the remains. Since few animals are received each year, a jar of arsenic may last several years. Other chemicals utilized include paradichlorobenzene, methylbenzene, ethyl alcohol and cyanide ("cyanide jars"). Resultant wastes (primarily empty containers and waste ethyl alcohol) are very small in quantity, probably not exceeding 1 to 2 kg per month per museum[2]. Wastes of a hazardous nature generated in maintenance operations include waste oil, lacquer, paint wastes, paint solvents, refrigerants and cleaning solutions. At one of the 5 largest museums in the U.S., liquid hazardous wastes from maintenance activities are collected in 55-gallon drums. About 50 of these drums are disposed of per year. Monthly waste generation for this particular museum is 670 kg. This rate, however, is considered very high for the majority of museums in the nation. Based on an average monthly generation rate of 50 kg/mo, which is believed to be more typical, the total waste generated by museums is estimated at 94,000 kg/mo.

WASTE TREATMENT, STORAGE AND DISPOSAL PRACTICES:

Container wastes from natural history museums are generally disposed of via municipal refuse collection. Small amounts of chemical wastes and meat and organs from taxidermy operations are disposed of in the sewer[2]. Wastes generated in connection with maintenance activities for museums are predominantly disposed of via contract waste haulers[2].

*Census data indicate a total of 792 establishments in SIC 8411; a figure of 1821 from Reference 3 is considered more accurate since the census data would be low because of the tax-exempt nature of certain establishments in this SIC.

CURRENT DISPOSAL COST:

Disposal cost for hazardous wastes is insignificant compared to the cost for the total waste quantity.

ALTERNATIVE DISPOSAL METHODS:

Rinsing of empty containers before codisposal in municipal refuse; separate collection of waste oil and solvents to enable recycling by commercial reclaimers.

SOURCES OF DATA USED:

(1) Three art galleries

(2) Four museums

(3) Statistical Abstract, 1978

11/27/79. 08.43.27.

INDUSTRY PROFILE SIC: 8411 NATION

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	1816	99.7	90800.	96.5
100-200	0	0.0	0.	0.0
200-300	0	0.0	0.	0.0
300-400	0	0.0	0.	0.0
400-500	0	0.0	0.	0.0
500-600	0	0.0	0.	0.0
600-700	5	.3	3250.	3.5
700-800	0	0.0	0.	0.0
800-900	0	0.0	0.	0.0
900-1000	0	0.0	0.	0.0
1000-2000	0	0.0	0.	0.0
2000-5000	0	0.0	0.	0.0
> 5000	0	0.0	0.	0.0
TOTAL	1821(3)	100.0	94050.	100.0

INDUSTRY: Noncommercial Educational, Scientific and Research Organizations   SIC: 8922

DESCRIPTION OF INDUSTRY:

The establishments in this industry are primarily engaged in noncommercial research into, and dissemination of, information for public health, education, or general welfare. It includes institutions which operate primarily on funds from endowments, contributions, and grants. A variety of activities are performed by these establishments including archeological expeditions, educational research, medical research, scientific research, and social research. The census data indicate a total of 2349 establishments for this SIC which are distributed throughout the country roughly in proportion to the population of a region[1]. Over 50% of the establishments employ less than 5 persons (see census data computer printout on the distribution of establishments by EPA region and employment size category).

CHARACTERISTICS OF HAZARDOUS WASTES PRODUCED:

It is anticipated that any hazardous wastes produced by establishments in this SIC come from laboratory activities and that the wastes generated may include infectious biological wastes, corrosive wastes such as acids and alkalis, and toxic or flammable wastes including oils, solvents, and miscellaneous organic and inorganic chemicals. The estimated amount of hazardous waste generated by the subject SIC is 254,000 kg/mo or an average rate of 215 kg/mo per generator (see Industry Profile). All establishments in this SIC generate less than 5000 kg/mo of hazardous waste and it is assumed that 50% do not generate hazardous wastes[1].

WASTE TREATMENT, STORAGE, AND DISPOSAL PRACTICES:

Based on disposal practices of laboratories in other SIC categories[2], it is expected that more than 30% of the establishments dispose of some general laboratory wastes in the sewer and over 50% use landfill disposal for some or all of their hazardous wastes. Other disposal methods may include incineration (for infectious wastes) and landspreading.

CURRENT DISPOSAL COST:

ALTERNATIVE DISPOSAL METHODS:

INDUSTRY PROFILE:

(See table)

ASSESSMENT OF QUALITY OF DATA BASE:

SOURCES OF DATA USED AND EXPLANATORY NOTES:

(1) Based on discussions with the National Science Foundation, a figure of 2349 establishments for SIC 8922 is probably too low; however, based on a 1973 NSF study, there are only 186 non-profit scientific research institutes with at least $100,000 per year R&D expenditure. The NSF estimates that about 99% of the research (which would involve laboratory activities and hence generation of hazardous waste) is carried out by these 186 institutes. For this study, it is assumed that only 50% of all establishments generate any hazardous waste. The other 50% which do not generate hazardous wastes are establishments engaged in social sciences and similar reserach activities.

(2) See assessment summary sheets for SIC's 7391, 7397, 8221/8222

(3) Census data, adjusted for estimated "zero" generators (50%)

(4) Based on discussions with the NSF, approximately 200 establishments perform 99% of the research (see Reference 1) and it is assumed that 50% of these, or 100 institutes, perform laboratory research and hence generate hazardous waste. It is further assumed that these establishments generate waste quantities analogous to those of other large research institutions (see assessment summary sheet for SIC 8221/8222). Of the remaining 2151 establishments, it is assumed that 50%, or 1075 institutes, perform laboratory research and therefore generate hazardous waste. Since all together these establishments perform only 1% of the research, it is assumed that they are very small establishments and each generate less than 100 kg/mo.

11/27/79.   08.43.27.

INDUSTRY PROFILE(4)   SIC: 8922   NATION

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	1075	91.5	53750.	21.2
100-200	0	0.0	0.	0.0
200-300	0	0.0	0.	0.0
300-400	0	0.0	0.	0.0
400-500	0	0.0	0.	0.0
500-600	0	0.0	0.	0.0
600-700	0	0.0	0.	0.0
700-800	0	0.0	0.	0.0
800-900	0	0.0	0.	0.0
900-1000	0	0.0	0.	0.0
1000-2000	75	6.4	112500.	44.3
2000-5000	25	2.1	87500.	34.5
> 5000	0	0.0	0.	0.0
TOTAL	1175(3)	100.0	253750.	100.0

APPENDIX C

MISCELLANEOUS SUPPORT DATA

SECTION C-1. AGENCIES, ASSOCIATIONS AND COMPANIES SUPPLYING INFORMATION FOR USE IN THE TRW STUDY

- Federal Agencies
- State Agencies
- County and Local Agencies
- Past and Current EPA and Other Contractors
- Trade Associations

LIST OF KEY FEDERAL AGENCIES PROVIDING INFORMATION FOR USE IN THE TRW STUDY

- U.S. EPA Office of Solid Waste, Hazardous Waste Management Division
- U.S. EPA Office of Pesticide Programs
- U.S. EPA Regional Offices (all ten offices)
- U.S. EPA Office of Water Planning and Standards, Effluent Guidelines Division
- U.S. Department of Commerce, Bureau of the Census
- U.S. Department of Energy (Bartlesville Energy Technology Center)
- U.S. Department of Agriculture
- U.S. Department of Interior, Bureau of Mines
- Federal Drug Enforcement Agency
- Interstate Commerce Commission
- U.S. Postal Service
- U.S. Coast Guard
- U.S. Corps of Engineers
- Federal Aviation Administration
- Food and Drug Administration
- U.S. Department of Health, Education and Welfare
- National Science Foundation (NSF)
- U.S. Bureau of Alcohol, Tobacco and Firearms

LIST OF STATE AGENCIES PROVIDING HAZARDOUS WASTE SURVEY DATA AND SUMMARY REPORTS FOR USE IN THE TRW STUDY

State	Agency
Alabama	Department of Public Health Division of Solid Waste and Vector Control
Alaska	Solid Waste Programs Department of Environmental Conservation
Arizona	Bureau of Sanitation Department of Health Services
Arkansas	Solid Waste Control Division Department of Pollution Control and Ecology
California	Department of Health Services Vector and Waste Management Division State Department of Agriculture
Colorado	Department of Health
Connecticut	Solid Waste Management Programs Department of Environmental Protection
Delaware	Solid Waste Section Department of National Resources and Environmental Control
District of Columbia	Office of Environmental Quality Department of Environmental Services
Florida	Solid Waste Management Program Department of Environmental Regulation
Georgia	Land Protection Branch Environmental Protection Division Department of Natural Resources
Hawaii	Environmental Health Division Department of Health
Idaho	Solid Waste Management Section Department of Health and Welfare
Illinois	Hazardous Waste Management Division State Environmental Protection Agency
Indiana	Solid Waste Management Section Division of Sanitary Engineering State Board of Health

LIST OF STATE AGENCIES (CONTINUED)

State	Agency
Iowa	Air and Land Quality Division Department of Environmental Quality
Kansas	Solid Waste Management Section Department of Health and Environment
Kentucky	Hazardous Waste Materials Department of Natural Resources and Environmental Protection
Louisiana	Administration and Operations Division Office of Science, Technology and Environmental Policy
	Solid Waste and Vector Control Unit Health and Human Resources Administration
Maine	Division of Solid Waste Management Control Bureau of Land Quality Department of Environmental Protection
Maryland	Department of Natural Resources Water Resources Administration
Massachusetts	Bureau of Solid Waste Disposal Department of Environmental Management
Michigan	Environmental Protection Bureau Department of Natural Resources
Minnesota	Division of Solid Waste Pollution Control Agency
Mississippi	Division of Solid Waste Management and Vector Control State Board of Health
Missouri	Solid Waste Management Program Department of Natural Resources
Montana	Solid Waste Management Bureau Department of Health and Environmental Sciences
Nebraska	Solid Waste Division Department of Environmental Control
Nevada	Solid Waste Management Department Division of Environmental Protection Department of Conservation and Natural Resources

LIST OF STATE AGENCIES (CONTINUED)

State	Agency
New Hampshire	Bureau of Solid Waste Department of Health and Welfare
New Jersey	Solid Waste Administration Division of Environmental Protection
New Mexico	Solid Waste Management Unit Environmental Improvement Division
New York	Division of Solid Waste Management Department of Environmental Conservation Department of Agriculture
North Carolina	Solid Waste and Vector Control Department of Human Resources Division of Health Services
North Dakota	Division of Waste Supply and Pollution Control Department of Health
Ohio	Office of Hazardous Waste Coordinator Environmental Protection Agency
Oklahoma	Industrial and Solid Waste Division Department of Health
Oregon	Solid Waste Management Division Department of Environmental Quality
Pennsylvania	Division of Solid Waste Management Department of Environmental Resources
Rhode Island	Solid Waste Management Program Department of Environmental Management
South Carolina	Solid Waste Management Division Department of Health and Environmental Control
South Dakota	Air Quality and Solid Waste Management Division Department of Environmental Protection
Tennessee	Division of Solid Waste Management Bureau of Environmental Services Department of Public Health
Texas	Department of Water Resources Solid Waste Branch
Utah	General Sanitation Section State Division of Health

LIST OF STATE AGENCIES (CONTINUED)

State	Agency
Vermont	Air and Solid Waste Programs Agency of Environmental Conservation
Virginia	Bureau of Solid and Hazardous Waste Management Department of Health
Washington	Department of Health Services
West Virginia	Disposal Planning Division Department of Health
Wisconsin	Department of Natural Resources Bureau of Solid Waste Management
Wyoming	Solid Waste Programs Department of Environmental Quality
Territory	
Puerto Rico	Environmental Quality Board Office of the Governor
Virgin Islands	Solid Waste Planning Office Department of Public Works

LIST OF COUNTY AND LOCAL AGENCIES PROVIDING INFORMATION FOR USE IN THE TRW STUDY

Chicago Metropolitan Sanitation District
Chicago, IL

County Sanitation District of Los Angeles County
Solid Waste Management Department
Whittier, CA

Alameda County Planning Department
Hayward, CA

County of San Diego
Department of Sanitation and Flood Control
Solid Waste Division
San Diego, CA

Nassau County Department of Health
Mineola, NY

Los Angeles County Agricultural Commission
Los Angeles, CA

Los Angeles International Airport Authority
Los Angeles, CA

LIST OF PAST AND CURRENT EPA AND OTHER CONTRACTORS PROVIDING DATA FOR USE IN THE TRW STUDY

Accurex Corporation
Mountain View, CA

GCA
Bedford, MA

Garrity-Sandage Associates, Inc.
Mason City, IA

Hamilton Standards
Division of United Technologies
Windsor, CT

Jacobs Engineering Group, Inc.
Pasadena, CA

Environmental Science and Engineering, Inc.
Gainesville, FL

Versar, Inc.
Springfield, VA

LIST OF TRADE ASSOCIATIONS PROVIDING ASSISTANCE AND INFORMATION FOR USE IN THE TRW STUDY

Air Transport Association

Aluminum Recycling Association

American Apparel Manufacturing Association

American Association of Blood Banks

American Association of Botanical Gardens and Arboreta

American Association of Nurserymen

American Building Contractors Association

American Chiropractic Association

American Concrete Pressure Pipe Association

American Dental Association

American Electroplater Society

American Federation of Small Businesses

American Foundrymen's Society

American Hospital Association

American Medical Association

American Optometric Association

American Osteopathic Association

American Pharmaceutical Association

American Plywood Association

American Red Cross

American Society of Zoological Parks and Aquariums

American Veterinary Medical Association

American Wood Preservers Association

Associated General Contractors of America

Associated Master Barbers and Beauticians of America

Association of American Railroads

LIST OF TRADE ASSOCIATIONS (CONTINUED)

Association of Home Appliance Manufacturers

Association of Petroleum Rerefiners

Association of Theological Schools

Automotive Service Industry Association

Barbers, Beauticians and Allied Industries Association

California Nursing Home Association

California Trucking Association

Cosmetics, Toiletry and Fragrance Association

Council of Community Blood Centers

Cremation Association of North America

Electric Apparatus Service Association

Embalming Chemical Manufacturers Association

Farm and Industrial Equipment Institute

Flexible Packaging Association

Glass Packaging Institute

Graphic Arts Technical Association

Gypsum Association

Hardwood Plywood Manufacturers Association

Institute of Shortening and Edible Oils

International Fabricare Institute

International Lead Zinc Research Organization

International Sanitary Supply Association

Lawn and Garden Distributors Association

Manufacturing Jewelers and Silversmiths of America

Metal Treating Institute

National Alliance of Television and Electronic Service Association

LIST OF TRADE ASSOCIATIONS (CONTINUED)

National Association of Home Builders

National Association of Pesticide Control Officials

National Association of Photographic Manufacturers, Inc.

National Automatic Laundry and Cleaning Association

National Communications Association

National Council of the Paper Industry for Air and Stream Improvement

National Funeral Directors and Morticians Association

National Funeral Directors Association

National Nursing Home Association

National Pest Control Association

National Wholesale Druggists' Association

Non-Ferrous Founders Society

North American Telephone Association

Portland Cement Association

Printing Industries of America

Refrigeration Service Engineers Society

Sealed Insulating Glass Manufacturers Association

Soap and Detergent Association

Tanners' Council of America

The Proprietary Association

The Tobacco Institute

Writing Instrument Manufacturers Association, Inc.

SECTION C-2. ITEMS RELATED TO PREPARATION OF FACILITY COMPUTER INPUT DATA SHEETS FOR COMPUTERIZATION OF STATE DATA BASE

- Entries for Facilities Computer Input Data Sheet
- Facility Computer Input Data Sheets, Waste Characteristics and Treatment/Disposal Codes
- Facility Computer Input Data Sheet, General Explanatory Notes
- Sample of a Completed Facility Computer Input Data Sheet

ENTRIES FOR FACILITY COMPUTER INPUT DATA SHEET

Computer Entry Designation	Entry Number	Entry Designation
ID	1	Identification Number
DATASOUR	2	Data Source
ALLSICS	3	All SIC's (list)
ASICPRE	4	All SIC's Preassigned? (Y/N)
PSIC	5	Primary SIC(s)
PSICPRE	6	Primary SIC Preassigned? (Y/N)
YRDCOD	7	Year Data Collected
COMPNAM	8	Company Name
STRADR	9	Street Address
CITY	10	City
COUNTY	11	County
STATE	12	State
ZIPCODE	13	Zip Code
TELE	14	Telephone Number
CONTACT	15	Contact
PRODSERV	16	Product/Service
WASTNO	17	Waste Number
WASTCODE	18	Waste Code (see list)
WASTNAM	19	Waste Chemical Name
HAZCHAR	20	Hazardous Character (see list)
PHYSCHAR	21	Physical Character (see list)
QASTSORC	22	Waste Source
WTDDIS	23	Total Waste Quantity to Disposal, kg/mo
WDISLS	24	Waste Disposal, Landspreading (on/off)
WTOLS	25	Total Waste Quantity to Landspreading, kg/mo
WDISDW	26	Waste Disposal, Deep Well Injection (on/off)
WTODW	27	Total Waste Quantity to Deep Well Injection, kg/mo
WDISLF	28	Waste Disposal, Landfill (on/off)
WTOLF	29	Total Waste Quantity to Landfill, kg/mo
WDISCOMP	30	Waste Disposal, Composting (on/off)
WTOCOMP	31	Total Waste Quantity to Composting, kg/mo
WDISINC	32	Waste Disposal, Incineration (on/off)
STOINC	33	Total Waste Quantity to Incineration, kg/mo

Computer Entry Designation	Entry Number	Entry Designation
WDISREC	34	Waste Disposal, Off-site Recycling? (Y/N)
WTORED	35	Total Waste Quantity to Off-site Recycling, kg/mo
WDISMS	36	Waste Disposal, On-site Municipal Sewer? (Y/N)
WTOMS	37	Total Waste Quantity to On-site Municipal Sewer, kg/mo
WDISLP	38	Waste Disposal, Lagoons/Solar Ponds (on/off)
WTOLP	39	Total Waste Quantity to Lagoons/Solar Ponds, kg/mo
WDISOM	40	Waste Disposal, Other Methods (on/off)
WTOOM	41	Total Waste Quantity to Other Disposal Method, kg/mo
WDISUNK	42	Waste Disposal, Unknown Method
WTOUNK	43	Total Waste Quantity to Unknown Disposal Method, kg/mo
WTOCH	44	Contractor Waste Hauling Total Quantity, kg/mo
WTOSH	45	Self-Hauling Total Waste Quantity, kg/mo
WTOMRC	46	Municipal Refuse Collection Hauling Total Waste Quantity, kg/mo
WTOTRR	47	Total Waste Quantity Transported by Road, kg/mo
WTOTRRR	48	Total Waste Quantity Transported by Rail, kg/mo
WTOTRW	49	Total Waste Quantity Transported by Water, kg/mo
WTOTRA	50	Total Waste Quantity Transported by Air, kg/mo
WTRB	51	Waste Treatment, Biological On/Off (see list)
WTOB	52	Total Waste Quantity to Biological Treatment, kg/mo
WTRC	53	Waste Treatment, Chemical On/Off (see list)
WTOC	54	Total Waste Quantity to Chemical Treatment, kg/mo
WTRP	55	Waste Treatment, Physical On/Off (see list)
WTOP	56	Total Waste Quantity to Physical Treatment, kg/mo
WQTYBR	57	Waste Quantity to Disposal Breakdown by Waste Number, kg/mo
WQTYGF	58	Waste Quantity to Disposal Generation Factor by Waste Number
WQTYLS	59	Landspreading Disposal Waste Quantity Breakdown by Waste Number, kg/mo
WQTYDW	60	Deep Well Injection Disposal Waste Quantity Breakdown by Waste Number, kg/mo
WQTYLF	61	Landfill Disposal Waste Quantity Breakdown by Waste Number, kg/mo
WQTYCO	62	Composting Disposal Waste Quantity Breakdown by Waste Number, kg/mo

Computer Entry Designation	Entry Number	Entry Designation
WQTYIN	63	Incineration Disposal Waste Quantity Breakdown by Waste Number, kg/mo
WQTYMS	64	Waste Disposal to Off-site Recycling Quantity Breakdown by Waste Number, kg/mo
WQTYMS	65	Waste Disposal to On-site Municipal Sewer Quantity Breakdown by Waste Number, kg/mo
WQTYLP	66	Waste Disposal to Lagoons/Solar Ponds Quantity Breakdown by Waste Number, kg/mo
WQTYOM	67	Waste Disposal to Other Methods Quantity Breakdown by Waste Number, kg/mo
WQTYUM	68	Waste Disposal to Unknown Methods Quantity Breakdown by Waste Stream, kg/mo
WQTYCH	69	Contractor Hauling Waste Quantity Breakdown by Waste Number, kg/mo
WQTYSH	70	Self Hauling Waste Quantity Breakdown by Waste Number, kg/mo
WQTYMRC	71	Municipal Refuse Collection Hauling Waste Quantity Breakdown by Waste Number, kg/mo
WQTYTRR	72	Waste Transport by Road Quantity Breakdown by Waste Number, kg/mo
WQTYTRRR	73	Waste Transport by Rail Quantity Breakdown by Waste Number, kg/mo
WQTYTRW	74	Waste Transport by Water Quantity Breakdown by Waste Number, kg/mo
WQTYTRA	75	Waste Transport by Air Quantity Breakdown by Waste Number, kg/mo
WQTBY	76	Waste Quantity to Biological Treatment, Breakdown by Waste Number, kg/mo
WQTYC	77	Waste Quantity to Chemical Treatment, Breakdown by Waste Number, kg/mo
WQTYP	78	Waste Quantity to Physical Treatment, Breakdown by Waste Number, kg/mo
WQTYSIC	79	Waste Quantity to Disposal for Multiple SIC's Broken Down by SIC? (Y/N)
WQTYDA	80	Waste Quantity Fluctuations Data Available? (Y/N)
NDEMP	81	Number of Employees
ANSAL	82	Annual Sales, $
COSTSAL	83	Cost of Sales, $
FBS	84	Financial Balance Sheet Available? (Y/N)
ANPROD	85	Annual Production, kg

Computer Entry Designation	Entry Number	Entry Designation
PROCUSED	86	Processes Used
RAWMAT	87	Raw Material Data Available? (Y/N)
COSTDATA	88	Cost Data
MISTEXT	89	Miscellaneous Text

FACILITY COMPUTER INPUT DATA SHEETS

WASTE CHARACTERISTICS AND TREATMENT/DISPOSAL CODES

A. WASTE CODE:

01 - Acids
02 - Alkali
03 - Pesticides
04 - Heavy metals
05 - Solvents
06 - Chlorinated organics
07 - Paint wastes
08 - Cyanides
09 - Waste oil*
10 - Inorganic sludges
11 - Organics sludges
12 - Infectious
13 - Other organics
14 - Other inorganics
15 - Explosive
16 - Radioactive

B. HAZARDOUS CHARACTERISTICS:†

I - Ignitable (flammable)
C - Corrosive
R - Reactive
T - Toxic
IF - Infectious
RA - Radioactive
M - Mutagenic
CA - Carcinogenic
TE - Teratogenic

C. PHYSICAL CHARACTERISTICS:‡

SO - Solid
LQ - Liquid
SL - Sludge

D. WASTE SOURCE:§

P - Process
NP - Non-process
PC - Pollution control

E. BIOLOGICAL TREATMENT METHODS:

Activated sludge
Trickling filter
Aerated lagoon
Stabilization pond
Other

F. CHEMICAL TREATMENT METHODS:

Ion exchange
Neutralization
Precipitation
Oxidation
Reduction
Coagulation/flocculation
Other

G. PHYSICAL TREATMENT METHODS:

Adsorption

Centrifugation

Dilution

Evaporation

Filtration

Flotation

Settling

Solvent Extraction

Stripping

Other

---

*All waste oils except vegetable and animal oils; the category includes lube oil, hydraulic oil and cutting oil.

†Use hazardous characteristics specified in the raw data, provided that the characteristics specified are reasonable; if not reasonable, assign characteristics based on technical judgment.

‡If physical characteristics (solid, liquid or sludge) not specified in the raw data, use the following as guidelines in assigning physical characteristics:

Solid - "non-fluid" wastes
Liquid - Liquids containing dissolved solids (e.g., brine solutions) or containing less than 1% (by weight) suspended solids
Sludge - Still bottoms, tank bottoms and liquids containing more than 1% (by weight) suspended solids

§Use the following definitions for waste source:

Process - Waste resulting directly from (not incidental to) manufacturing operation or service industries, e.g., still bottoms from purification of crude phenols or pesticides wastes (empty containers, unused pesticides, etc.) from exterminating operations
Non-process - Wastes not directly related to the main manufacturing or service industry operation, but incidental to them, e.g., waste lube oil from maintenance of production equipment; also waste from utility and support operations such as brines from regeneration of ion exchange resins used for raw waste treatment.

FACILITY COMPUTER INPUT DATA SHEET

General Explanatory Notes

A. Leave blanks for all entries for which there are no data or the answer to a "yes/no" question is "no."

B. Do not use commas to separate 3-digits in a single number (e.g., enter 3000000 and not 3,000,000)

C. In reporting quantities, round numbers as follows:

- Less than 1, to the nearest 0.1; e.g., 0.6 and not 0.62; 0.7 and not 0.69 (or 1.0)
- For numbers greater than 1, show no decimal points; e.g., 157 and not 157.3
- In rounding decimals, go to the next higher number if the decimal value is greater than 0.05 (when number is less than 1) or 0.5 (when number is greater than 1); e.g., 0.66 will be rounded to 0.7 and 157.6 will be rounded to 158
- In rounding decimals go to the next lower number if the decimal value is less than 0.05 (when number is less than 1) or 0.5 (when number is greater than 1); e.g., 0.63 will be rounded to 0.6 and 157.4 will be rounded to 158
- In rounding decimals ending in "5" ("0.05" or "0.5"), round upward if the preceding digit is an "odd" number, and round downward if the preceding digit is an "even" number; e.g., 0.65 will be rounded to 0.6 whereas 157.5 will be rounded to 158

D. Write out chemical names and not chemical formulas; e.g., tertiary butyl acetate and not $C_6H_{12}O_2$, sulfuric acid and not H_2SO_4, water and not H_20

E. If information for an entry must be continued on the next line, the last item on the first line cannot be split between lines; i.e., the information on the last quote on the first line should appear in its entirety on the first or second line and not split between the 2 lines; e.g., for ENTRY 19:

```
INCORRECT  _(FIRST LINE  .......'SULFURIC' 'STILL
            (SECOND LINE  BOTTOM'

CORRECT    _(FIRST LINE ........'SULFURIC'
            (SECOND LINE  'STILL BOTTOM'

CORRECT    —(FIRST LINE ........'SULFURIC' 'STILL BOTTOM'
```

F. To indicate completion of the entries for a plant, place a period (.) at the end of the last item on the last entry line

G. When data are given as a "range" and no computer data manipulation involving summation is anticipated, report them as such (e.g., number of employment 100-249)

H. When data are given as a "range" and computer data manipulation involving summations is anticipated, report the number as the average of the range (e.g., total waste quantity to disposal 300 kg/mo and not 100-500 kg/mo)

I. When several wastes are identified, but quantity (or other data) are given for all wastes, complete entries 17 through 22 for all wastes (wherever data available); the input for entry 23 will be the sum for those wastes for which data are given with an explanatory note in entry 89 indicating wastes for which no quantity data are available (the missing data would also be apparent by the entry 57)

J. In converting waste volume to weight quantities, use the following estimated densities (specific gravities) as general guidelines.

Organic solvent - 50 lb/cut ft (6.7 lb/gal or specific gravity = 0.8)

Aqueous wastes - 63 lb/cu ft (8.34 lb/ gal or specific gravity ~1.0)

Sludges - 75 lb/ cu ft (10 lb/gal or specific gravity = 1.2)

Woody trash - 15 lb/cu ft (specific gravity = 0.24)

K. Do not use abbreviations (e.g., manufacturing and not mfr.; Boulevard and not Blvd.; Company and not Co., etc.)

L. For entry 12, use the 2-letter U.S. Post Office abbreviations for the states (e.g., AZ for Arizona, etc. - see attached list for "State Abbreviations.")

M. Print out all entries in capital letters.

N. All individual facility computer input data sheets must be numbered and should indicate the total number of pages for each plant (thus, if only one page is used, page numbers should indicate Page 1 of 1; if 3 pages are used, page numbers should be 1 of 3, 2 of 3 and 3 of 3).

O. Place plant I.D. number on the upper right hand corner of <u>each</u> sheet below the page number.

P. Place plant I.D. number on the raw data sheet itself for reference purposes.

Q. For Entry 19, when a waste is described on a state survey form by a name other than a chemical name (e.g., a trade name or generic name), enter the name given (e.g., developer.fixer).

R. In reducing the raw data for a given facility (before transferring the data onto the facility input computer data sheet), indicate (on the raw data sheet or on separate sheet) any specific assumptions and judgments which you made as to waste quantities, sources, hazardous or nonhazardous nature of a waste, disposal practice, etc. pertaining to the data for that specific plant. Also, for each state, prepare a summary sheet of key general assumptions and technical judgments you made in reducing the data.

S. In printing entries on the facility computer input data sheets, make all capital i's as "I" and not "1." Also, make sure all zeros are O's and all letter O's are "Ø's" (e.g., ØILY and not OILY).

STATE ABBREVIATIONS

Alabama	AL
Alaska	AK
Arizona	AZ
Arkansas	AR
California	CA
Colorado	CO
Connecticut	CT
Delaware	DE
District of Columbia	DC
Florida	FL
Georgia	GA
Hawaii	HI
Idaho	ID
Illinois	IL
Indiana	IN
Iowa	IA
Kansas	KS
Kentucky	KY
Louisiana	LA
Maine	ME
Maryland	MD
Massachusetts	MA
Michigan	MI
Minnesota	MN
Mississippi	MS
Missouri	MO
Montana	MT
Nebraska	NE
Nevada	NV
New Hampshire	NH
New Jersey	NJ
New Mexico	NM
New York	NY
North Carolina	NC
North Dakota	ND
Ohio	OH
Oklahoma	OK
Oregon	OR
Pennsylvania	PA
Rhode Island	RI
South Carolina	SC
South Dakota	SD
Tennessee	TN
Texas	TX
Utah	UT
Vermont	VT
Virginia	VA
Washington	WA
West Virginia	WV
Wisconsin	WI
Wyoming	WY

American Samoa	AS
Canal Zone	CZ
Guam	GU
Puerto Rico	PR
Trust Territories	TT
Virgin Islands	VI

DATE

NAME

PROBLEM NO

NO OF CARDS

80 COLUMN FREE KEY PUNCH FORM

PAGE 1 OF 2

PRIORITY ID# 5117

KEYPUNCHED BY

VERIFIED BY

1 '5117'
2 'STATE'
3 '3662'
4 'YES'
7 '1978'
8 [redacted]
9 [redacted]
10 [redacted]
11 'SAN DIEGO'
12 'CA'
13 '92121'
14 [redacted]
15 [redacted]
16 'COMMUNICATIONS EQUIPMENT'
17 '1', '2'
18 '09', '05'
19 'OIL', 'SOLVENT'
20 'T', 'T, I'
21 'LQ', 'LQ'

SYSTEMS 708 REV 12-66

DATE

NAME

PROBLEM NO

NO OF CARDS

PRIORITY 5117

KEYPUNCHED BY

VERIFIED BY

80 COLUMN FREE KEY PUNCH FORM

23'110'
28'ØFF
29'11Ø'
44'110'
47'110'
56'47''63'
61'47''63'
69'47''63'
72'47''63'
89 TEXT
WASTES ARE HAULED BY AN ØUTSIDE CØMPANY TØ A CLASS III LANDFILL
END.

SYSTEMS 709 REV 12-66

SECTION C-3. SAMPLES OF COMPLETED HAZARDOUS WASTE INFORMATION QUESTIONNAIRES

- Dry Cleaning Industry
- Wood Preserving Industry

Return to:
TRW Inc R4/1128
M. Ghassemi
1 Space Park
Redondo Bch. Ca
90278

HAZARDOUS WASTE INFORMATION

DRY CLEANING INDUSTRY

I. GENERAL INFORMATION

A. Establishment Location — State: Florida

City (optional) [redacted]

B. SIC Code (check the most appropriate one(s)

7213 (Linen Supply)
7215 (Coin-Operated Dry Cleaning)
7216 (Dry Cleaning Plants)
7218 (Industrial Launderers)

C. Production employees: 94

D. Quantity of items dry cleaned (lb/month) (clean dry weight basis) — Average: 23,500 — Range: 19,000-30,000

E. Major type(s) of clothes or other materials dry cleaned (e.g., work uniforms, shop towels, industrial gloves, dress garments, etc.).

Industrial garments (shirts, pants, coveralls)

II. DRY CLEANING SOLVENT(S) USED

Please indicate the type and quantity of solvent(s) used at your establishment:

Petroleum ______ gal/month
Perchloroethylene 260 gal/month
F-113 ______ gal/month
Other ______ gal/month (please specify

III. WASTE GENERATION/CHARACTERISTICS

A. Empty solvent containers - If empty solvent containers are generated at your establishment please indicate type and quantity; (please indicate if no containers are generated).

Type of Container	Container Size	Number per month
None	N/A	Bulk delivery by Tank truck

B. Distillation residues - If spent solvent is distilled for reuse at your establishment, please indicate the amount of distillation residues produced.

300 to 500 *lbs/month*
(gal/month)

(2% to 5% residual solvent)

C. Filtration wastes - If filtration (e.g., diatomateous earth or cartridges) is used in connection with solvent cleaning, please indicate the type of filter used, frequency and method of filter cleaning (if carried out) and quantity of spent filter ultimately disposed of.

Type of filtration medium used Diatomateous Earth

Frequency of filter cleaning (per month) Daily

Method of filter cleaning Automatic "Cook-down"

Quantity of spent filtration medium disposed of (lb/yr) 1300

D. Other wastes - Please indicate the quantity and type of other wastes which may be generated at your establishment.

Waste Type	Quantity (lb/month, etc.)
Sand, Grit, Oil & Grease plus water. (4% to 6% solids)	500 to 600 gallons/month

IV. WASTE TREATMENT AND DISPOSAL PRACTICES

A. Waste treatment and disposal - Please indicate theon-site treatment methods employed (if any) and the ultimate disposal method used for wastes identified in Section III above.

Waste Type	Treatment*	Disposal†
Empty containers	N/A	N/A
Distillation residues	Cook-down	Municipal Refuse
Filtration wastes	" "	" "
Other (please specify)	N/A	On-Site landfill

*Examples of on-site treatment of wastes: "cooking" of filter residues to reduce solvent content and draining and drying of filter cartridges

†Examples of disposal: disposal via municipal refuse collection, discharge into municipal sewer, contract hauling to an off-site waste management facility (e.g., landfill, incineration), waste pickup by solvent suppliers.

V. ECONOMIC CONSIDERATIONS

A. Please indicate the approximate capital and operating costs at your facility which may be attributed to the treatment and disposal of wastes listed in Section III above. If possible, please provide a breakdown by individual wastes.

	Treatment	Disposal
Capital, $		
Total for all wastes		
Breakdown for individual wastes	N	
Waste 1	N/A	
Waste 2		
Waste 3		
Annual Operating, $		
Total for all wastes		
Breakdown for individual wastes		
Waste 1	Approx. $1,000.00/annum	
Waste 2	on-site labor.	
Waste 3		

B. Annual sales - Please indicate the total annual sales attributable to dry cleaning for your establishment. $12,200.00

IV. ADDITIONAL STUDIES

A. Would you be willing to entertain a plant visit or a follow-up call by a member of the project team for additional information? If yes, please indicate the name and telephone number of the person to be contacted. Yes.

VII. MISCELLANEOUS INFORMATION - Please provide any additional information (e.g., waste composition, waste toxicity, anticipated changes in operation, etc.) which you feel would help us in better characterizing the waste generation and disposal in your industry and more accurately assessing the potential impacts of various regulatory options on your operation and the industry.

Drycleaning wastes characterized by predominance of oil, grease, sand & grit, plus diatomateous earth from filter.

Please return to:

M. Ghassemi
R4/1128
One Space Park Dr.
Redondo Beach, CA 90278

HAZARDOUS WASTE INFORMATION

WOOD PRESERVING INDUSTRY

I. GENERAL INFORMATION

A. Plant Location (State or EPA Region - see map of EPA Regions) 6

B. Approximate Plant Production (cu.ft. of treated wood/day)

Average 6,000

Range 5,000 - 6,000

C. Approximate "Cylinder" or "Tank" Capacity (cu.ft.)

"Pressure" 5,800

Non-Pressure and Vacuum 1,200

D. Approximate Number of Production Employees Associated with the Wood Preserving Operation at the Site 96

II. PLANT OPERATION

A. Materials - Please check the materials used to treat wood at your plant and indicate approximate percentage of total wood treated by each chemical (if more than one chemical is used).

1. Creosotes

   Creosote 50%

   Creosote-coal tar Solution ______

   Creosote-petroleum Solution ______

   Creosote-pentachlorophenol ______

2. Pentachlorophenols

   Dry pentachlorophenol ______

   Solvent-pentachlorophenol 25%

3. Arsenates

   Fluor chrome arsenate phenol ______

   Ammonical copper arsenate ______

   Chromated copper arsenate 25%

4. Other (please specity) ______

B. Process Type - Please check the process type employed at your plant for wood treating and indicate the approximate percentage of the total wood treated by each process type (if more than one process type is employed).

1. Pressure 95%
2. Non-pressure and vacuum 5%
3. Thermal ________
4. Steeping/cold soaking ________
5. Dipping ________
6. Other (please specify) ________

C. Other Operations - Please indicate the nature and size of other operations (e.g., saw mill) which may be conducted at your plant.

III. WASTE GENERATION/CHARACTERISTICS

A. Empty Containers - If empty containers (drums and bags) are generated at your plant as a result of use of treating materials, please indicate type and quantity.

	Drums	Bags	Other (specify)
Size and type	____	100#	____
Quantity (number/month)			
Average	____	50	____
Range	____	50 - 75	____

B. Wastewater Sludges - Does your plant generate a wastewater?

Yes ____

No x

If wastewater is generated, please indicate any treatment (e.g., lagooning) used onsite and the quantity of wastewater treatment sludge accumulated onsite or sent to disposal.

Wastewater treatment process ________________

Quantity of sludge (ton/year or cu yd/year) ________

C. Vessel Cleaning Wastes - Are wastes (sludges or solids), other than wastewater treatment sludges indicated in III.B above, produced as a result of cleaning of treating vessels? Please indicate the type of waste, frequency of cleaning and waste quantity.

Waste type(s)	____	____	sludges
Frequency of cleaning (no. per yr)	____	____	2
Waste quantity produced per cleaning	____	____	750#

D. Other Wood Preserving Wastes - Please indicate the type and quantity of other wastes (e.g., solvents, sludges or dry residue from air pollution control) produced as a result of wood preserving operation.

Waste type(s)	______	Boiler Flyash	
Waste quantity (lb/mo)	______	______	1500#

E. Wastes from Other Operations - Please indicate the type and quantity of waste produced at your plant site as a result of other operations (e.g., saw mill) carried out at the site.

Waste type(s)	______	None	______
Waste source	______	______	______
Waste quantity(lb/mo)	______	______	______

IV. WASTE TREATMENT AND DISPOSAL PRACTICES

A. Waste Treatment and Disposal - Please indicate the treatment methods (if any) employed and the ultimate disposal for each waste identified in Section III above.

Waste Type	Treatment*	Disposal†
Empty containers	None	approved off-site landfill
Wastewater sludges	______	______
Vessel cleaning wastes		
sludges	none	approved off-site landfill
______, etc.	______	______
Other wood preserving wastes		
______	______	______
______, etc.	______	______
Waste from other operations		
______	______	______
______, etc.	______	______

*Examples of treatment methods: rinsing or crushing of containers and sludge thickening or filtration

†Examples of ultimate disposal: on-site landfill, off-site landfill, incineration, disposal on roads (e.g., road stabilization), on-site lagoons.

B. Waste Hauling - Where Off-site disposal is employed, please indicate whether the waste is hauled by a contractor or by your own company.

By Contractor

V. ECONOMIC CONSIDERATIONS

A. Waste Treatment and Disposal Costs - Please indicate the approximate capital and operating costs at your plant which can be attributed to the treatment and to the disposal of wastes listed in Section III above. If possible, please provide a cost breakdown by individual wastes.

	Capital, $	Annual Operating, $
Treatment	______	~~$1,200.00~~ Flyash
Disposal	none	$1,000.00 Sludge

B. Annual Sales - Please indicate the total annual sales for your plant.

5 million

IV. ADDITIONAL STUDIES

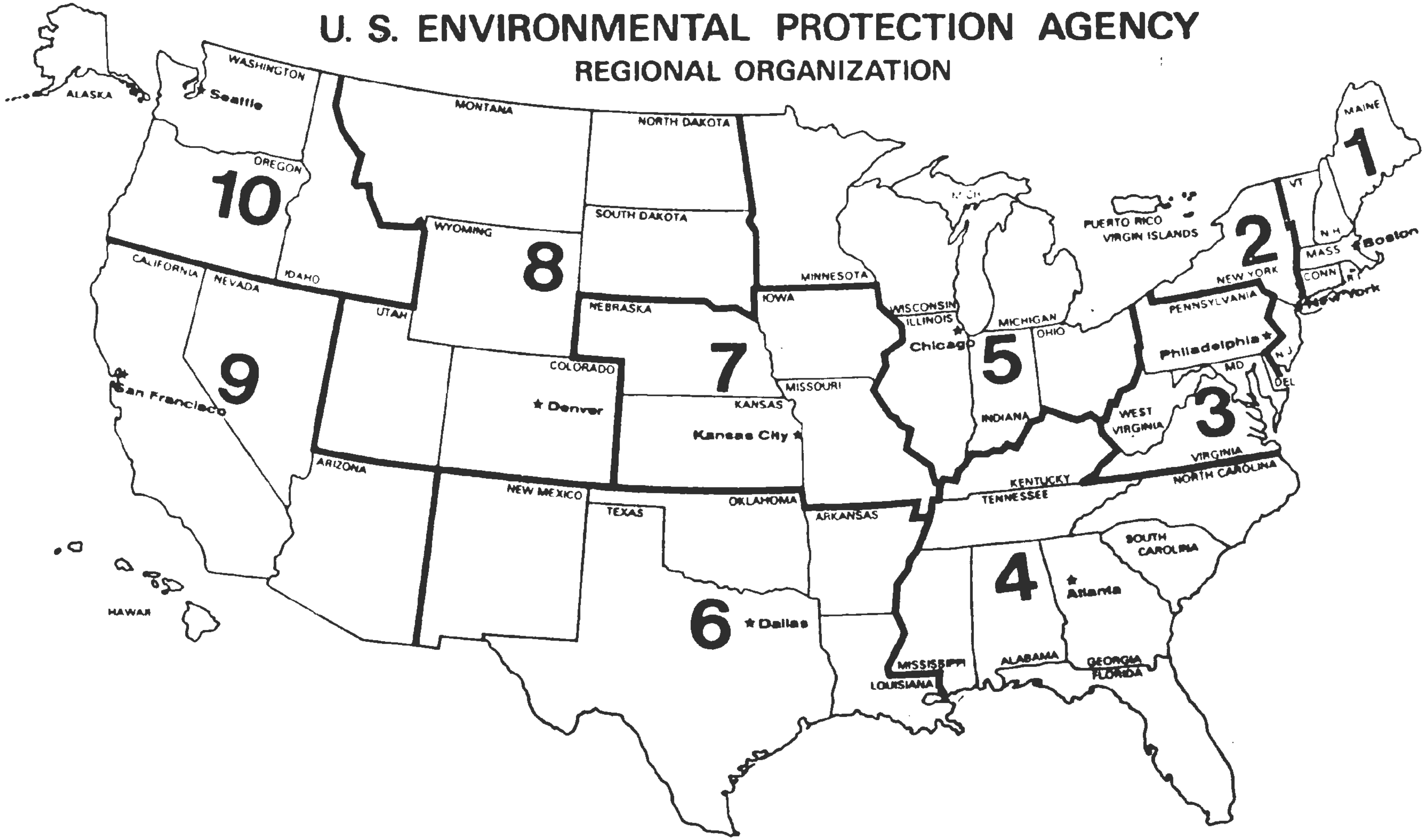
A. Would you be willing to entertain a plant visit or a follow-up call by a member of the project team for additional information? If yes, please indicate the name and telephone number of the person to be contacted. no

VII. MISCELLANEOUS INFORMATION

- Please provide any additional information (e.g., waste composition, waste toxicity, anticipated changes in operation, etc.) which you feel would help us in better characterizing the waste generation and disposal in your industry and more accurately assessing the potential impacts of various regulatory options on your operation and the industry.

none

U. S. ENVIRONMENTAL PROTECTION AGENCY
REGIONAL ORGANIZATION



SECTION C-4. COMPUTER CALCULATIONS AND HAND PLOTS OF INDUSTRY WASTE GENERATION PROFILE FOR SIC 286

- Sample Summary - State Data Base
- Adjusted Percentiles for Individual Plants
- Cumulative Percentage Distribution of Plants in the Sample State Data (Normal Plot)
- Cumulative Percentage Distribution of Plants in the Sample State Data (Log-normal Plot)
- Industry Profile, Normal Distribution
- Industry Profile, Log-normal Distribution

08/28/79. 14.31.59.

SAMPLE SUMMARY SIC: 2860 STATE DATA BASE

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	2	10.0	107.	.5
100-200	2	10.0	326.	1.5
200-300	1	5.0	208.	.9
300-400	1	5.0	353.	1.6
400-500	3	15.0	1376.	6.1
500-600	0	0.0	0.	0.0
600-700	0	0.0	0.	0.0
700-800	4	20.0	3145.	14.0
800-900	1	5.0	844.	3.8
900-1000	0	0.0	0.	0.0
1000-2000	3	15.0	5491.	24.5
2000-5000	3	15.0	10590.	47.2
TOTAL	20	100.0	22440.	100.0

NUMBER OF PLANTS IN NATION: 774

PERCENT ZERO GENERATORS: 6.0
PERCENT LARGE GENERATORS: 61.0
AVERAGE RATE FOR LARGE GENERATORS: 1122000.0

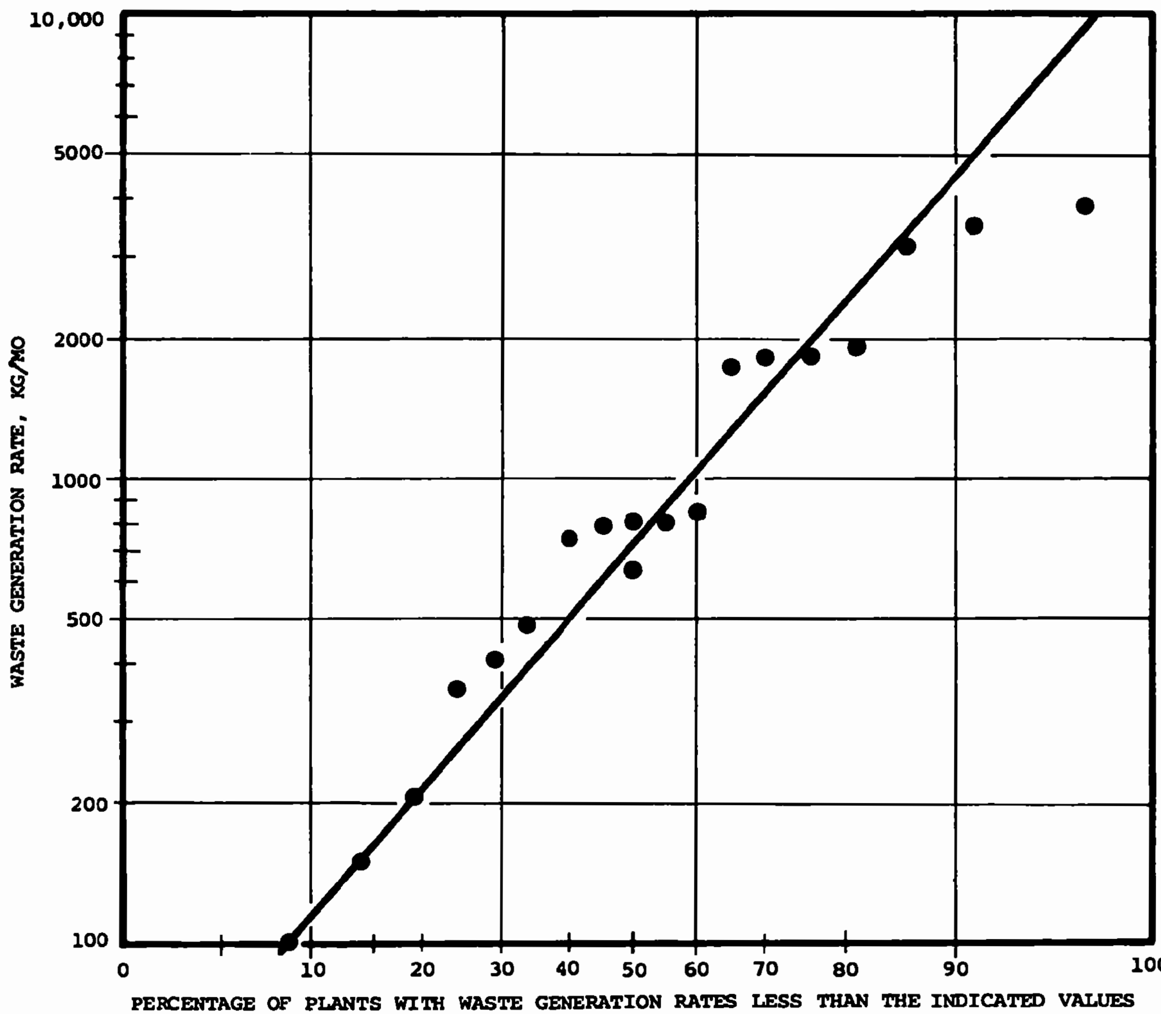
ADJUSTED PERCENTILES FOR INDIVIDUAL PLANTS

INDEX	ST	AMT	LOG(A)	LN(A)	PCTILE
1	CA	7.0	.8451	1.9459	.0309
2	NY	100.0	2.0000	4.6052	.0802
3	TX	150.0	2.1761	5.0106	.1296
4	MA	176.0	2.2455	5.1705	.1790
5	NY	208.0	2.3181	5.3375	.2284
6	NH	353.0	2.5478	5.8665	.2778
7	RI	401.0	2.6031	5.9940	.3272
8	NY	487.0	2.6875	6.1883	.3765
9	IA	488.0	2.6884	6.1903	.4259
10	NY	756.0	2.8785	6.6280	.4753
11	NY	789.0	2.8971	6.6708	.5247
12	RI	800.0	2.9031	6.6846	.5741
13	RI	800.0	2.9031	6.6846	.6235
14	NH	844.0	2.9263	6.7382	.6728
15	NY	1782.0	3.2509	7.4855	.7222
16	KS	1816.0	3.2591	7.5044	.7716
17	MO	1893.0	3.2772	7.5459	.8210
18	NY	3244.0	3.5111	8.0846	.8704
19	MS	3518.0	3.5463	8.1656	.9198
20	NY	3828.0	3.5830	8.2501	.9691
TOTALS		22440.0	55.0469	126.7510	
AVG		1122.0	2.7523	6.3376	
REAL AV		1122.0	565.4	565.4	
SD		1180.7	.6425	1.4794	
50 PCTL		1122.0	565.4	565.4	
84 PCTL		2302.7	2482.3	2482.3	

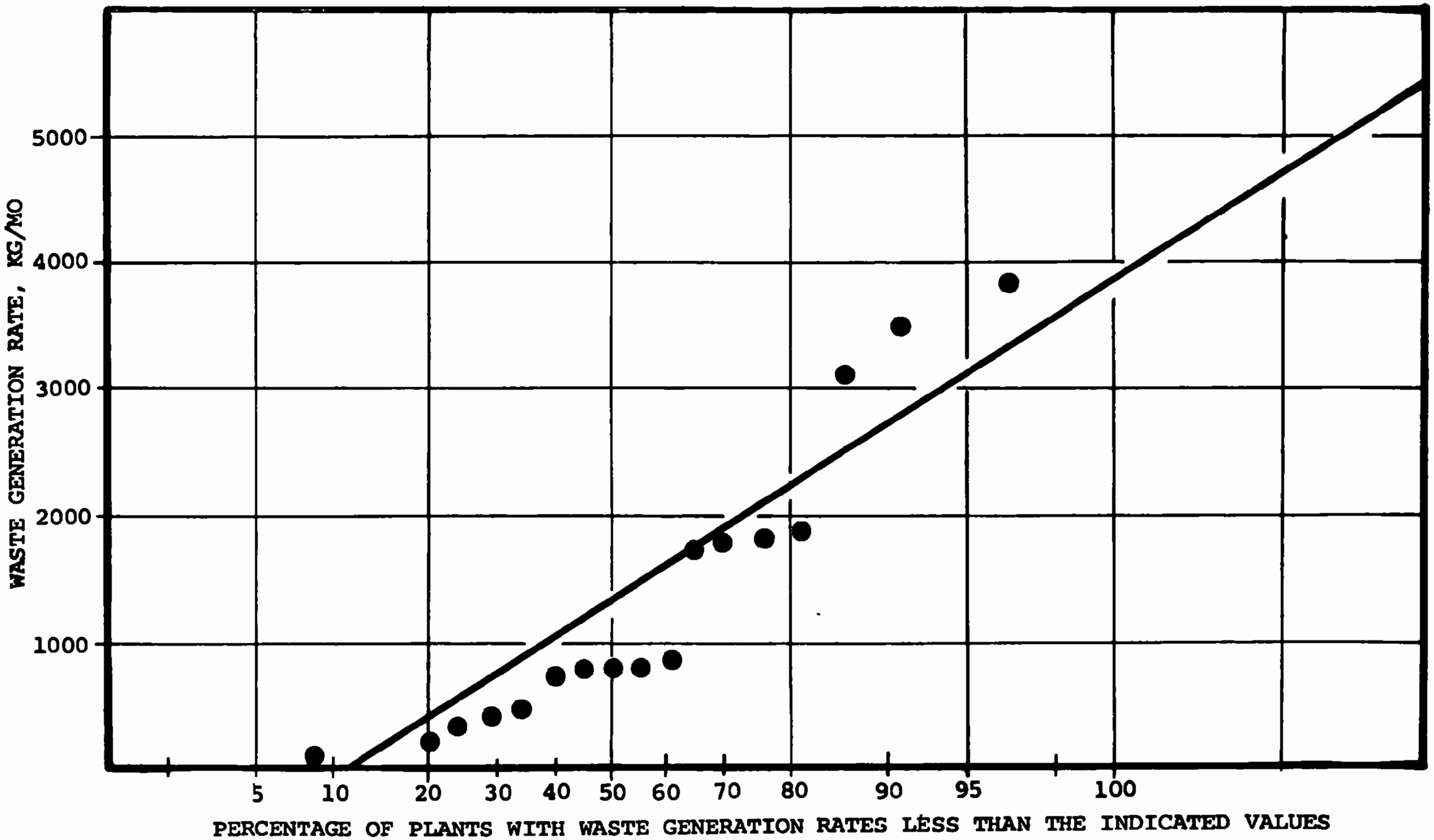
LOG-NORMAL DISTRIBUTION
NUMBER OF SAMPLES = 20

50TH PERCENTILE (Z=0) AT: 565.4
84TH PERCENTILE (Z=1) AT: 2413.6
16TH PERCENTILE (Z=-1) AT: 132.5

```
TOTAL SUMS OF SQUARES =           41.5824
SUMS OF SQUARES DUE TO REGRESSION =            37.0879
SUMS OF SQUARES DUE TO DEVIATION =             4.4945
GOODNESS OF FIT =          .891913
CORRELATION COEFFICIENT =          .944411


     NORMAL DISTRIBUTION
NUMBER OF SAMPLES =     20

50TH PERCENTILE (Z=0) AT:       1122.0
84TH PERCENTILE (Z=1) AT:       2223.1
16TH PERCENTILE (Z=-1) AT:        20.9

TOTAL SUMS OF SQUARES =    26486498.0000
SUMS OF SQUARES DUE TO REGRESSION =   21346879.0150
SUMS OF SQUARES DUE TO DEVIATION =    5139618.9850
GOODNESS OF FIT =          .805953
CORRELATION COEFFICIENT =          .897749
```



CUMULATIVE PERCENTAGE DISTRIBUTION OF PLANTS IN THE SAMPLE STATE DATA FOR SIC 286 (LOG-NORMAL PLOT)



CUMULATIVE PERCENTAGE DISTRIBUTION OF PLANTS IN THE SAMPLE STATE
DATA FOR SIC 286 (NORMAL PLOT)

08/28/79. 14.31.59.

INDUSTRY PROFILE SIC: 2860 NORMAL DISTRIBUTION

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
ZERO GEN	46	6.0	0.	0.0
0-100	45	5.8	2250.	.0
100-200	6	.8	900.	.0
200-300	7	.9	1750.	.0
300-400	7	.9	2450.	.0
400-500	8	1.0	3600.	.0
500-600	8	1.0	4400.	.0
600-700	8	1.1	5200.	.0
700-800	9	1.1	6750.	.0
800-900	9	1.2	7650.	.0
900-1000	9	1.2	8550.	.0
1000-2000	85	10.9	127500.	.0
2000-5000	54	7.0	189000.	.0
> 5000	472	61.0	529584000.	99.9
TOTAL	773	100.0	529944000.	100.0

08/28/79.   14.31.59.

INDUSTRY PROFILE   SIC: 2860   LOG-NORMAL DISTRIBUTION

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
ZERO GEN	46	6.0	0.	0.0
0-100	32	4.1	1600.	.0
100-200	33	4.3	4950.	.0
200-300	26	3.3	6500.	.0
300-400	20	2.6	7000.	.0
400-500	17	2.1	7650.	.0
500-600	14	1.8	7700.	.0
600-700	12	1.5	7800.	.0
700-800	10	1.3	7500.	.0
800-900	9	1.1	7650.	.0
900-1000	7	1.0	6650.	.0
1000-2000	42	5.5	63000.	.0
2000-5000	34	4.4	119000.	.0
> 5000	472	61.0	529584000.	100.0
TOTAL	774	100.0	529831000.	100.0

SECTION C-5. COMPUTER-GENERATED SAMPLE SUMMARY SHEETS AND INDUSTRY PROFILES FOR SIC'S 3471 AND 7342

- Sample Summary Sheet - State Data Base - SIC 3471
- Adjusted Percentile for Individual Plants, SIC 3471
- Industry Profile, Log-normal Distribution, SIC 3471
- Industry Profile, Normal Distribution, SIC 3471
- Sample Summary Sheet - State Data Base - SIC 7342
- Adjusted Percentiles for Individual Plants, SIC 7342
- Industry Profile, Log-normal Distribution, SIC 7342
- Industry Profile, Normal Distribution, SIC 7342

08/28/79.   14.31.59.

SAMPLE SUMMARY   SIC: 3471   STATE DATA BASE

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	23	35.4	811.	2.3
100-200	6	9.2	846.	2.4
200-300	8	12.3	2040.	5.8
300-400	5	7.7	1699.	4.9
400-500	2	3.1	846.	2.4
500-600	3	4.6	1677.	4.8
600-700	5	7.7	3178.	9.1
700-800	2	3.1	1496.	4.3
800-900	1	1.5	882.	2.5
900-1000	0	0.0	0.	0.0
1000-2000	6	9.2	8049.	23.0
2000-5000	4	6.2	13452.	38.5
TOTAL	65	100.0	34976.	100.0

NUMBER OF PLANTS IN NATION: 3088

PERCENT ZERO GENERATORS: 0.0
PERCENT LARGE GENERATORS: 20.0
AVERAGE RATE FOR LARGE GENERATORS: 20300.0

ADJUSTED PERCENTILES FOR INDIVIDUAL PLANTS

INDEX	ST	AMT	LOG(A)	LN(A)	PCTILE
1	AZ	1.0	0.0000	0.0000	.0096
2	CA	3.0	.4771	1.0986	.0249
3	CT	4.0	.6021	1.3863	.0402
4	IA	7.0	.8451	1.9459	.0556
5	NY	8.0	.9031	2.0794	.0709
6	ME	9.0	.9542	2.1972	.0862
7	TX	10.0	1.0000	2.3026	.1015
8	CA	19.0	1.2788	2.9444	.1169
9	AZ	25.0	1.3979	3.2189	.1322
10	NY	28.0	1.4472	3.3322	.1475
11	IA	28.0	1.4472	3.3322	.1628
12	MO	31.0	1.4914	3.4340	.1782
13	NY	32.0	1.5051	3.4657	.1935
14	NY	38.0	1.5798	3.6376	.2088
15	MA	42.0	1.6232	3.7377	.2241
16	NY	44.0	1.6435	3.7842	.2395
17	NY	47.0	1.6721	3.8501	.2548
18	CA	51.0	1.7076	3.9318	.2701
19	CT	68.0	1.8325	4.2195	.2854
20	MA	70.0	1.8451	4.2485	.3008
21	AZ	76.0	1.8808	4.3307	.3161
22	OK	80.0	1.9031	4.3820	.3314
23	WA	90.0	1.9542	4.4998	.3467
24	NY	104.0	2.0170	4.6444	.3621
25	NY	125.0	2.0969	4.8283	.3774
26	OK	142.0	2.1523	4.9558	.3927
27	NY	150.0	2.1761	5.0106	.4080
28	CT	157.0	2.1959	5.0562	.4234
29	TX	168.0	2.2253	5.1240	.4387
30	NY	208.0	2.3181	5.3375	.4540
31	NY	227.0	2.3560	5.4250	.4693
32	NY	232.0	2.3655	5.4467	.4847
33	GA	257.0	2.4099	5.5491	.5000
34	OK	262.0	2.4183	5.5683	.5153
35	CT	283.0	2.4518	5.6454	.5307
36	MA	285.0	2.4548	5.6525	.5460
37	NY	286.0	2.4564	5.6560	.5613
38	CT	302.0	2.4800	5.7104	.5766

39	NY	330.0	2.5185	5.7991	.5920
40	AZ	333.0	2.5224	5.8081	.6073
41	CA	345.0	2.5378	5.8435	.6226
42	CA	389.0	2.5899	5.9636	.6379
43	AZ	405.0	2.6075	6.0039	.6533
44	CA	441.0	2.6444	6.0890	.6686
45	OK	553.0	2.7427	6.3154	.6839
46	IA	557.0	2.7459	6.3226	.6992
47	CT	567.0	2.7536	6.3404	.7146
48	NY	625.0	2.7959	6.4378	.7299
49	TX	630.0	2.7993	6.4457	.7452
50	TX	631.0	2.8000	6.4473	.7605
51	OK	632.0	2.8007	6.4489	.7759
52	NY	660.0	2.8195	6.4922	.7912
53	NY	734.0	2.8657	6.5985	.8065
54	OK	762.0	2.8820	6.6359	.8218
55	OK	882.0	2.9455	6.7822	.8372
56	TX	1009.0	3.0039	6.9167	.8525
57	NY	1011.0	3.0048	6.9187	.8678
58	OK	1327.0	3.1229	7.1907	.8831
59	NY	1389.0	3.1427	7.2363	.8985
60	NY	1565.0	3.1945	7.3556	.9138
61	NY	1748.0	3.2425	7.4662	.9291
62	ME	2311.0	3.3638	7.7454	.9444
63	NH	3039.0	3.4827	8.0193	.9598
64	OK	3810.0	3.5809	8.2454	.9751
65	OK	4292.0	3.6327	8.3645	.9904
TOTALS		34976.0	144.7073	333.2029	
AVG		538.1	2.2263	5.1262	
REAL AV		538.1	168.4	168.4	
SD		851.6	.7912	1.8217	
50 PCTL		538.1	168.4	168.4	
84 PCTL		1389.7	1041.0	1041.0	

LOG-NORMAL DISTRIBUTION
NUMBER OF SAMPLES = 65

50TH PERCENTILE (Z=0) AT: 168.4

```
84TH PERCENTILE (Z=1) AT:        1042.8
16TH PERCENTILE (Z=-1) AT:         27.2

TOTAL SUMS OF SQUARES =          212.3977
SUMS OF SQUARES DUE TO REGRESSION =          206.4562
SUMS OF SQUARES DUE TO DEVIATION =            5.9415
GOODNESS OF FIT =          .972027
CORRELATION COEFFICIENT =          .985914



     NORMAL DISTRIBUTION
NUMBER OF SAMPLES =     65

50TH PERCENTILE (Z=0) AT:         538.1
84TH PERCENTILE (Z=1) AT:        1217.9
16TH PERCENTILE (Z=-1) AT:       -141.7

TOTAL SUMS OF SQUARES =    46416907.4462
SUMS OF SQUARES DUE TO REGRESSION =    28696782.9025
SUMS OF SQUARES DUE TO DEVIATION =   17720124.5437
GOODNESS OF FIT =          .618240
CORRELATION COEFFICIENT =          .786282
```

08/28/79. 14.31.59.

INDUSTRY PROFILE SIC: 3471 LOG-NORMAL DISTRIBUTION

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	PERCENT	WASTE QUANTITY KG/MO	PERCENT
ZERO GEN	0	0.0	0.	0.0
0-100	988	32.0	49400.	.4
100-200	382	12.4	57300.	.4
200-300	222	7.2	55500.	.4
300-400	149	4.8	52150.	.4
400-500	108	3.5	48600.	.4
500-600	82	2.7	45100.	.3
600-700	65	2.1	42250.	.3
700-800	53	1.7	39750.	.3
800-900	44	1.4	37400.	.3
900-1000	37	1.2	35150.	.3
1000-2000	197	6.4	295500.	2.1
2000-5000	143	4.6	500500.	3.6
> 5000	618	20.0	12545400.	90.9
TOTAL	3088	100.0	13804000.	100.0

INDUSTRY PROFILE   SIC: 3471   NORMAL DISTRIBUTION

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	PERCENT	WASTE QUANTITY KG/MO	PERCENT
ZERO GEN	0	0.0	0.	0.0
0-100	641	20.8	32050.	.2
100-200	123	4.0	18450.	.1
200-300	133	4.3	33250.	.2
300-400	140	4.5	49000.	.3
400-500	144	4.7	64800.	.5
500-600	144	4.7	79200.	.6
600-700	143	4.6	92950.	.7
700-800	139	4.5	104250.	.7
800-900	131	4.2	111350.	.8
900-1000	120	3.9	114000.	.8
1000-2000	575	18.6	862500.	6.1
2000-5000	39	1.3	136500.	1.0
> 5000	618	20.0	12545400.	88.1
TOTAL	3090	100.0	14243700.	100.0

08/28/79. 14.31.59.

SAMPLE SUMMARY SIC: 7342 STATE DATA BASE

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
0-100	14	73.7	513.	39.5
100-200	4	21.1	552.	42.5
200-300	1	5.3	235.	18.1
300-400	0	0.0	0.	0.0
400-500	0	0.0	0.	0.0
500-600	0	0.0	0.	0.0
600-700	0	0.0	0.	0.0
700-800	0	0.0	0.	0.0
800-900	0	0.0	0.	0.0
900-1000	0	0.0	0.	0.0
1000-2000	0	0.0	0.	0.0
2000-5000	0	0.0	0.	0.0
TOTAL	19	100.0	1300.	100.0

NUMBER OF PLANTS IN NATION: 5105

PERCENT ZERO GENERATORS: 0.0
PERCENT LARGE GENERATORS: 0.0
AVERAGE RATE FOR LARGE GENERATORS: 0.0

ADJUSTED PERCENTILES FOR INDIVIDUAL PLANTS

INDEX	ST	AMT	LOG(A)	LN(A)	PCTILE
1	CA	1.0	0.0000	0.0000	.0325
2	CA	1.0	0.0000	0.0000	.0844
3	CA	6.0	.7782	1.7918	.1364
4	CA	6.0	.7782	1.7918	.1883
5	CA	8.0	.9031	2.0794	.2403
6	CA	9.0	.9542	2.1972	.2922
7	CA	19.0	1.2788	2.9444	.3442
8	CA	38.0	1.5798	3.6376	.3961
9	CA	45.0	1.6532	3.8067	.4481
10	CA	57.0	1.7559	4.0431	.5000
11	CA	66.0	1.8195	4.1897	.5519
12	CA	76.0	1.8808	4.3307	.6039
13	CA	83.0	1.9191	4.4188	.6558
14	CA	98.0	1.9912	4.5850	.7078
15	CA	111.0	2.0453	4.7095	.7597
16	CA	139.0	2.1430	4.9345	.8117
17	CA	151.0	2.1790	5.0173	.8636
18	CA	151.0	2.1790	5.0173	.9156
19	CA	235.0	2.3711	5.4596	.9675
TOTALS		1300.0	28.2091	64.9543	
AVG		68.4	1.4847	3.4186	
REAL AV		68.4	30.5	30.5	
SD		65.6	.7223	1.6632	
50 PCTL		68.4	30.5	30.5	
84 PCTL		134.0	161.1	161.1	

LOG-NORMAL DISTRIBUTION
NUMBER OF SAMPLES = 19

50TH PERCENTILE (Z=0) AT: 30.5
84TH PERCENTILE (Z=1) AT: 157.2
16TH PERCENTILE (Z=-1) AT: 5.9

TOTAL SUMS OF SQUARES = 49.7942

SUMS OF SQUARES DUE TO REGRESSION = 44.6870
SUMS OF SQUARES DUE TO DEVIATION = 5.1073
GOODNESS OF FIT = .897432
CORRELATION COEFFICIENT = .947329

NORMAL DISTRIBUTION
NUMBER OF SAMPLES = 19

50TH PERCENTILE (Z=0) AT: 68.4
84TH PERCENTILE (Z=1) AT: 133.0
16TH PERCENTILE (Z=-1) AT: 3.9

TOTAL SUMS OF SQUARES = 77444.6316
SUMS OF SQUARES DUE TO REGRESSION = 69336.1079
SUMS OF SQUARES DUE TO DEVIATION = 8108.5237
GOODNESS OF FIT = .895299
CORRELATION COEFFICIENT = .946202

08/28/79.   14.31.59.

INDUSTRY PROFILE   SIC: 7342   LOG-NORMAL DISTRIBUTION

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
ZERO GEN	0	0.0	0.	0.0
0-100	3912	76.6	195600.	29.3
100-200	555	10.9	83250.	12.5
200-300	226	4.4	56500.	8.5
300-400	120	2.4	42000.	6.3
400-500	73	1.4	32850.	4.9
500-600	48	.9	26400.	4.0
600-700	34	.7	22100.	3.3
700-800	25	.5	18750.	2.8
800-900	19	.4	16150.	2.4
900-1000	14	.3	13300.	2.0
1000-2000	56	1.1	84000.	12.6
2000-5000	22	.4	77000.	11.5
> 5000	0	0.0	0.	0.0
TOTAL	5104	100.0	667900.	100.0

08/28/79.   14.31.59.

INDUSTRY PROFILE   SIC: 7342   NORMAL DISTRIBUTION

ESTIMATED NUMBER AND WASTE QUANTITIES FOR ESTABLISHMENTS IN VARIOUS WASTE GENERATION CATEGORIES

WASTE GENERATION RANGES KG/MO	ESTABLISHMENTS NUMBER	ESTABLISHMENTS PERCENT	WASTE QUANTITY KG/MO	WASTE QUANTITY PERCENT
ZERO GEN	0	0.0	0.	0.0
0-100	3512	68.8	175600.	41.3
100-200	1488	29.2	223200.	52.5
200-300	104	2.0	26000.	6.1
300-400	1	.0	350.	.1
400-500	0	.0	0.	0.0
500-600	0	.0	0.	0.0
600-700	0	.0	0.	0.0
700-800	0	.0	0.	0.0
800-900	0	.0	0.	0.0
900-1000	0	.0	0.	0.0
1000-2000	0	.0	0.	0.0
2000-5000	0	0.0	0.	0.0
> 5000	0	0.0	0.	0.0
TOTAL	5105	100.0	425150.	100.0

SECTION C-6. SAMPLE RAW DATA PROVIDED BY STATE OF ARIZONA, CALIFORNIA AND WASHINGTON

- State of Arizona Industrial Waste Survey
- San Diego County Industrial Waste Survey
- Washington State Industrial and Hazardous Waste Inventory

INSTRUCTIONS FOR COMPLETING INDUSTRIAL WASTE SURVEY FORM

WASTE PRODUCTION

Primary SIC Group (3 digit)	Entered by the Department
ID-	Identification number given each manufacturer or company
City-	Name of city in which company is located
County-	Name of county in which company is located
Zip Code-	Postal zip code number assigned to manufacturer or company
Major Product or Service.	Representative products or services of the company
SIC Code-	Enter four digit number pertaining to major products or services
Common Name:	Enter the name of the major waste product generated in your establishment
Chemical Name:	If the major waste is a chemical substance, enter the name here
Quantity of Waste per Year	Enter the amounts and units of wastes generated (T for tons, Y for cubic yards, G for gallons)
Potential Hazard	This refers to the fact that the wastes require special management provision in waste handling because of their acute and/or chronic effects on the health and public welfare or environment (Enter Y for yes, N for no)
Special Handling Required	Special handling may be required of the wastes which are potentially hazardous (Enter Y for yes, N for no)

WASTE CHARACTERISTICS AND ON-SITE HANDLING

Waste Types	Enter the waste type from previous page
Hazardous Characteristics of Wastes	Check one or more cells which adequately describes the characteristics of the wastes
On-site Waste Storage and Handling	Enter percent of waste disposed, reduced or stored by each method

WASTE DISPOSAL

Percent of Final Disposal and Volume Reduction-	For each waste type, enter the percent of waste disposed by final disposal methods
Off-Site Disposal: Question #1	Enter the rate at which waste products are removed from your company to a final disposal site
Question #2	Enter the method by which this waste product is transported to a final disposal site
Question #3	List by name and address all final disposal sites and facilities utilized by your company
Question #4	List by name and address recyclers and processors used by your company
Question #5	List by name and address the hauling or collection service(s) utilized by your company

STATE OF ARIZONA INDUSTRIAL WASTE SURVEY

WASTE PRODUCTION

Date 5 13 75
Primary Sic Group 364
ID 049
City PHX
County MAR
Zip Code 85017

Major product or services	SIC Code (4 Digit)	Waste Type: Common Name	Waste Type: Chemical Name	Quantity of Waste/Year	Potential Hazard Yes (Y) No (N)	Special Handling Required Yes (Y) No (N)
Envelope	2642	Paper		671T	N	N
		Developer		100G	Y	N
		Fixer		100G	Y	N
		Refuse		5T	N	N

ON-SITE WASTE STORAGE AND HANDLING

CHARACTERISTICS OF WASTES (MARK X)

Waste Types	Organic	Inorganic	Solid	Semi Solid	Liquid	Skin Irritants	Corrosive	Explosive	Toxic	Flammable	Pathogenic	% of waste reduction & handling by method: Compacting	Shredding	Crushing	Composting	Incineration	Ponding	Landfill	Other (Specify)	None
Paper	✓		✓							✓									BIN 100	
Dev.		✓			✓	✓			✓											✓
Fix		✓			✓	✓			✓											✓
Refuse	✓		✓							✓									BIN 100	

% Final disposal and volume reduction								
Salvage	Dump Site	Sanitary Landfill	Spread On Land	Lagoon	Composting	Incinerated	Public Sewer System	Other Specify
100								
			100					
			100					
		100						

WASTE DISPOSAL
Off-Site Disposal

1 Frequency of removal of waste products from company to disposal site

3xwk - paper

2xwk - refuse

2 Method of removal from your company to final disposal site

Truck

3 Names and addresses of agencies operating final disposal sites utilized by your company

unk.

4 Names and addresses of off-premise processors and recyclers utilized by your company

Consolidated Fiber.

5 Names and addresses of waste haulers or collection services used by your company

Universal Waste Control

ARIZONA DEPARTMENT OF HEALTH SERVICES

Division of Environmental Health Services

RAUL H CASTRO Governor
J I SCHAMADAN M D Director

March 10, 1975

TO ALL ARIZONA MANUFACTURERS

Gentlemen:

The Bureau of Sanitation, Arizona Department of Health Services, has requested Behavioral Health Consultants, Inc. to conduct an industrial waste survey of randomly selected Arizona industries and manufacturers.

As one of those selected, your responses to the following questions will be appreciated. Please complete the attached survey form by March 25, 1975. A BHC representative will arrange to visit your company to collect the form and provide assistance in completing any unanswered questions.

The data you provide will be held in confidence and will be compiled as industry-wide averages without references to specific respondents.

Thank you for your time and cooperation in this matter. If you should have any questions concerning the completion of the survey form, please contact Mr. Dom Bertolino, 2214 North Central, Suite 211, Phoenix, Arizona 85004, PH: 602/258-6096.

Sincerely,

John B. Beck

John B. Beck, M.P.H., Chief
Bureau of Sanitation

Enclosure

State Health Building 1740 West Adams Street Phoenix, Arizona 85007

6. Please complete the industrial wastes table of information (centerfold) for your operations. (Insert sheet illustrates typical samples.)

7. Please indicate the names of haulers and off-site disposal facilities utilized for:

Liquids CATHEM CO. (Hauler) ESCONDIDO, CA (Disposal Site)

Solids ______ (Hauler) ______ (Disposal Site)

C. DEPARTMENT OF HEALTH

Are your waste managers acquainted with California Department of Health's rules and guidelines for handling hazardous wastes? Yes ☐ In Part ☒ No ☐

D. RESOURCES RECOVERED

What materials are recovered from your operation's wastes? By whom? (ck. below)

(Material recovered)	(Annual amount)	(Company)	(Others)
OIL		☐	☒
SOLVENT		☐	☒
	UNKNOWN	☐	☐

E. BRANCH INFORMATION

1. How many people are employed in your operations?

1-20 ☐ 21-50 ☐ 51-100 ☐ 101-500 ☐ 501 or more ☐

2. How much area do your operations occupy?

Land area ______ acres Floor area ______ sq.ft.

3. What is the present age of your facilities?

Under 5 years ☐ 5-30 years ☐ over 30 years ☐

4. COMMENT

F. AIR POLLUTION CONTROL

1. Are your waste materials disposed of on site by evaporation or incineration? Yes ☐ No ☒ Evap. ☐ Incin. ☐

C-57

SAN DIEGO COUNTY

INDUSTRIAL WASTE SURVEY

RECEIVED
AUG 11 1976
SANITATION & FLOOD CONTROL

FOR AGENCY USE

I.D. 5117

By Mail ___ In Person ___

Interviewer ______

Date ______

Primary SIC: 3662

Secondary SIC: ______

A. GENERAL INFORMATION

1. Company [redacted]
2. Branch ______
3. [redacted]
(Street & No.) (City) (Zip) (Phone)
4. Person Interviewed [redacted]
(Name) (Title) (Phone)
5. What is your principal product or service? Communications Equipment

B. INDUSTRIAL WASTES

1. Do your operations produce any kind of waste? . . . . Yes ☒ No ☐
If so, does your waste or waste mixture have any of the following properties?

Carcinogenic	☐	OIL Flammable AUTO IGNITION 800°F	☒
Corrosive	☐	Irritant/strong sensitizer . . .	☐
Explosive	☐	SOLVENT Toxic TLV* 700PPM/VOL.	☒
Nontoxic	☐	PHOTOCHEMICAL NONREACTIVE	

2. Does your operation's waste generation change seasonally? . . Yes ☐ No ☒
If yes, when does peak occur? ______ (Please specify time period)

3. How are your operation's wastes stored prior to disposal/transportation?

Barrels (not steel)	☐	Special packaging	☐
Concrete encased	☐	Steel drums	☒
Open yard	☐	Tanks	☐
Plastic encased	☐	Warehouse	☐
Ponds	☐	Other ______ (Please specify)	
Pressure containers	☐	None stored	☐

4. Are wastes combined in storage? . . . . Yes ☐ No ☒

5. Will your compliance with current federal water and air pollution control standards produce additional wastes? Yes ☐ No ☒

* THRESHOLD LIMIT VALUE

INDUSTRIAL WASTES

TABLE OF INFORMATION

	PROCESS		ASSOCIATED WASTE	ESTIMATED CONCENTRATION (% or ppm)	PHYSICAL STATE	ESTIMATED ANNUAL VOLUME: POUNDS, BARRELS TONS OR GALLONS (INDICATE WHICH)			please use key sheet			
									DISPOSAL POINT (1-3)	PROCESS EMPLOYED		
						PRESENT	5 YEARS	10 YEARS		TREATMENT PROCESS	DISPOSAL MODE	SHIPPING CONTAINER
A.	WAVE SOLDERING	1.	OIL	NONE	LIQUID	150 GAL	250 GAL		3		60	2
	PARTS CLEANING	2	, SOLVENT			250 GAL	500 GAL		3		60	2
						Kg/M						
					1	47						
					2	63						
						~~[illegible]~~						

ID 232u

09/22/73	WASHINGTON STATE INDUSTRIAL AND HAZARDOUS WASTE INVENTORY MASTER FILE	PAGE 147

ID NUMBER - 2711144761 INTERVIEW DATE 07/73

[redacted]

SIC I - 271 AREA OCCUPIED (LAND) - 0000.0 ACRES
SIC II - 000 (FLOOR) - 017500 SQ FT

0010 98520

PRODUCTION QUANTITIES	PRODUCT CODE	PRODUCT NAME	SIC CODE	OPER LOCATION CITY	OPER LOCATION COUNTY	MONTHLY YIELDS	SEASON VAR 1	2	3	4	WORK SCHEDULE	TOTAL EMPLOYEES PRODUCTION	OTHER
....	0271000	NEWSPAPER	2711	0010	14		X	X	X	X	365	0095	0000

PRODUCTION INPUT	MATERIAL CODE	QUANTITY USED PER MONTH AVERAGE	MAXIMUM	MATERIAL CODE	QUANTITY USED PER MONTH AVERAGE	MAXIMUM
....	0262111	000010 T	0000010 T	0289301	000002 G	0000003 G
	0262101	000030 P	0000030 P	0386111	000030 P	0000030 P
	0000425	000001 G	0000001 G	0279100	000540 P	0000540 P

WASTE MANAGEMENT COSTS	MANAGEMENT FUNCTION	INTERNAL CAPITAL COST INIT INVEST	LIFE	INTERNAL ANNUAL COSTS LABOR (M-O)	OPERATING	ANNUAL EXTERNAL COSTS PRIVATE	MUNICIPAL	REGIONAL	TOTAL ANNUAL COST OF FUNCTION
....	COLL & TRANS	00000.0	00	0000	000000	000250	00000	00000	00000250
	TOTAL	00000.0	00	0000	000000	000250	00000	00000	00000250

ANNUAL RETURN FROM SALVAGE - 0000103 GROSS 0000103+ NET

WASTE GENERATION & COMPOSITION	WASTE TYPE	TONS OF WASTE PER MONTH	SC	%	SC	%	SC	%	SC	%	SC	%	SC	%	SC	%	SC	%	SC	%	SC	%
....	PAPER	00008.0	002	050	033	050																
	INORG CHEM	00000.1	425	100																		
	NONFERROUS	00000.3	002	100																		
	OTHER	00003.1	001	100																		
	REFUSE	00001.0	001	100																		

(PERCENT OF WASTE BY SUBWASTE (SC) TYPE)

ID NUMBER - 2711144761 CONTINUED INTERVIEW DATE 07/73

STORAGE & TRANS OF WASTES	WASTE TYPE	ON-SITE VOLUME REDUCTION METHODS: COMPACT / SHRED	CRUSH / COMPOST	BURN / LAGOON	OTHER / NONE	........STORAGE PROBLEMS.......: CAPACITY / VECTORS	ODOR / DRAIN	UNSIGHTLY	OTHER / HANDLE	COLL FREQ #/MO	WASTE TRANS METHOD: TRUCK / RAIL	PIPE / BARGE	CONVEYOR / OTHER	AGENCY CO MUN / PVT REG
	PAPER				X	N	O	N	E	21	X			X
	INORG CHEM				X	N	O	N	E	01	X			X
	NONFERROUS				X	N	O	N	E	01	X			X
	OTHER				X	N	O	N	E	01	X			X
	REFUSE				X	N	O	N	E	21	X			X

WASTE CHARACTERISTICS	WASTE TYPE	RECYCLABLE %	HAZARDOUS	SPECIAL HANDLING	SKIN IRRITANT	CORROSIVE	EXPLOSIVE	TOXIC	FLAMMABLE	PATHOGENIC	RADIOACTIVE	NO HAZARD
	PAPER	000	YES	NO					X			
	INORG CHEM	100	YES	NO	X							
	NONFERROUS	100	NO	NO								X
	OTHER	100	NO	NO								X
	REFUSE	000	NO	NO								X

(..............HAZARDOUS CHARACTERISTICS OF WASTE..............)

WASTE DISPOSAL	WASTE TYPE	SALVAGE	BURNING DUMP	NO-BURN DUMP	SANITARY LANDFILL	LAND SPREAD	LAGOON	COMPOST	CONICAL BURN	INCIN-ERATE	OCEAN DISPOSAL	ANIMAL FEED	WELL INJECT	OTHER
	PAPER			100										
	INORG CHEM	100												
	NONFERROUS	100												
	OTHER	100												
	REFUSE			100										

(..........................FINAL DISPOSAL METHOD BY PERCENT OF WASTE..........................)

FINAL DISPOSAL SITES	DISPOSAL METHOD	DISTANCE TO SITE: COMPANY	PRIVATE	MUNICIPAL	REGIONAL	LOCATION OF SITE: SECTION	TOWNSHIP	RANGE	COMPANY OWNED FACILITIES: DATE BUILT	LIFE	BLDG AREA	LAND-AREA
	SALVAGE		00			00	00	00 W				
	DUMP-NO BURN			05		12	17	09 W				

SECTION C-7. SELECTED EXAMPLES OF REPORTED DAMAGE INCIDENTS INVOLVING SMALL QUANTITIES OF HAZARDOUS WASTE

- Summary of waste types and quantities involved
- Descriptions of reported cases

SUMMARY OF WASTE TYPES AND QUANTITIES INVOLVED

Miscellaneous Wastes (including ignitable, reactive and carcinogenic wastes)

25 kg, Pesticide Containing Arsenic

30 kg/mo, Trichloroethylene (degreasing solvent)

100 kg, Toxaphene (pesticide)

200 kg, Single 55-Gallon Drums

Ignitables

Cook County, IL
Dakota County, MN
Edison Township, Middlesex County, NJ
California
Delaware County, PA

Corrosives

York County, PA
Edison Township, Middlesex County, NJ
(2 incidents)

Reactives

Mundelein, IL

300 kg/mo, Trichloroethylene (degreasing solvent)

1000 kg, Ignitable Waste, Cincinnati, OH

1000 kg, Ignitable Waste, Michigan

1000 kg, Pesticide

1500 kg/mo, PBB

1800 kg, Trichloroethylene (degreasing solvent)

1800 kg, Ignitables (paints and solvents)

3000 kg/mo, Corrosive Waste

3500 kg/mo, "Carcinogenic Chemicals"

3600 kg, Organic Liquids (toxic cleaning solids)

5000 kg, "Toxic Liquids"

Pesticide Containers (empty)

McAdoo, TX, Parathion Single 55-Gallon Drum

Dunning, Nebraska, Parathion, Single 55-Gallon Drum

North Carolina, Organophosphate, Single 5-Gallon Drum

North Carolina, Organophosphate, Single 55-Gallon Drum

Haghes, AR, Organophosphate, Several Drums

Environmental Damage Caused by Fighting Fires at Landfills--Secondary Effect of Improper Disposal of Hazardous Wastes

Delaware County, PA

Murfreesboro, TN

DESCRIPTIONS OF REPORTED DAMAGE INCIDENTS FROM SMALL QUANTITIES OF HAZARDOUS WASTES

A. Miscellaneous Wastes

1. 25 kg, Pesticide Containing Arsenic

In May 1972, a private commercial well was dug for a new office of a small contractor in Perham, MN. Within the same month, 5 of 13 employees became ill with gastro-intestinal ailments. Six other employees also became ill within the next two months, requiring hospitalization. One employee lost the use of his legs for six months due to severe neuropathy. After several weeks it was discovered that the well was located 20 feet from a site where approximately 50 pounds of a pesticide had been buried between 1934 and 1936. The pesticide, which consisted of arsenic trioxide, bran, sawdust, and molasses, had been buried at a depth of about three feet while the affected well was 31 feet deep. In addition to causing acute effects, arsenic compounds are known to be carcinogenic in humans. Well contained up to 21 ppm arsenic. Soil samples contained up to 12,600 ppm of arsenic in the vicinity of the burial. To date, the affected well has been capped and an alternate water supply obtained at a cost of about $300. Twelve nearby wells are also monitored periodically to establish the threat to the Perham municipal well field 3/4 mile away.

2. 30 kg/mo, Trichloroethylene (degreasing solvent)

In November, 1974 the Connecticut Resources Commission discovered that the Kras Tool and Machine Company, Wolcott, CT had dumped 100 to 150 gallon/year of degreasing solvent containing trichloroethylene from 1964 to date of inspection (11/15/74). The solvent had contaminated private wells. Trichloroethylene is a known animal carcinogen and a suspected human carcinogen.

3. 100 kg, Toxaphene

In 1966 an employee cleaning up around a State Highway Department garage dumped 30 gallons of excess Toxaphene, a very toxic pesticide, into the parking lot drain. The drain entered a ditch which led to a public water supply reservoir serving the City of Effingham, IL. The maximum level of Toxaphene detected in the reservoir was 10 ppb (5 ppb is interim drinking water limit set by EPA). Toxaphene is also a known animal carcinogen and a suspected human carcinogen.

4. 300 kg/mo, Trichloroethylene (degreasing solvent)

A metal auto parts manufacturing plant (The Thompon Company) in Oscoda, MI dumped about 1000 gallon/year from 1968 to 1972 of degreasing solvent on the ground behind the plant. Trichloroethylene discovered in a residential well and spring about 1100 feet away at concentrations of 10 mg/ℓ and 28 mg/ℓ, respectively. Trichloroethylene is a known animal carcinogen and a suspected human carcinogen.

5. 1000 kg (estimated), Ignitable Waste

An employee of a private dump in Cincinnati, Ohio, was burned over 50% of his body when several containers of an unknown volatile liquid caught fire and enveloped his bulldozer. Firemen had to run their hoses more than a half mile to get to the fire because the dump had no hydrants.

6. 1000 kg (estimated), Ignitable Waste

When burying drums containing an unknown waste, a bulldozer operator at a Michigan landfill experienced dizziness and eye irritation, and soon left his bulldozer. Upon returning, he found the machine in flames. Evidently, some of the drums contained volatile flammable substances that ignited while he was gone.

7. 1000 kg, Pesticide

In 1972 approximately 2000 pounds of packaged technical mevinphos was buried in Waterloo, Iowa, resulting in gross contamination of vegetation in the area. The area was later neutralized with alkali, and some of the material was removed.

8. 1500 kg/mo, Waste PBB

Michigan Chemical Corporation dumped 160,000 pounds of waste PBB over four years in Gratiot County, Michigan landfill. EPA awarded $70,000 grant to study problem. Department of Natural Resources decided to build vaults around contamination at a cost of $1 million each.

9. 1800 kg, Paints and Solvents (Ignitable)

Industrial waste disposal firm in Cornwells Heights, PA dumped more than 500 gallons of paints and solvents into a sewer line. Several families abandoned their homes until fumes and fire danger subsided. Firm owner sentenced to 28.5 to 58.5 months in jail.

10. 1800 kg, Trichloroethylene (degreasing solvent)

In Reloboth, MA, 500 gallons of sludge from a solvent reprocessing plant were dumped and contaminated a drinking water reservoir and private wells with toluene, trichloroethylene, and ethyl acetate. Incident discovered in May, 1978. Trichloroethylene is a known animal carcinogen and a suspected human carcinogen.

11. 3000 kg/mo, Corrosive Waste

Pittsburgh Plate Glass Company in Mercer County, PA contracted with private hauler to dispose of 20,000 to 30,000 gallons over two years of alkaline waste (caustic soda, soda ash). Waste was disposed in swampy area and changed pH of water to 10.6. Landowner drained swamp with a bulldozer and caused a 5-mile fish kill in a 10-foot wide stream. Landowner was fined $100.

12. 3500 kg/mo, "Carcinogenic Chemicals"

In New London, CT 800 to 1000 drums were dumped between 1969-1972 by Auto World Ltd. At least seven private wells were contaminated with "carcinogenic chemicals." The State Department of Environmental Control released information on the incident on 11/30/78 and it was reported by the Hartford Corrant Newspaper.

13. 3600 kg, Organic Liquids

In early 1974 approximately 1000 gallons of petroleum-based cleaning fluids were poured into a landfill in Haywood County, North Carolina. The disposed fluids overflowed the top of a dike and entered a tributary of Hominy Creek. Three cattle that drank from the contaminated stream were fatally poisoned. The source of the fluids was a textile dyeing company. The town of Catton compensated the cattle owner for his losses, and the stream waters were decontaminated.

14. 5000 kg, "Toxic Liquids"

In Haywood County, Texas approximately 24 drums of concentrated dyes and other chemical liquids were illegally dumped at a landfill. The toxic liquids were washed downstream, poisoning three cows fatally and rendering many others ill.

B. Wastes Presenting Acute HHE Problems if Not Handled Properly

1. Ignitables--Single Drums

a) Cook County, Illinois

In September 1975 David Klepser was severly burned when the compactor he was operating struck a 55-gallon drum of ethyl acetate. He died three days later from second and third degree burns. The machine that he was operating (valued at $100,000) was a total loss. The incident occurred at the Calumet Industrial Development (CID) Landfill (a 24-hour operation) in the dark hours of morning. Load contained two drums--400 kg.

b) Dakota County, MN

Landfill employee suffered burns over 80% of body when equipment he was operating crushed and ignited a container of solvent. He was hospitalized for four and one-half months.

c) Edison Township, Middlesex County, NJ

Five 55-gallon drums of unidentified chemical wastes were being buried with municipal waste when one exploded. The bulldozer operator was killed as he stepped from the machine and two more exploded.

d) California

A hauler was unloading drums of flammable waste from a truck at a disposal site in California. One of the drums, when disturbed exploded or ruptured and the truck was immediately engulfed in flames. The truck was a total loss, but no one was hurt.

e) Delaware County, PA

During compacting operations at a county landfill, an explosion occurred that destroyed a bulldozer and caused a fire that burned for several days. Groundwater contamination resulting from firefighting activities caused a fish kill in Crum Creek (1972).

2. Corrosives--Single Drums

   a) York County, PA

      Two or three drums of unlabelled corrosives were delivered to a landfill authorized to handle only municipal waste. One drum burst as it was being compacted by a bulldozer and burned a bystander (state inspector) on face and neck. Penn State Aluminum generated the waste. The incident occurred in summer, 1974.

   b) Edison Township, NJ

      Eye irritation sustained when bulldozer operator was pushing drum which split, squirting liquid into eyes.

      Chemical burns to hands and other parts of body as a result of pushing a drum with bulldozer. Drum split open and liquid squirted out.

3. Reactive--Single Drum

   a) Mundelein, IL

      A truck driver noticed that one of the drums he was hauling through the village of Mundelein, IL was leaking titanium trichloride, a chemical that changes to an hydrochloric acid mist on contact with the air. Fourteen people were hospitalized for exposure to the fumes. The four drums of chemicals were neutralized and buried.

C. Pesticide Containers--Single Containers

1. McAddo, TX (55-gallon drum)

   Death from parathion poisoning resulting from use of acethylene torch to cut top off drum that contained concentrated parathion (Red Barn Parathion 4).

2. Dunning, Nebraska (55-gallon drum)

Death in June 1968 from child playing in 55-gallon drum which they (3 children) filled with water; drum contained De-Pester Parathion.

3. North Carolina (5-gallon drum)

A seven year old female who had experienced nausea and vomiting the previous evening was admitted to a North Carolina hospital in a comatose state, suffering from organic phosphate poisoning. After a restless evening, she lost her ability to walk, complained of difficulty seeing, and became progressively unresponsive. An immediate inspection of her home revealed a discarded 5-gallon drum of pesticide collecting rainwater in the backyard. Neighborhood children reported that the little girl had filled a plastic spray bottle with the contaminated rainwater and sprayed some of it in her mouth while making mud pies. The girl rapidly responded to treatment, recovering completely.

4. North Carolina (55-gallon drum)

Two brothers, aged one and two years, were brought to a North Carolina hospital with sudden onset of vomiting, diarrhea, and difficult breathing. Increased salivation and pinpoint pupils led doctor to suspect organic phosphate poisoning, and treatment for that was successful. The boys' father reported that on the afternoon the boys had become ill, they had been jumping in and out of an empty 55-gallon drum that had recently held organophosphate pesticide. Sufficient residue remained in the drums to cause poisoning from dermal absorption.

5. Hughes, Arkansas (several drums)

In 1972, a two-year old boy in Hughes, AR was hospitalized for organophosphate poisoning after playing among some empty drums formerly containing various pesticides. The drums were procured from an aerial applicator to serve as trash containers. The child completely recovered from the poisoning after medical treatment.

D. Environmental Damage Caused by Firefighting Water (secondary effect of improper disposal of hazardous waste)

1. Delaware County, PA

During compacting operations at a Delaware County, PA landfill, an explosion occurred that destroyed a bulldozer and caused a fire that burned for several days. Groundwater contamination resulted from firefighting activities, causing a fish kill in Crum Creek (1972).

2. Murfreesboro, TN

Runoff from quenching a fire at a landfill in Murfreesboro, TN caused turbidity and mild contamination of wells in the area. Zinc and chromium electroplating waste sludge, as well as industrial phenols, were disposed at the site, along with demolition waste and municipal refuse. Consequently, the site was closed by the city, and the municipal water line was extended into the affected area.