National Hazardous Waste Constituent Survey

Briefing

Office of Solid Waste

May 26, 1998

Background

- Voluntary survey
- Conducted: August 1996-December 1996
- Survey response QA/QC : January- July 1997
- Data Analysis: August 1997- present
  - Objective: *To obtain physical characteristic, and constituent specific information on RCRA hazardous waste streams.*
  - Purpose: *To provide data for the HWIR-Process Waste rulemaking*

•This survey is the first of its kind to use BRS data as the basis.

•The 1993 BRS data was used to identify the facilities and to provide waste stream information. The facility specific information was preload and respondents were asked to verify or correct any areas that were incorrect in the first section of the survey. The second part of the survey which was broken into two sections. The first section provided some preloaded waste streams specific information, and asked the responded to provide characteristic information on the specific waste streams. The second section requested constituent concentration data from the respondent.

•The completion of the survey in 12/96 was followed by extensive respondent follow-up and QA/QC. The goal was to make sure that the data was as accurate as possible, which required follow-up calls to clarify any areas where there was confusion in the answers received

•Another over arching objective of this survey effort was to gather information that would assist OSW in obtaining a better understanding of wastes managed in the RCRA system

Background cont.

- The survey data has been, and is useful in a number of OSW issues:
  - Definition of Solid Waste
  - HWC MACT Rule/Comparable Fuels Exclusion
  - Waste Minimization Analysis
  - Silver Analysis
  - Air Characteristic Study
  - Phase IV LDR Final Rulemaking

•Definition of Solid Waste project used the survey data to gather information on constituent composition, frequencies of occurrence and concentrations.

•HWC MACT --used data to estimate the quantity of hazardous wastes that may qualify as comparable fuels, and to specify the types of Haz. Waste managed in different types of combustion facilities.

•Waste Min.--data used to add considerations of chemical quantity or waste stream quantity, prevalence to narrow the NWMML (national waste min. measurement list), and in the Prioritized Chemical List (PCL)

•Silver Analysis -- data was used to identify the prevalence of silver in waste streams

•Air Characteristic Study -- plans to use data to pinpoint co-occurrence of chemicals

•Phase IV LDR -- used survey data to identify total constituent concentrations in TC metal wastes

Who Was Surveyed?

- 221 facilities selected based on their cumulative management of at least 90% of the Nation's hazardous waste (as reported in the 1993 National biennial RCRA Hazardous Waste Report) in each of six categories:
  - Total Waste
  - Listed Waste
  - Characteristic Waste
  - Listed and Characteristic Waste
  - Non-wastewaters
  - Combusted Waste

•The survey was sent out to facilities that managed the largest waste volumes, as reported in the '93 BRS in the above categories.

•The largest facilities which together handled over 90% of the waste (by volume) were selected for the survey. NOT A RANDOM SELECTION FROM A LARGER POPULATION.

•requested info. on major waste streams within the facilities: Major waste stream was defined as greater than 400 tons for NWW, and 40,000 tons for WW

•20 major WS randomly selected (larger waste streams = higher prob. of being selected) if facility had more than 20 WS

•smaller Like WS (same: origin code form code and waste code)were aggregated to be identified as a large WS.

•For aggregated streams one individual stream was selected (waste code make up) to represent the aggregated stream.

•Weights were developed to extrapolate the data quantities up to represent the quantities for aggregated waste streams

•Weights were developed to assist in the random selection of waste streams where there were more that 20 large waste streams with prob. proportional to size.

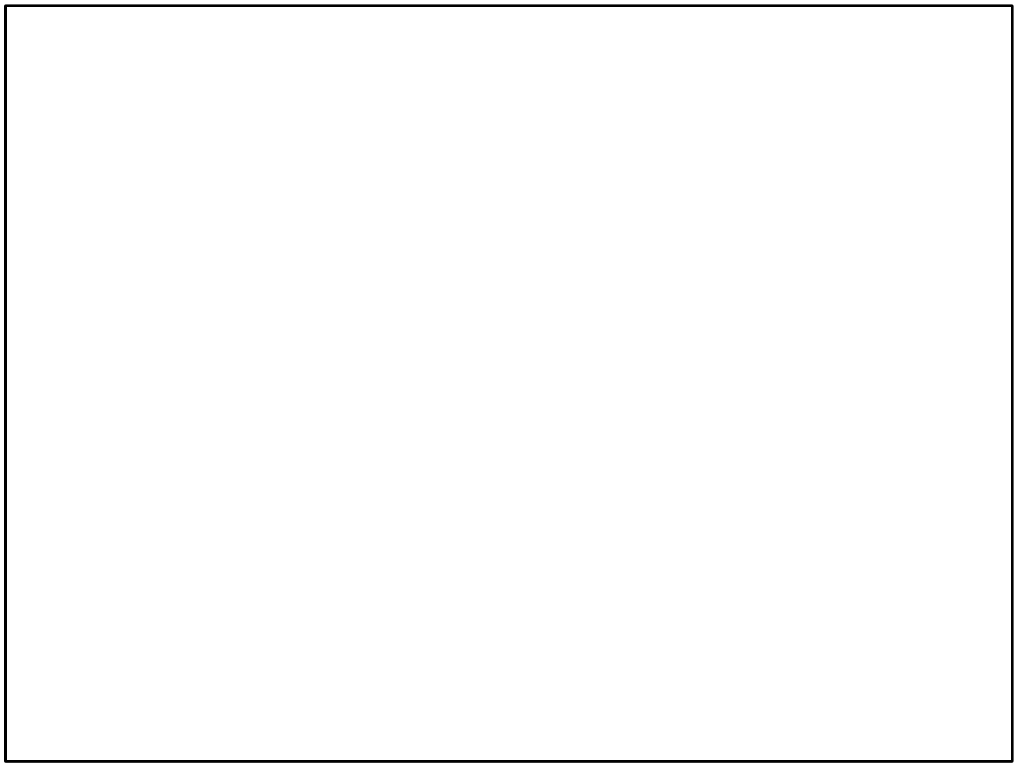
Who Responded?

- 156 facilities responded (71% response rate)
  - managers of 48% of the total quantity of the nation's hazardous waste managed in 1993
    - Total quantity of waste managed 234.8 mil tons
  - 65 facilities did not respond

•Despite the fact that this was a voluntary survey we were able to get an impressive 71% response rate.

•Those who responded provided us with constituent specific information for 48% of the hazardous waste managed in 1993.

•Although were recieved Survey response for facilities representing 48% of the Hazardous Waste Managed we do have waste stream specific information on over 90% of the waste managed in 1993 via the preloaded data.



•Table 4B-1 shows the top industry sectors (by 2-digit SIC) who are responsible for managing the largest quantity of the waste managed in the survey sample.

•Chemical and Allied Products(SIC28) and Petroleum Refining (SIC29) dominate waste generation among the large quantity generators and managers represented in the survey.

•account for 90% of total quantity of waste

•Only 5 other industries report more than one million tons each.

Transportation Equip. (SIC 37)

Primary Metals (SIC 33)

Electronics and other equip. (SIC 36)

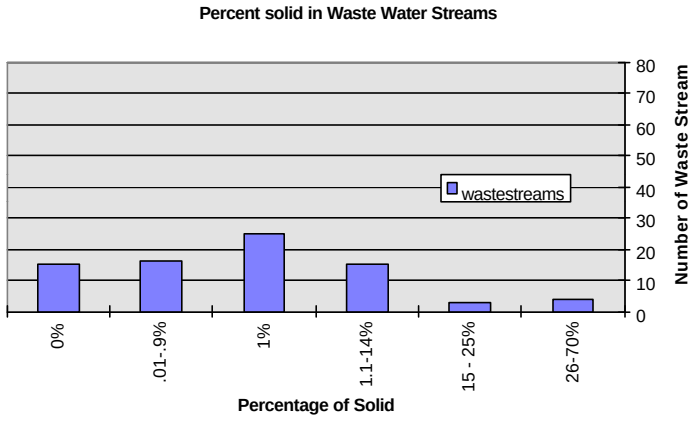
Electric Gas and Sanitary Services (SIC 49) and

Fabricated Metals (SIC 34)

•On the right of this table is highlighted the levels of toxic constituents that are managed/generated by each industrial sector.

•In the unspecified category the chemical mass appears to indicate a very high level of chemical mass of toxic chemical compared to the total waste quantity of the industry. Almost 2/3 of the waste quantity can be categorized as toxic.

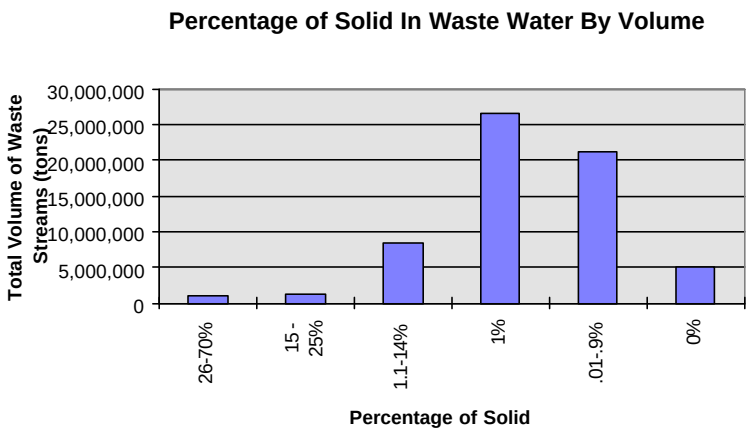
Waste Stream Data



•Also as part of the information gather in this survey is information on the physical for of the waste.

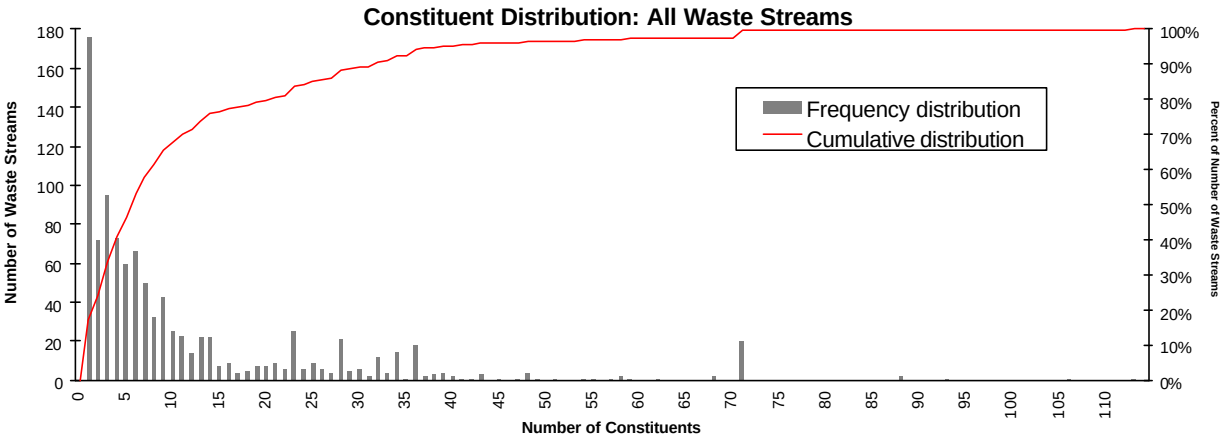
•As an example of the type of information that can be taken from the data is a snap-shot of the percentage of solid in waste water stream.

Waste Stream Data



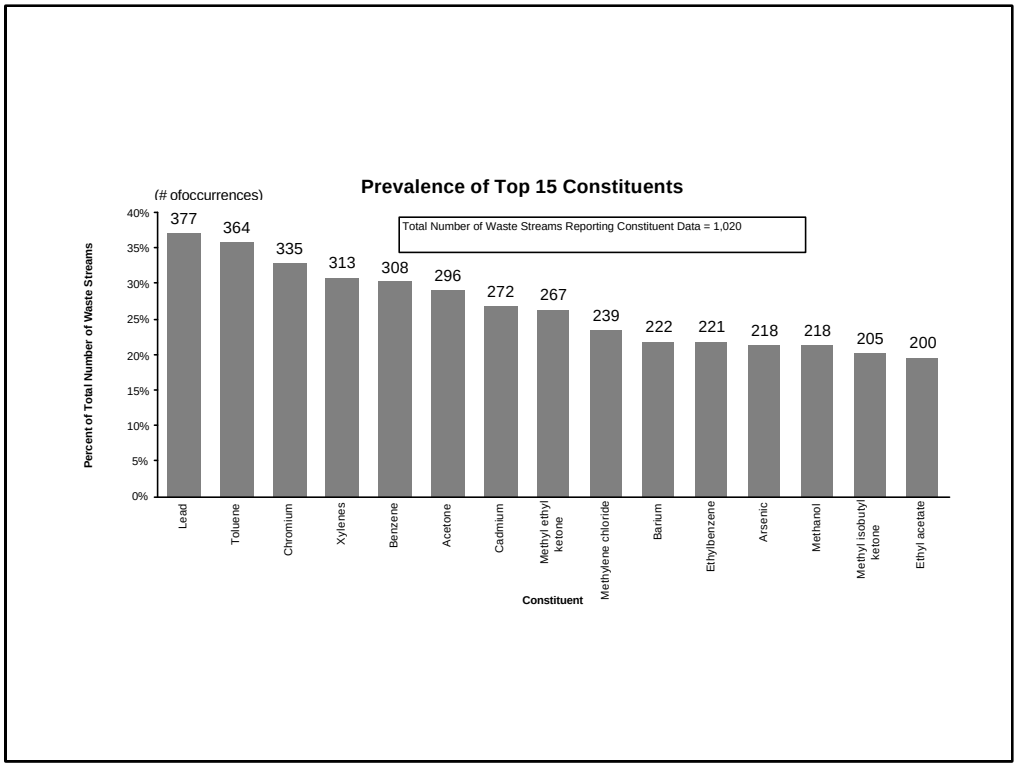
•In terms of volume one can see that the majority of the volume of waste fall between 0 and 14% solid.

•This is a very useful piece of information to use in determining the form of waste with respect of analyzing waste management options or requirements.



Average Number of Constituents per Waste Stream: 12
Median Number of Constituents per Waste Stream: 6
Total Number of Waste Streams with Constituent Data: 1,020
Total Number of Non-Wastewater Streams with Data: 919
Total Number of Wastewater Streams with Data: 101

- This slide illustrates the distribution of constituents across waste streams.
- The median number of constituents per waste stream is 6.
- Approximately 50% of the waste streams contain more than 5 constituents.
- Approximately 10% of the waste streams contain 30 constituents or greater.
- In general Non-wastewater streams have more constituents per waste stream than waste water streams.

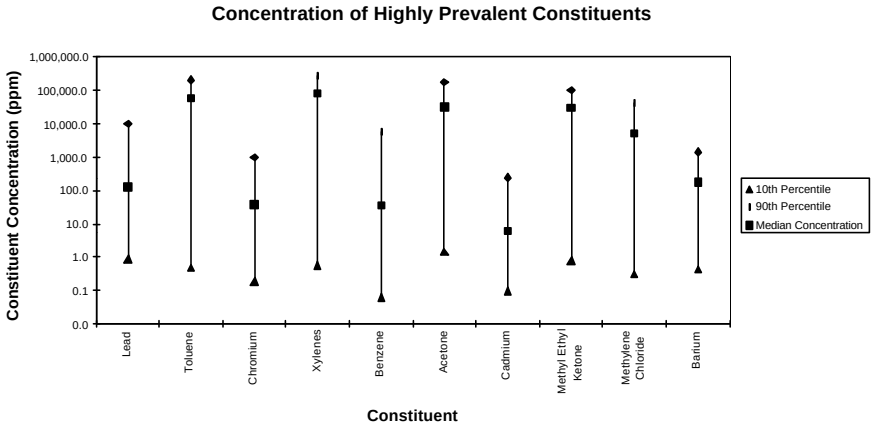


•The survey contained 724 unique constituents

•As shown in the bar-graph, lead is the most prevalent constituent occurring in 37% of the responding waste streams.

•Chromium, Toluene, Benzene, and Xylenes are also very highly prevalent; each appearing in more than 30% of the responding waste streams.

Constituent Concentration



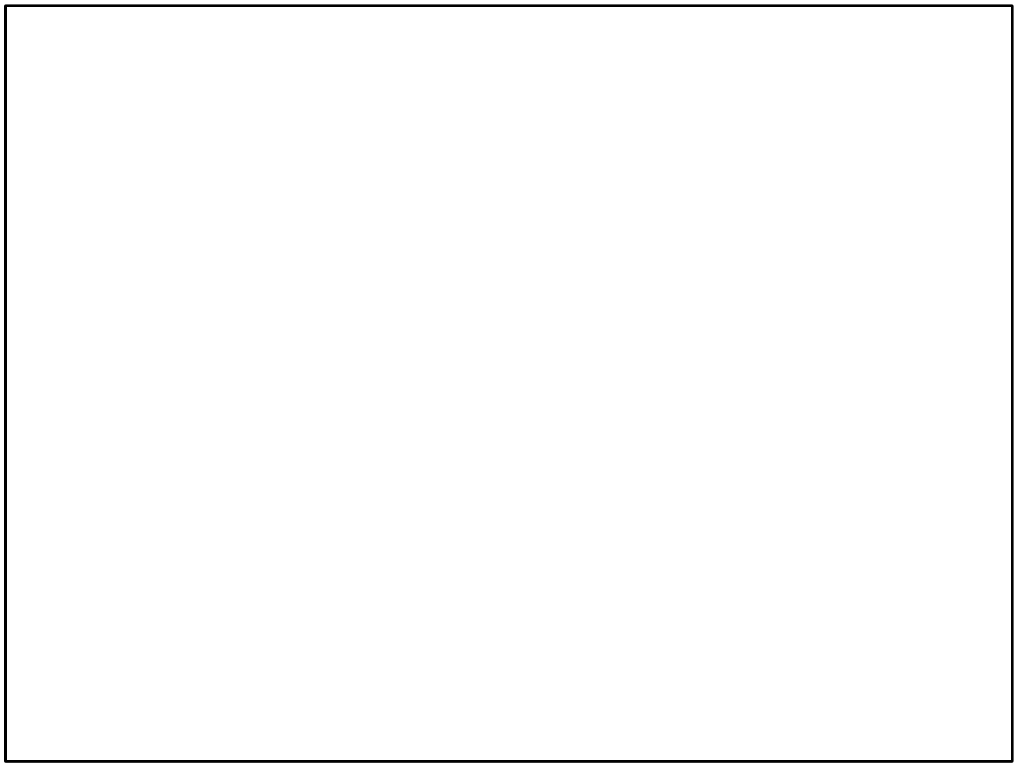
•The survey requested concentration data in total and leachate concentration levels.

•The majority of the concentration was received in total concentration level. Those constituents that were reported in leachate concentrations were converted to totals using the standard EPA conversion factor of (TCLP # * 20)

•This slide illustrates the median, 10th percentile, and 90th percentile concentrations of the highly prevalent constituents

•The constituents with the highest median concentrations, all between 10,000 and 100,000 ppm are toluene, xylene, acetone, and methyl ethyl ketone.

•The constituent in this group of highly prevalent constituents with the lowest median concentration is Cadmium, with a median concentration of approx. 10 ppm.



•As part of the data analysis to identify the toxic constituents in the waste reported on in the survey we used the PBT ranking factors developed by the Waste Minimization Branch in OSW.

•This tool ranks chemicals hazard based on the ranking of the Persistence, Bioaccumation, and toxicity characteristics of the chemical.

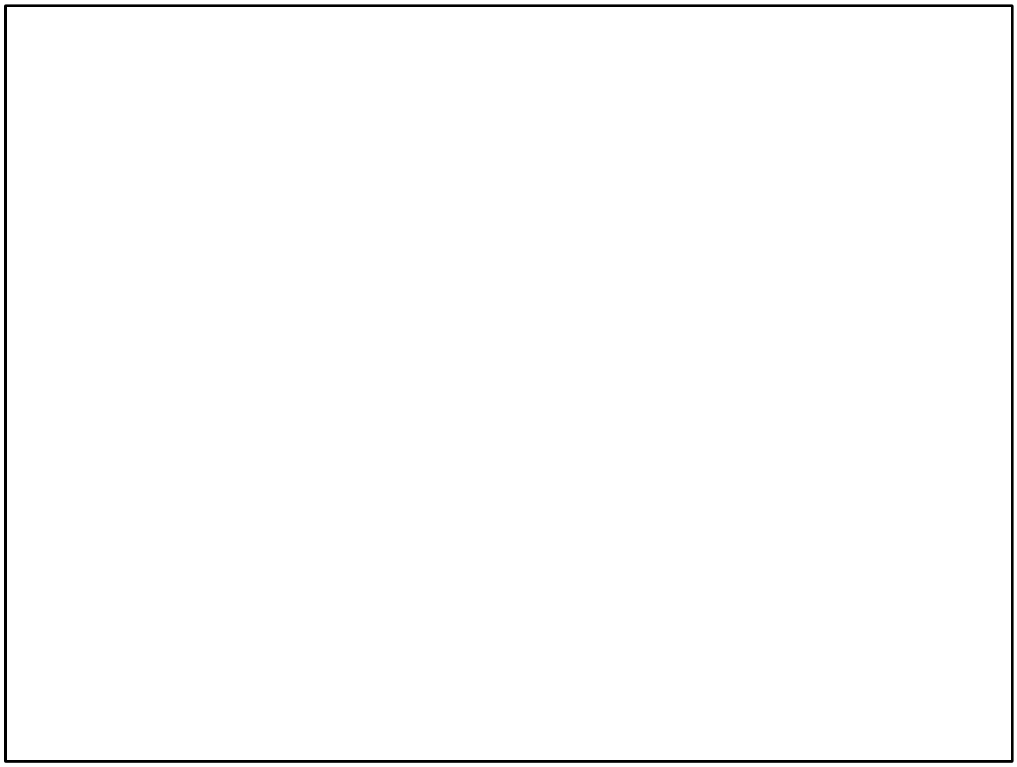
•For the purposes of this report we used the toxicity ranking of the PBT tool to classify constituents as toxic.

•In the following slides, the term " PBT Toxics" refers to those chemicals with a PBT score of 12 through 18.

•The above slide represents those constituents which fall into this category

•267 constituents are ranked between 12 and 18 for toxicity on the Priority Minimization List

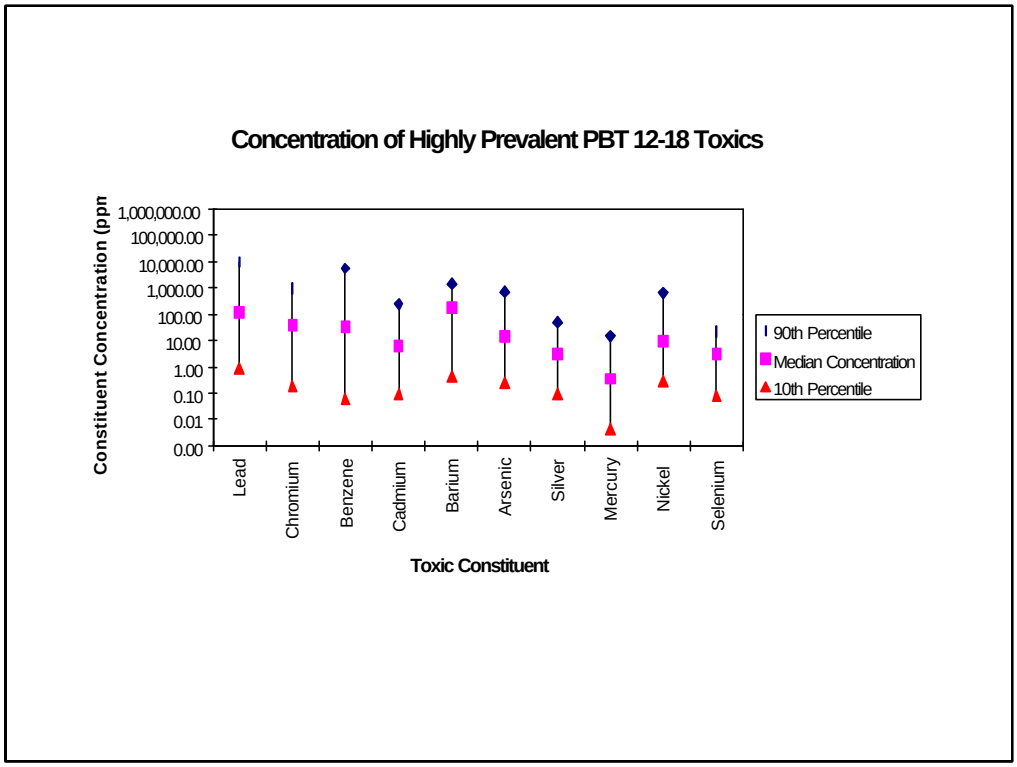
•93 (35%) of these 267 constituents appear in the NHWCS.



•Exhibit 3c-1 highlights the total chemical mass of the wastes in the NHWCS which is 2.1 million tons

•The total chemical mass of PBT 12-18 toxics represent 12% (.2 mil tons) of the mass of all constituents

•characteristic only waste accounts for 86% of the total chemical mass of the PBT toxics.



•The top ten high prevalent toxic constituents (PBT Toxics) are listed above

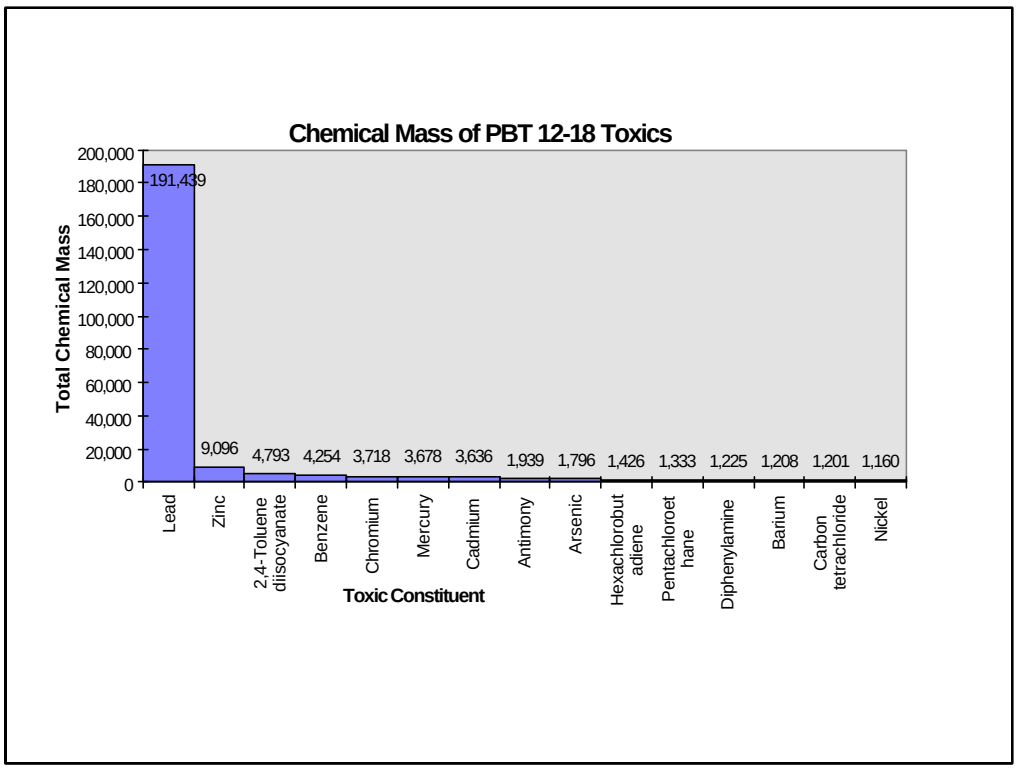
•These constituents, on average are not highly concentrated.

•Lead and Barium have the highest median concentrations >100 ppm

•Mercury has the lowest median concentration at .5 ppm

•None of the PBT Toxics report a 90th percentile concentration above 10,000 ppm.

•(types of analysis that can use this...)

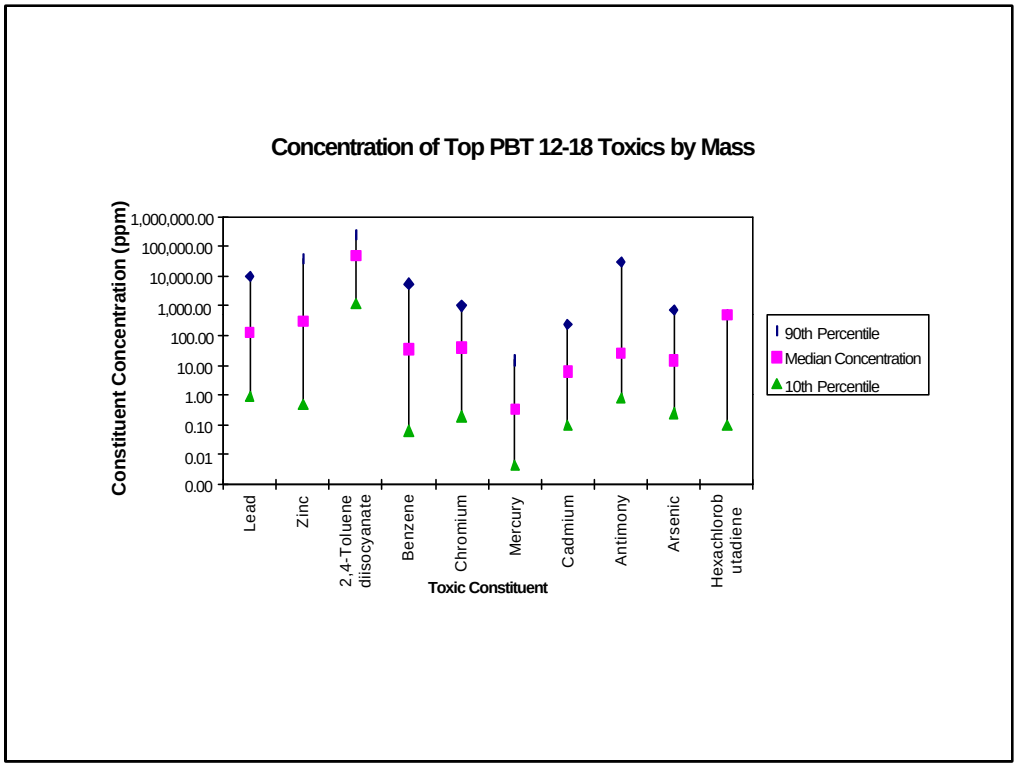


•The constituent containing the largest chemical mass far and above all other toxic constituents is Lead at 191,439 tons.

•But, by contrast the most highly concentrated constituent is 2,4-Toluene diisocyanate (see next slide)

•Only a small number of waste streams account for the large chemical mass of lead. These waste streams are primary Lead Acid Battery Manufacturers, and materials associated with smelting.

•This mass of lead accounts for 79% of the total mass of PBT Toxics in the survey database.



•**concentration of top PBT by Chemical Mass.**

•The top ten toxic constituents (PBT Toxics) ranked by mass are listed above

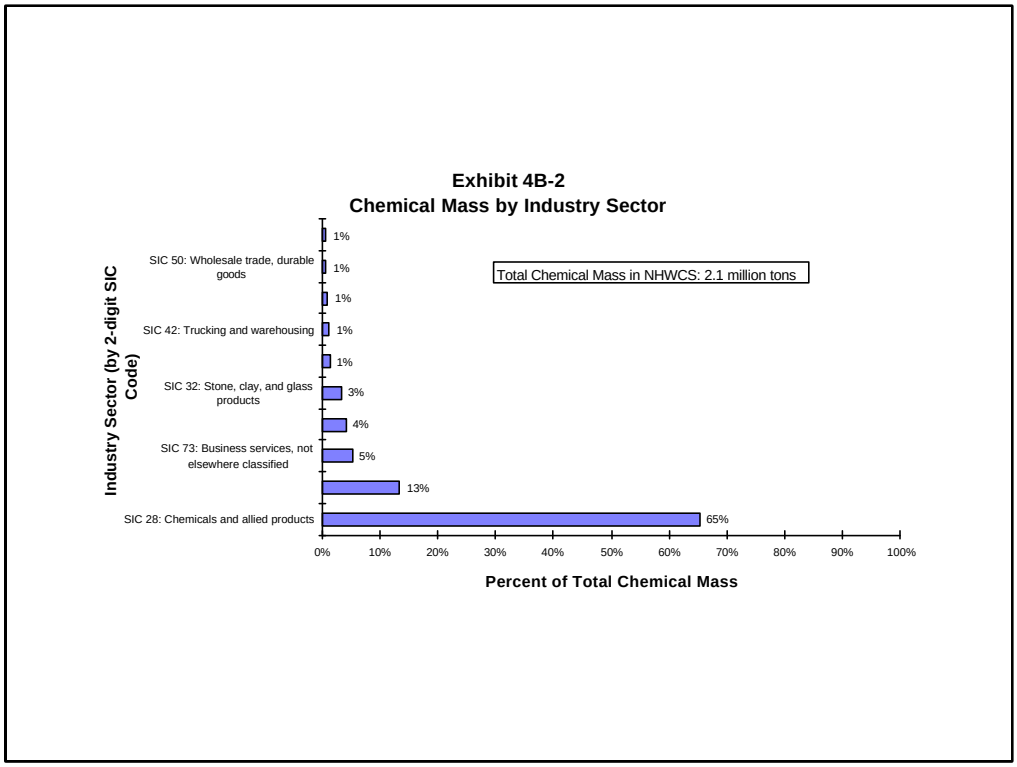
•These constituents, on average are not highly concentrated.

•2,4-Toluene diisocyanate has the highest median concentrations >10,000 ppm

•Mercury has the lowest median concentration at .5 ppm

•Most of the PBT Toxics report a 90th percentile concentration between 100 ppm and 100,000 ppm.

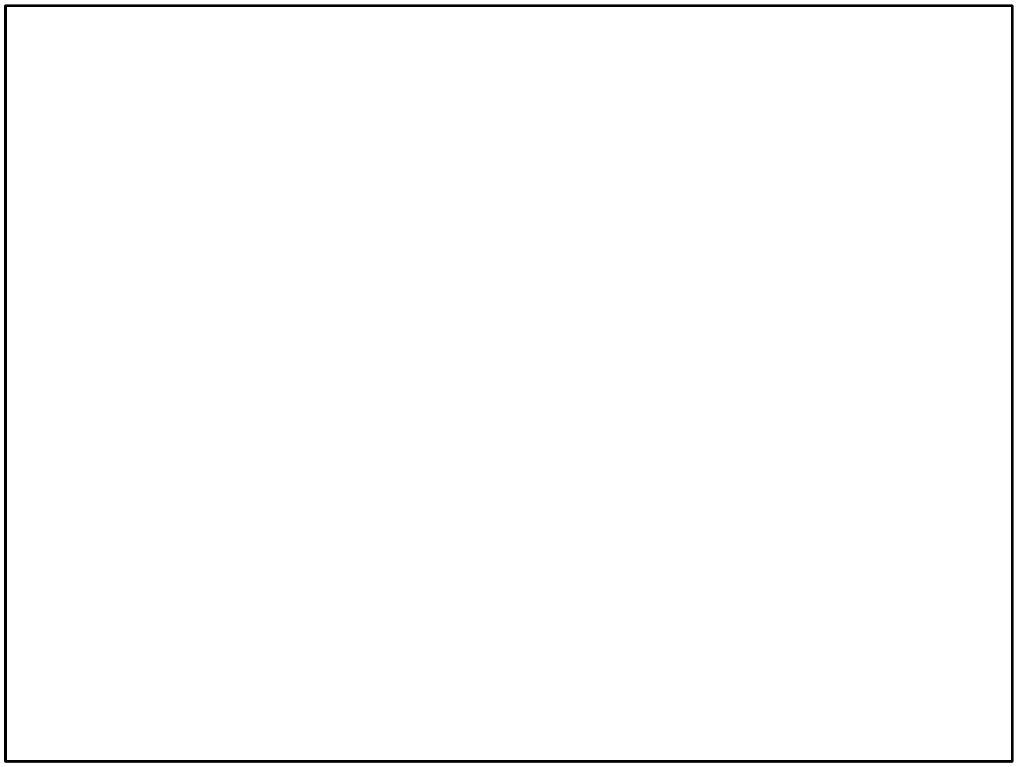
•(types of analysis that can use this...)



•In terms of chemical mass Chemicals and Allied Products (SIC 28) dominates accounting for 65% (over 1.4 mil tons) to total chemical mass in the NHWCS.

•Petroleum Refining (SIC 29) on the other hand accounts for only 1% of the total chemical mass.

•Petroluem at the same time is ranked second in terms of total waste quantity.

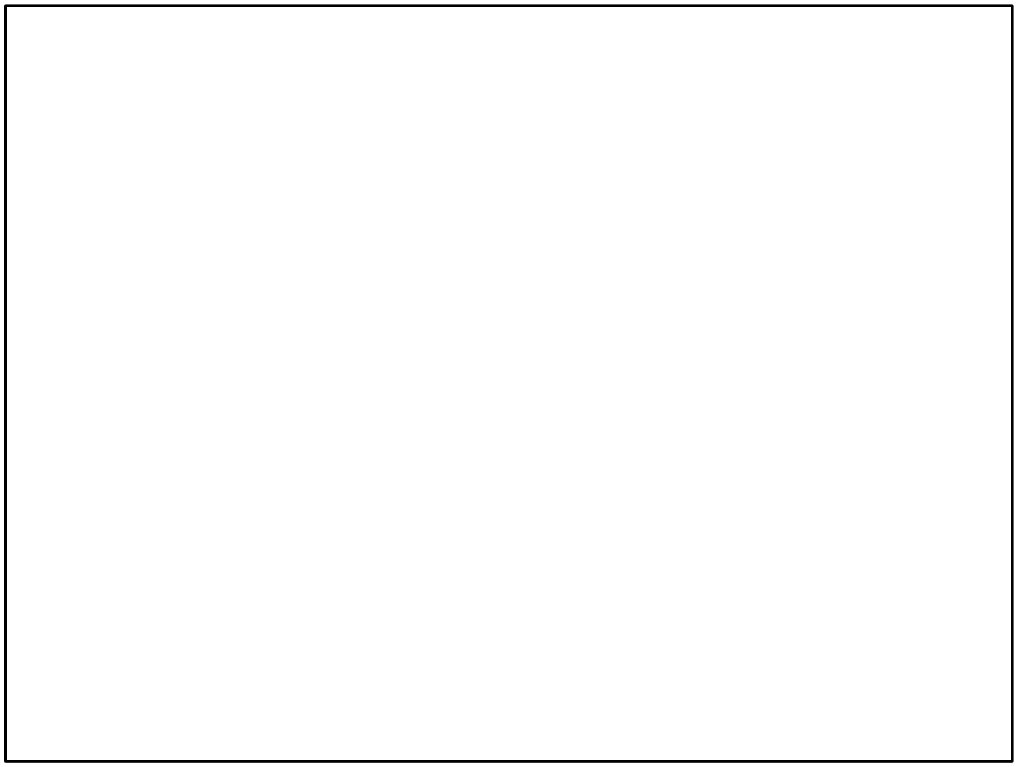


Co-occurrence Data

Another unique aspect of the data is the information on the co-occurrence of chemicals. This type of information is quite useful in determining which chemicals will be indirectly affected by the exemption from treatment requirements as in the HWIR rulemaking analysis.

Another example of the use of this type of information is in the Characteristic Study.

•This chart shows that Silver, Selenium, Cadmium, and Mercury occur with Lead at least 93% of the time that it appeared in the survey.



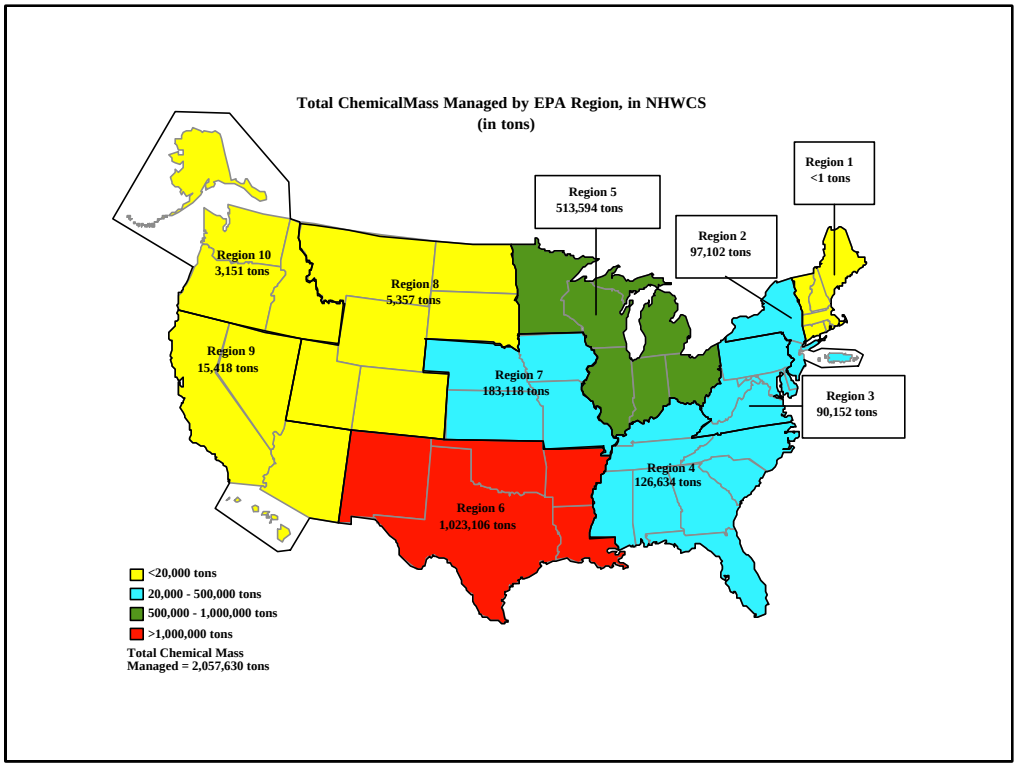
Management methods

•Exhibit 5E-1 presents the Top PBT toxics handled by various management methods in the the NHWCS.

•this type of information is very useful in evaluation how chemicals are really being managed in the RCRA system.

•Being able to see from the survey data that 2,4-Toluene diisocyanate with a median concentration of 49,200 ppm is primarily being managed by incineration. And Arsenic is being managed by Land fill as examples is very useful in making policy decisions with respect to treatment and disposal requirements.

•Metals recovery is the most common management practice 6 out of the top 10 toxic chemicals are manged by this method.



•The above US. displays the chemical quantities of PBT toxics managed by EPA region.

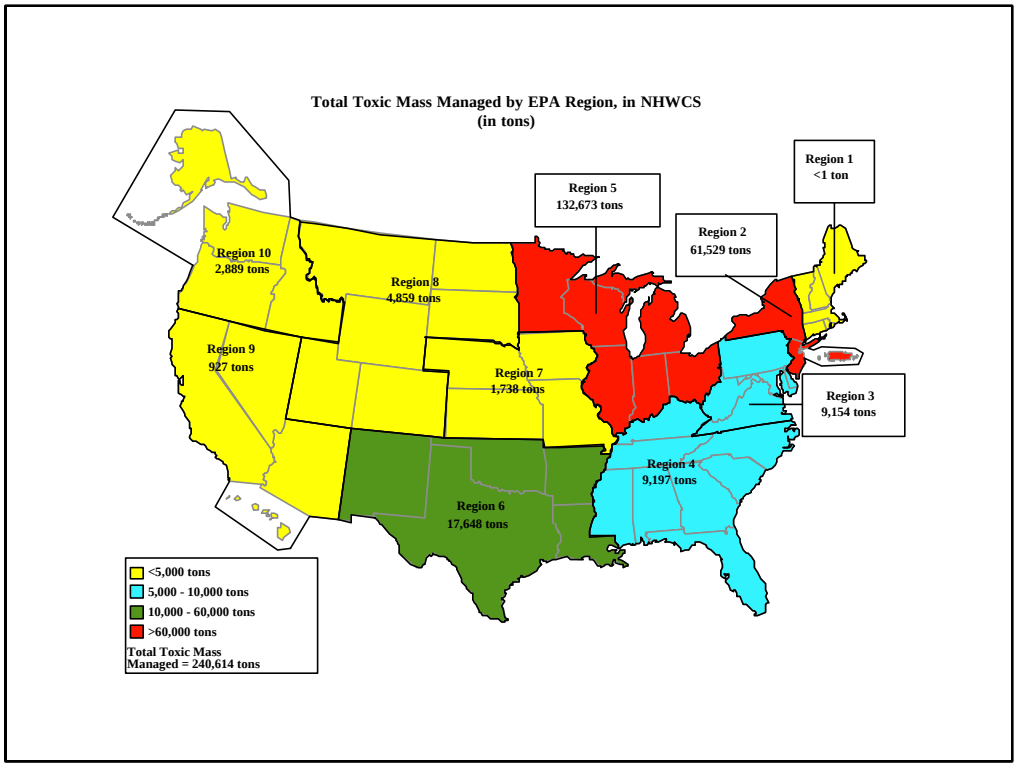
•Region 5 (MN,WI,MI,IN,IL,OH) and Region 2 (NY, NJ, Puerto Rico, and US Virgin Islands) manages that highest, and second highest masses of PBT 12-18 toxics (132,673 tons and 61,529 tons respectively)

•In both of these regions, large waste streams generated by lead smelters account for a large proportion of their total PBT toxic mass.

•In the map that displays the total chemical mass managed by region we can see that Region 6 manages the highest tot chemical mass of all the regions at 1.0 mil tons, by in terms of PBT chemical this region ranks only third highest.

•One interesting fact that came from the survey is that two states in region 6 Texas and Louisiana, each have a large number of large quantity generators in the Chemical and Petroleum Refining industries, as well as a large number of TSDF's. One would expect that this region should have the largest quantity of PBT toxic rather than region 5.

•This aspect of the data can be used in targeting regions/facilities for enforcement purposes.



Summary

- The NHWCS first time BRS based voluntary survey was quite successful in gathering useful information for OSW and Agency wide programs
- The waste stream specific information on constituent distribution and constituent prevalence data specifically on highly toxic constituents can help OSW focus regulatory efforts and is a valuable source of information in determining waste stream composition and the impact of testing requirements
- The waste generation data on industry sector is a vital link in pinpointing generators of hazardous waste in the Agency's effort to construct effective regulations.

Summary

- The waste management information is a key source of information on the current practices of industry. This type of information will assist OSW in focusing compliance requirements to achieve maximum effectiveness.
- The NHWCS has provided OSW with a more in-depth look at the waste management/ and generation practices of the hazardous waste universe by focusing on the constituent concentration level of the waste.
- The diverse uses of this information although highlighted in this briefing continue to expand as we become more familiar with the information in the database

Next Steps

- Completion of the Survey Final Report
- Provide full database file to users
- Provide the NHWCS on the EMRAD webpage of the EPA intranet.