

US EPA ARCHIVE DOCUMENT

ANALYSIS OF RCRA “*MIXTURES & DERIVED-FROM*” HAZARDOUS WASTE CONSTITUENT DATA

BACKGROUND DATA FOR USEPA’S 2001 HWIR FINAL RULE

Prepared by: Mark Eads, Economist

US Environmental Protection Agency

Office of Solid Waste (Economics, Methods & Risk Analysis Division)

1200 Pennsylvania Avenue, NW (Mailcode 5307W)

Washington, DC 20460

Office website: <http://www.epa.gov/osw>

Phone: 703-308-8615

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Synopsis

- **PURPOSE:** This document presents an analysis of **empirical data** of chemical constituents measured in RCRA hazardous “*mixtures*” and “*derived-from*” wastes:
 - **Empirical:** This study is based on analysis of a survey sample of actual RCRA hazardous waste data, not on theories, assumptions or assertions.
 - **Data Analysis:** This study evaluates descriptive, chemical and physical data from EPA’s 1996 “*National Hazardous Waste Constituent Survey*” database, for two waste groups: “*mixtures*” and “*derived-from*” RCRA hazardous wastes.
- **FINDINGS:**
 - **“Derived-from” wastes:** The NHWCS database revealed **175 different chemicals** measured as constituents in “derived-from” wastes, from **0.00003 to 950,000 ppm**; 97 have published human and ecological toxicity rankings, of which 26 have EPA’s highest rank for potential composite PBT effects, 33 are known or probably human carcinogens, 58 are known to cause either permanent or life-threatening adverse health effects, and 68 have EPA’s highest rank for potential ecological toxicity.
 - **Waste “mixtures”:** The NHWCS database revealed **103 different chemicals** measured as constituents in “mixtures”, from **0.00005 to 990,000 ppm**; 54 have published human and ecological toxicity rankings, of which 8 have EPA’s highest rank for potential composite PBT effects, 19 are known or probably human carcinogens, 34 are known to cause either permanent or life-threatening adverse health effects, and 35 have EPA’s highest rank for potential ecological toxicity.

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Part 1

Description of EPA's 1996

National Hazardous Waste Constituent Survey (NHWCS) Database

Part 1: Scope of EPA's 1996

National Hazardous Waste Constituent Survey (NHWCS) Database

- The NHWCS is a one-time, voluntary participation, **mail survey** administered by EPA in 1996, to **221** of the largest industrial hazardous waste treatment, storage, disposal and recycling (TSDR) facilities in the USA (08 Dec 1996 survey response deadline).
- Single-year snapshot benchmarked to data already collected in the **1993 BRS***.
- Although there were a total of 2,025 known RCRA TSDR facilities in 1993, these 221 survey facilities handled **1,760** wastestreams, constituting 92% of all RCRA hazardous solid waste volume generated in 1993 (i.e. 216.7 of 234.9 million tons).
- EPA **benchmarked** the survey by pre-loading many questionnaire answers with 1993 BRS data for each facility (e.g. waste volumes, waste management system codes).
- The unique purpose of the survey was to collect information about:
 - names of chemical constituents, and
 - constituent concentrations in RCRA hazardous wastesin hazardous solid wastes. EPA has not elsewhere collected this data comprehensively
- **156** of the 221 facilities voluntarily responded with **constituent information** for 1,020 of the 1,760 wastestreams, which represent a subtotal of 114.7 million tons (49%) of the 1993 BRS universe of 234.9 million tons (RCRA large quantity generator “universe”).

* BRS = USEPA's Biennial Reporting System for generators & handlers of RCRA hazardous waste:

<http://www.epa.gov/epaoswer/hazwaste/data/index.htm#brs>

Part 1: **Public Availability** of EPA's 1996 NHWCS Database

- **NHWCS Data Release**: EPA made available the NHWCS database to the public on **19 Nov 1999**, in conjunction with the economic analysis in support of the EPA's 1999 "Hazardous Waste Identification Rule" (HWIR) proposed rule (Federal Register, Vol. 64, No. 223, 19 Nov 1999, pp. 63382-63461; pages 63447-63448 of this FR notice reference the NHWCS database).
- **NHWCS Data Website**: The public may access and download the NHWCS database computer electronic files from the following EPA **website**: <http://www.epa.gov/epaoswer/hazwaste/id/hwirwste/economic.htm>
- **NHWCS Data Files**: The NHWCS database consists of **five separate electronic files**, which are contained in a single zipped file within item (4) of the website. This website item also contains five additional electronic files which introduce, explain, describe, and summarize the NHWCS database.

Part 1: Two Important **Caveats** for Proper Interpretation of Data Contained in EPA's 1996 NHWCS Database

- **The NHWCS database has both broad and narrow survey coverage :**

EPA targeted the NHWCS to a subset of 221 treatment, storage, disposal, & recycling facilities (TSDRFs) which in 1993, managed the largest RCRA hazardous wastestream volumes (i.e. >400 tons/year non-wastewaters or 40,000 tons/year wastewaters), and collectively handled 92% of the total 235 million tons RCRA hazardous waste managed in that year (BRS benchmark). Because of the fact that EPA pre-loaded many data elements in the NHWCS questionnaire with 1993 BRS data, the NHWCS database represents almost complete (i.e. 92%) coverage of the “universe” of RCRA hazardous waste quantity in 1993. But for other data elements in the NHWCS questionnaire, EPA did not pre-load them, and relied upon voluntary responses by survey participants, which lowered the survey response rate for many such data elements. Consequently, it is important to consider response rates separately for each data element (data field), when attempting to interpret the NHWCS data.

- **The NHWCS single year “snapshot” survey data have multi-year relevance:**

Although the NHWCS is benchmarked to a single data reporting year (i.e. wastes managed in 1993), the types and quantities of hazardous wastes covered by the NHWCS include a majority (51% of NHWCS waste quantities) of wastes which are generated continuously from on-going manufacturing operations (primarily by chemical and petroleum manufacturing facilities), rather than wastes which are generated on a one-time basis (<5% of NHWCS waste quantities). Because such facilities may be relatively large in size, capital intensive, and operate over many decades, it is reasonable to assert that some waste data in the NHWCS database may represent wastes generated in other years as well (e.g. year 2001). [One of the following pages (page 9) presents a table summarizing the waste generation sources and generation frequency data from the NHWCS database.]

Part 1: Overview of RCRA Hazardous Wastes in the NHWCS Database:
The Following Pages Present the **12 Attributes** Listed Below

1. Sources & frequency of NHWCS waste generation/handling
2. Economic sectors which generated/handled NHWCS wastes
3. States which generated/handled NHWCS wastes
4. Origin of NHWCS wastes (production, cleanup, remediation)
5. Processes/activities (sources) of NHWCS waste generation
6. Material content of NHWCS wastes (%solids, %water, %oil)
7. Physical form of NHWCS wastes (solid, liquid, gas)
8. Detailed breakdown of the physical form of NHWCS wastes
9. Specific gravity (i.e.density) of NHWCS wastes
10. pH (i.e. relative acidity/alkalinity) of NHWCS wastes
11. RCRA regulatory hazardous wastecodes for NHWCS wastes
12. Waste management systems used to handle NHWCS wastes

Part 1: Attribute #1 of 12 of NHWCS Hazardous Wastes: Sources & Frequency of Waste Generation in the NHWCS

FREQUENCY OF HAZARDOUS WASTE GENERATION							
SUMMARY OF BRS SOURCE CODES IN THE NHWCS DATABASE							
PROCESSES WHICH GENERATE RCRA HAZARDOUS WASTES							
Item	EPA BRS Source code	Waste Source Description	Annual quantity generated (tons)*		Frequency of Process or Activity Within Year (i.e. daily or weekly)	Frequency of Process or Activity Within Year (i.e. monthly, quarterly, or biannually)	Frequency of Process or Activity Within Year (i.e. annually or less frequent)
Cleaning & Degreasing:							
1	A01	Stripping	97,257			97,257	
2	A02	Acid cleaning	40,020			40,020	
3	A03	Caustic (alkal) cleaning	113,383			113,383	
4	A04	Flush rinsing	3,259,546			3,259,546	
5	A09	Clean out process equipment	928,042			928,042	
6	A19	Other cleaning & degreasing	10,205,284			10,205,284	
		Subtotal =	14,643,532	6.8%	0	14,643,532	0
Surface Preparation & Finishing:							
7	A22	Electroplating	111,913		111,913		
8	A26	Heat treating	257,178		257,178		
9	A29	Other surface coating/preparation	2,852,538		2,852,538		
		Subtotal =	3,221,629	1.5%	3,221,629	0	0
Processes Other Than Surface Preparation:							
10	A31	Product rinsing	663,176		663,176		
11	A32	Product filtering	377,963		377,963		
12	A33	Product distillation	18,931,262		18,931,262		
13	A34	Product solvent extraction	203,356		203,356		
14	A35	By-product processing	9,060,330			9,060,330	
15	A36	Spent catalyst removal	12,679			12,679	
16	A37	Spent process liquids removal	33,560,738			33,560,738	
17	A38	Tank sludge removal	5,955			5,955	
18	A39	Slag removal	5,654			5,654	
19	A49	Other processes other than surface preparation	36,187,001		18,093,500	18,093,500	
		Subtotal =	99,008,113	45.7%	38,269,257	60,738,856	0
Production or Service Derived One-Time & Intermittent Processes:							
20	A51	Leak collection	519,915			519,915	
21	A53	Cleanup of spill residues	7,013				7,013
22	A56	Discontinue use of process equipment	5,198				5,198
23	A57	Discarding off-spec material	28,583			28,583	
24	A59	Other production-derived one-time & intermittent processes	18,212			9,106	9,106
25	A60	Sludge removal	5,197			5,197	
		Subtotal =	584,118	0.3%	0	562,801	21,317
Remediation Derived Waste:							
26	A63	RCRA corrective action at solid waste management unit	5,318,744				5,318,744
27	A64	RCRA closure of hazardous waste management unit	119,249				119,249
28	A69	Other remediation	2,190,199				2,190,199
		Subtotal =	7,628,192	3.5%	0	0	7,628,192
Pollution Control or Waste Treatment Processes:							
29	A71	Filtering/screening	557		557		
30	A72	Metals recovery	49,487		49,487		
31	A73	Solvents recovery	92,926		92,926		
32	A74	Incineration/thermal treatment	10,916,657		10,916,657		
33	A75	Wastewater treatment	19,095,065		19,095,065		
34	A76	Sludge dewatering	12,386		12,386		
35	A77	Stabilization	283,775		283,775		
36	A78	Air pollution control devices	2,781,298		2,781,298		
37	A79	Leachate collection	416,442		416,442		
38	A89	Other pollution control or waste treatment processes	4,329,475		4,329,475		
		Subtotal =	37,978,069	17.5%	37,978,069	0	0
Other Processes:							
39	A92	Routine cleanup wastes (e.g. floor sweepings)	490,397		490,397		
40	A94	Laboratory wastes	1,568		1,568		
41	A99	Other process wastes	7,336,392		7,336,392		
		Subtotal =	7,828,356	3.6%	7,828,356	0	0
Missing or Incorrect Codes:							
42	B33	Incorrect code	1,234				
43	N/A	Incorrect code	4,591,416				
44		Missing code	41,225,294				
45	A	Incorrect code	35,953				
		Subtotal =	45,853,896	21.2%			
Total NHWCS database =			216,745,906	100.0%	87,297,312	75,945,189	7,649,509
Subtotal with codes =			170,892,010	100.0%	40.3%	35.0%	3.5%
					51.1%	44.4%	4.5%

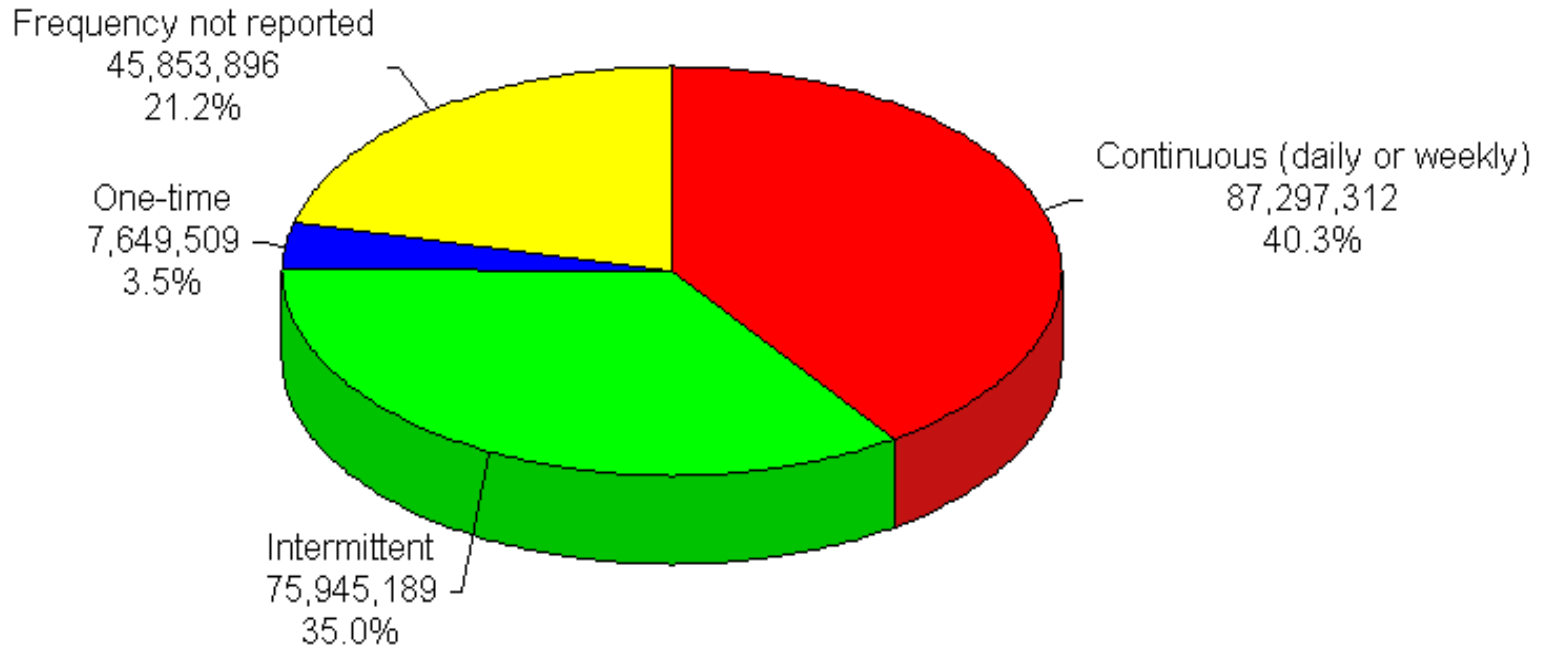
Explanatory Notes:

(a) * Note: Annual quantities represent NHWCS pre-loaded 92% of the 1993 BRS quantity of 234.9 million tons RCRA hazardous waste generated.
 (b) Items A49 and A59 assigned 50%/50% across two columns to reflect uncertainty in relation to dual classification of other items within same category.
 F:\User\MEADSPROJECTS\W\WFRM&DF_Rules\2001_final_rule\Final_rule_economics\Source_codes.123

Part 1: **Attribute #1 of 12** (cont'd) of NHWCS Hazardous Wastes: **Frequency** of Waste Generation for NHWCS Wastes

Frequency of Waste Generation Reported in the NHWCS

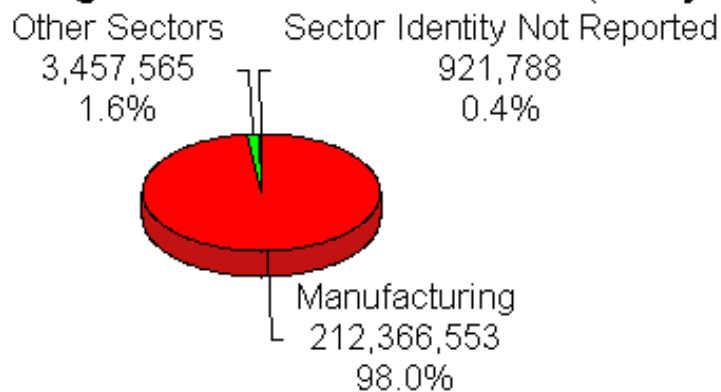
(Based on OSW Assessment of "Source Codes" for the NHWCS 216.7 million tons)



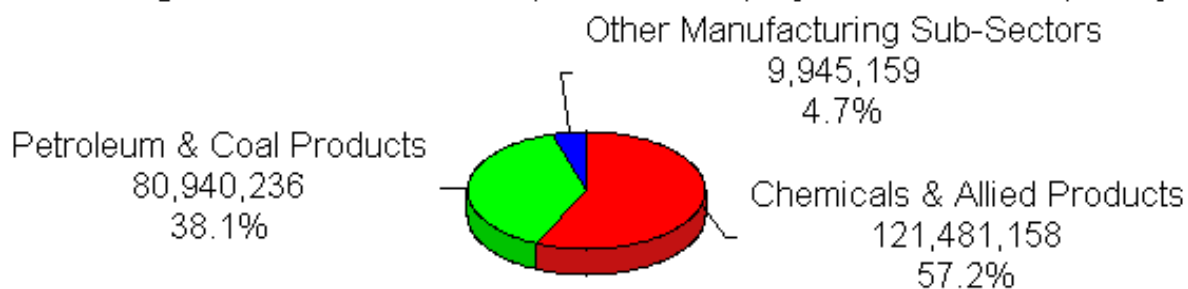
Part 1: **Attribute #2 of 12** of NHWCS Hazardous Wastes: :
Economic Sectors Which Generated NHWCS Wastes

Identity of Economic Sectors in the NHWCS

Sectors Generating RCRA Hazardous Wastes (tons/year)



Manufacturing Sector Breakdown (from Above) by Sub-Sectors (tons/year)



Part 1: Attribute #2 of 12 (cont'd) of NHWCS Hazardous Wastes: Economic Sub-Sectors Which Generated NHWCS Wastes

BREAKDOWN OF NHWCS DATABASE ECONOMIC SECTORS

A. Overall Summary All NHWCS Waste Quantities:

Item	Sector Description	SIC Codes	1993 tons	%
1	Mining & Construction	1000 to 1799	4,386	0.002%
2	Manufacturing	2000 to 3999	212,366,553	98.0%
3	Transportation & Utilities	4000 to 4999	1,402,249	0.647%
4	Wholesale Trade	5000 to 5199	88,713	0.041%
5	Retail Trade	5200 to 5999	466	0.0002%
6	Finance, Insurance & Real Estate	6000 to 6999	19,159	0.009%
7	Services	7000 to 8999	490,541	0.226%
8	Public Administration	9000 to 9799	1,452,051	0.670%
9	Sector not reported to NHWCS	Not reported	921,788	0.425%
Total NHWCS Quantity =			216,745,906	100.0%
Summary Overall:				
1	Manufacturing	2000 to 3999	212,366,553	98.0%
2	Other Sectors		3,457,565	1.6%
3	Sector Identity Not Reported	Not reported	921,788	0.4%

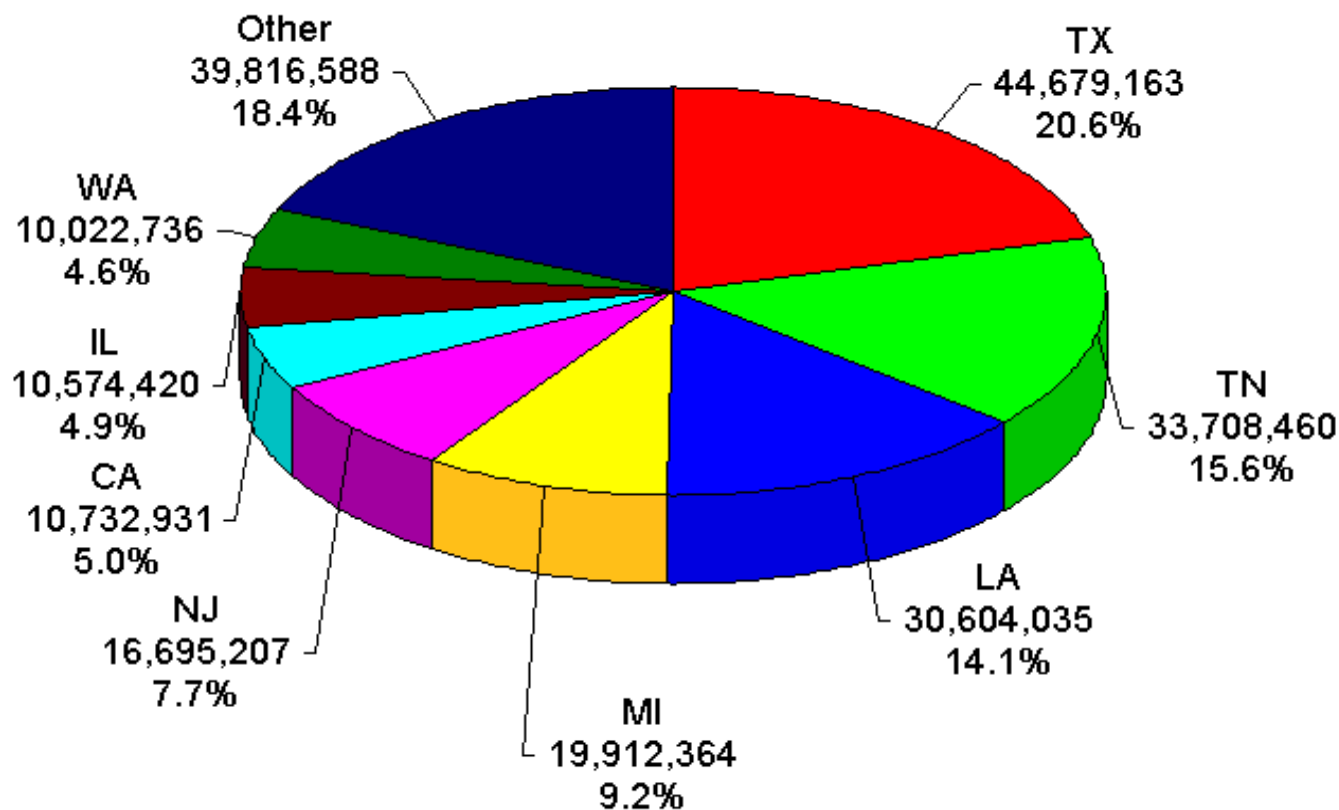
B. NHWCS Manufacturing Sector Breakdown (SIC Codes 2000 to 3999):

Item	Sub-Sector Description	SIC Codes	1993 tons	%
1	Food & Kindred Products	20xx	18,873	0.009%
2	Textile Mill Products	22xx	2,080	0.001%
3	Lumber & Wood Products	24xx	32,117	0.015%
4	Furniture & Fixtures	25xx	21,673	0.010%
5	Paper & Allied Products	26xx	18,893	0.009%
6	Printing & Publishing	27xx	13,194	0.006%
7	Chemicals & Allied Products	28xx	121,481,158	57.2%
8	Petroleum & Coal Products	29xx	80,940,236	38.1%
9	Rubber & Misc Plastic Products	30xx	3,356	0.002%
10	Stone, Clay & Glass Products	32xx	130,907	0.062%
11	Primary Metal Industries	33xx	2,515,154	1.184%
12	Fabricated Metal Products	34xx	988,314	0.465%
13	Industrial Machinery & Eqpmt	35xx	461,856	0.217%
14	Electronic & Other Electric Eqpmt	36xx	2,362,188	1.112%
15	Transportation Eqpmt	37xx	3,330,880	1.568%
16	Instruments & Related Products	38xx	38,312	0.018%
17	Misc Manufacturing Industries	39xx	7,363	0.003%
Subtotal for NHWCS Manufacturing Sector =			212,366,553	100.0%
Summary of Manufacturing:				
1	Chemicals & Allied Products	28xx	121,481,158	57.2%
2	Petroleum & Coal Products	29xx	80,940,236	38.1%
3	Other Manufacturing Sub-Sectors		9,945,159	4.7%

Part 1: **Attribute #3 of 12** of NHWCS Hazardous Wastes:
States Which Generated NHWCS Wastes

States Generating RCRA Hazardous Wastes Covered by the NHWCS

(NHWCS total waste quantity = 216.7 million tons 1993)



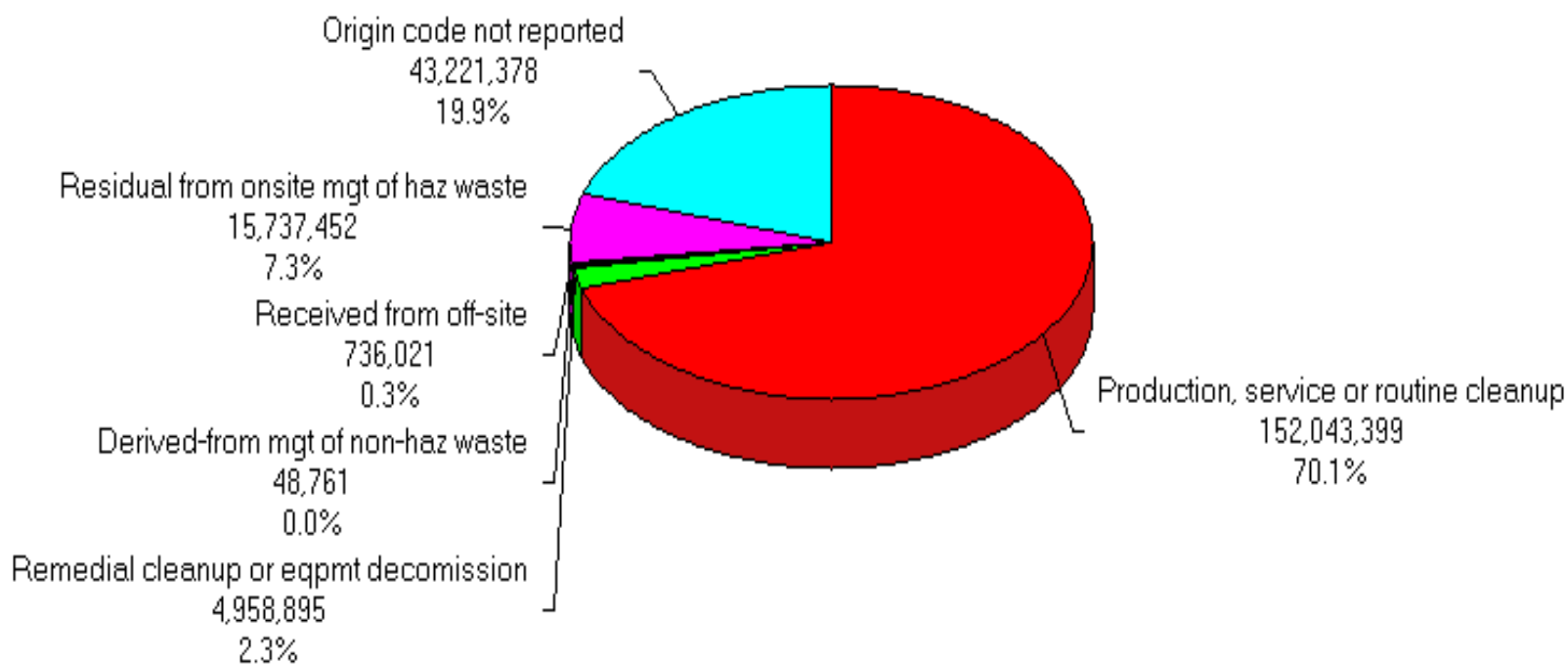
Part 1: **Attribute #3 of 12** (cont'd) of NHWCS Hazardous Wastes:
 List of **States** Which Generated NHWCS Wastes

Count	State	1993 tons	Item %	Cumltve%
1	TX	44,679,163	20.6%	20.6%
2	TN	33,708,460	15.6%	36.2%
3	LA	30,604,035	14.1%	50.3%
4	MI	19,912,364	9.2%	59.5%
5	NJ	16,695,207	7.7%	67.2%
6	CA	10,732,931	5.0%	72.1%
7	IL	10,574,420	4.9%	77.0%
8	WA	10,022,736	4.6%	81.6%
9	PA	8,923,390	4.1%	85.7%
10	WV	8,052,543	3.7%	89.5%
11	MN	5,999,773	2.8%	92.2%
12	KS	3,146,988	1.5%	93.7%
13	IN	2,368,349	1.1%	94.8%
14	MS	1,502,558	0.7%	95.5%
15	ID	1,332,529	0.6%	96.1%
16	OH	1,185,124	0.55%	96.6%
17	SC	1,038,654	0.48%	97.1%
18	OK	994,037	0.46%	97.6%
19	PR	857,156	0.40%	98.0%
20	NY	825,417	0.38%	98.3%
21	AR	735,512	0.34%	98.7%
22	ND	593,348	0.27%	99.0%
23	OR	544,252	0.25%	99.2%
24	GA	466,018	0.22%	99.4%
25	MO	435,507	0.20%	99.6%
26	AL	376,959	0.17%	99.8%
27	KY	140,023	0.06%	99.86%
28	CO	99,973	0.05%	99.91%
29	NV	71,281	0.03%	99.94%
30	UT	46,584	0.02%	99.96%
31	VA	40,368	0.02%	99.98%
32	WI	20,892	0.01%	99.99%
33	FL	13,565	0.01%	99.997%
34	CT	5,788	0.003%	100.000%
NHWCS Total =		216,745,906	100.0%	

Part 1: **Attribute #4 of 12** of NHWCS Hazardous Wastes:
Origins of RCRA Hazardous Wastes Reported in the NHWCS

Summary of Reported Origin of NHWCS Waste Quantities

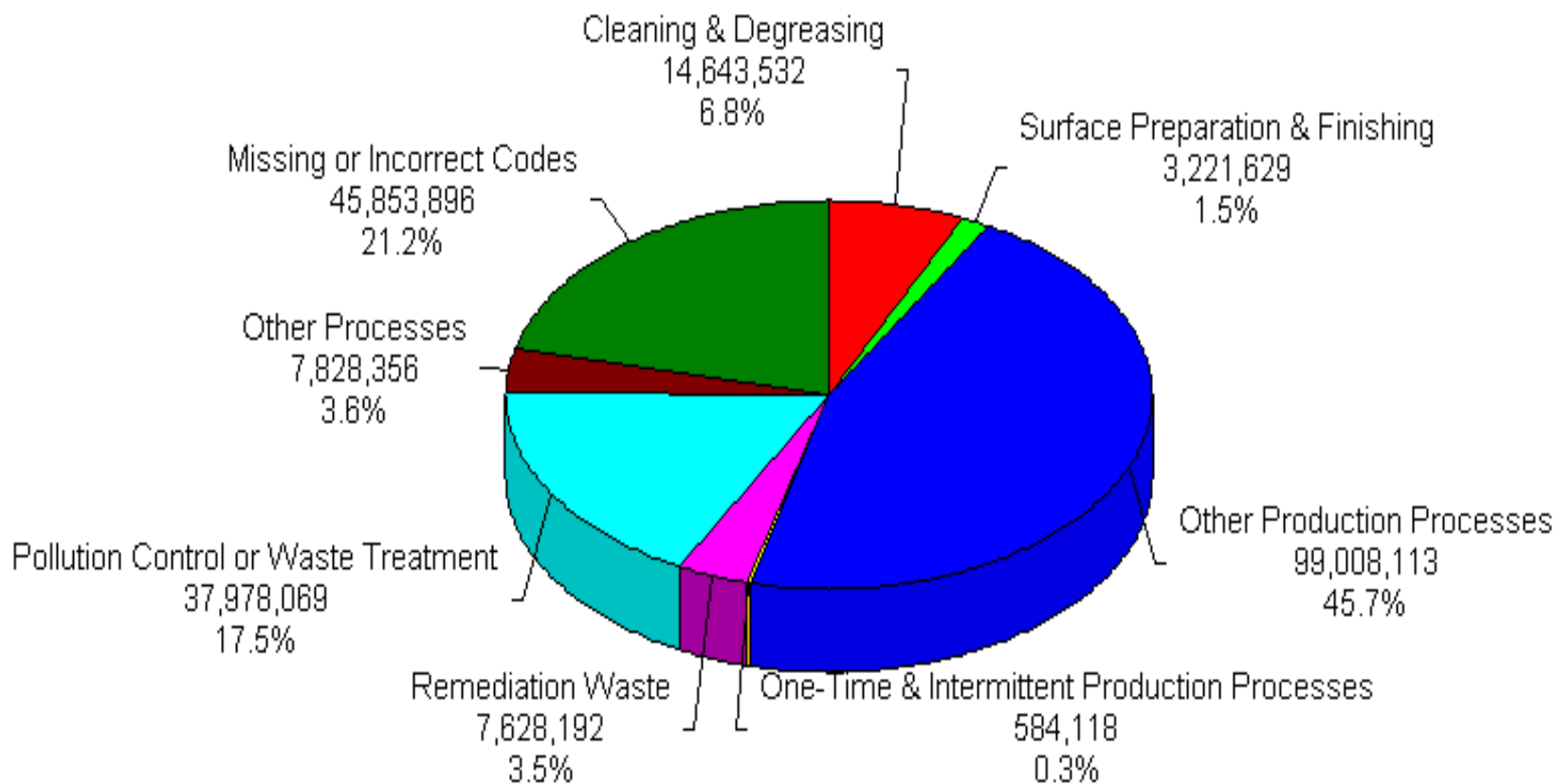
(Based on BRS "Origin Codes" reported for NHWCS 216.7 million tons)



Part 1: **Attribute #5 of 12** of NHWCS Hazardous Wastes:
Sources of RCRA Hazardous Wastes Reported in the NHWCS

Summary of Reported Sources of NHWCS Waste Quantities

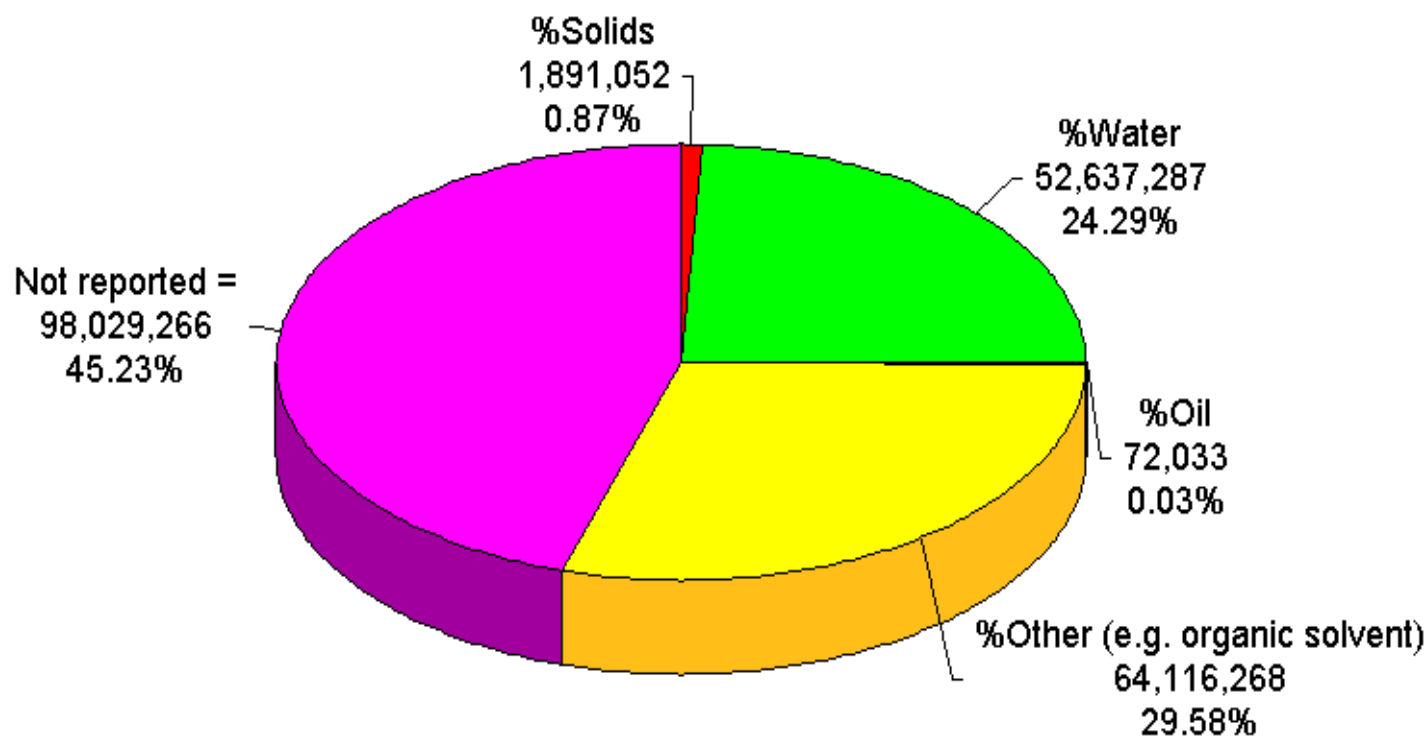
(Based on "Source Codes" reported for NHWCS 216.7 million tons)



Part 1: **Attribute #6 of 12** of NHWCS Hazardous Wastes: **Material Content** of RCRA Hazardous Wastes in the NHWCS

Summary of Material Form of NHWCS Waste Quantities

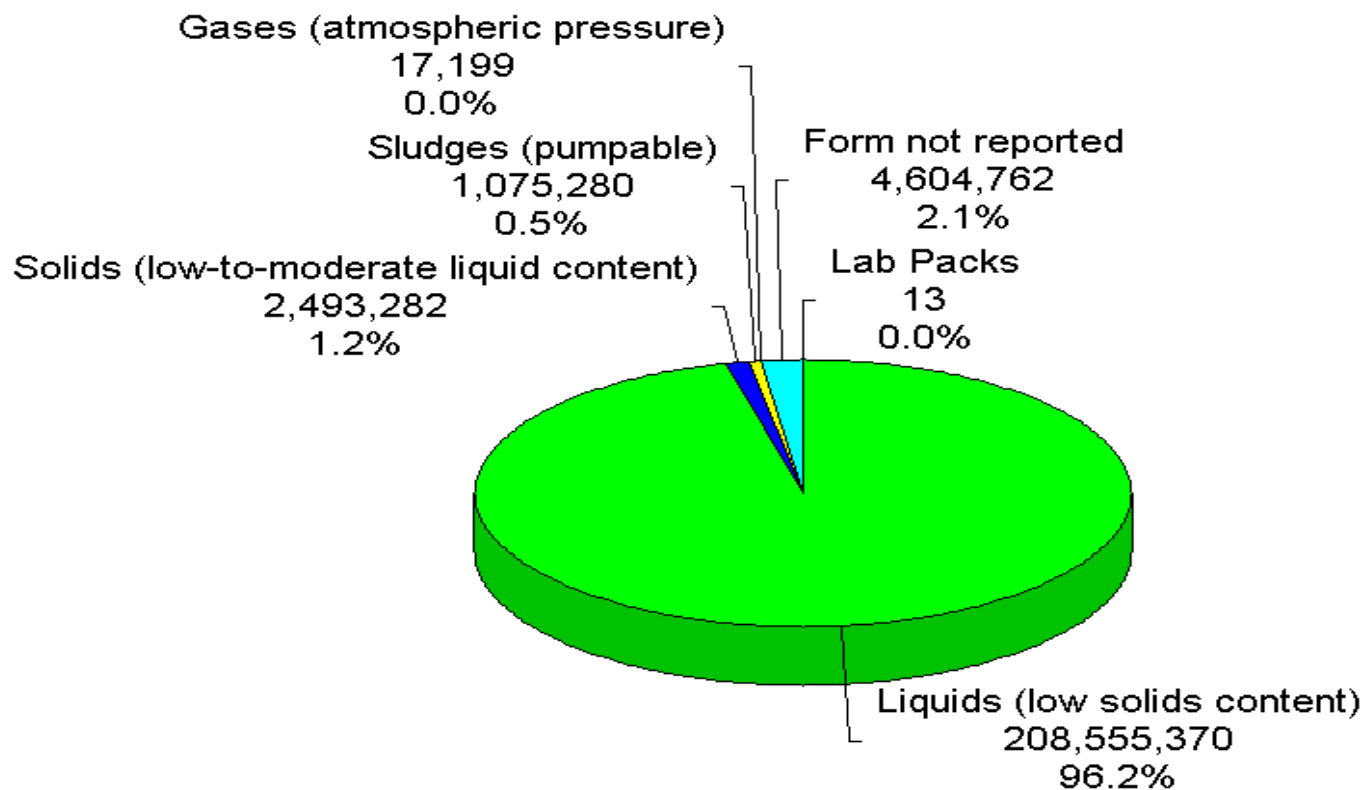
(Based on OSW Analysis of NHWCS data on 216.7 million tons)



Percents are an average weighted over all NHWCS quantities; single wastes may contain one or more of these materials

Part 1: **Attribute #7 of 12** of NHWCS Hazardous Wastes:
Physical Form of RCRA Hazardous Wastes in the NHWCS

Summary of Physical Form of NHWCS Waste Quantities

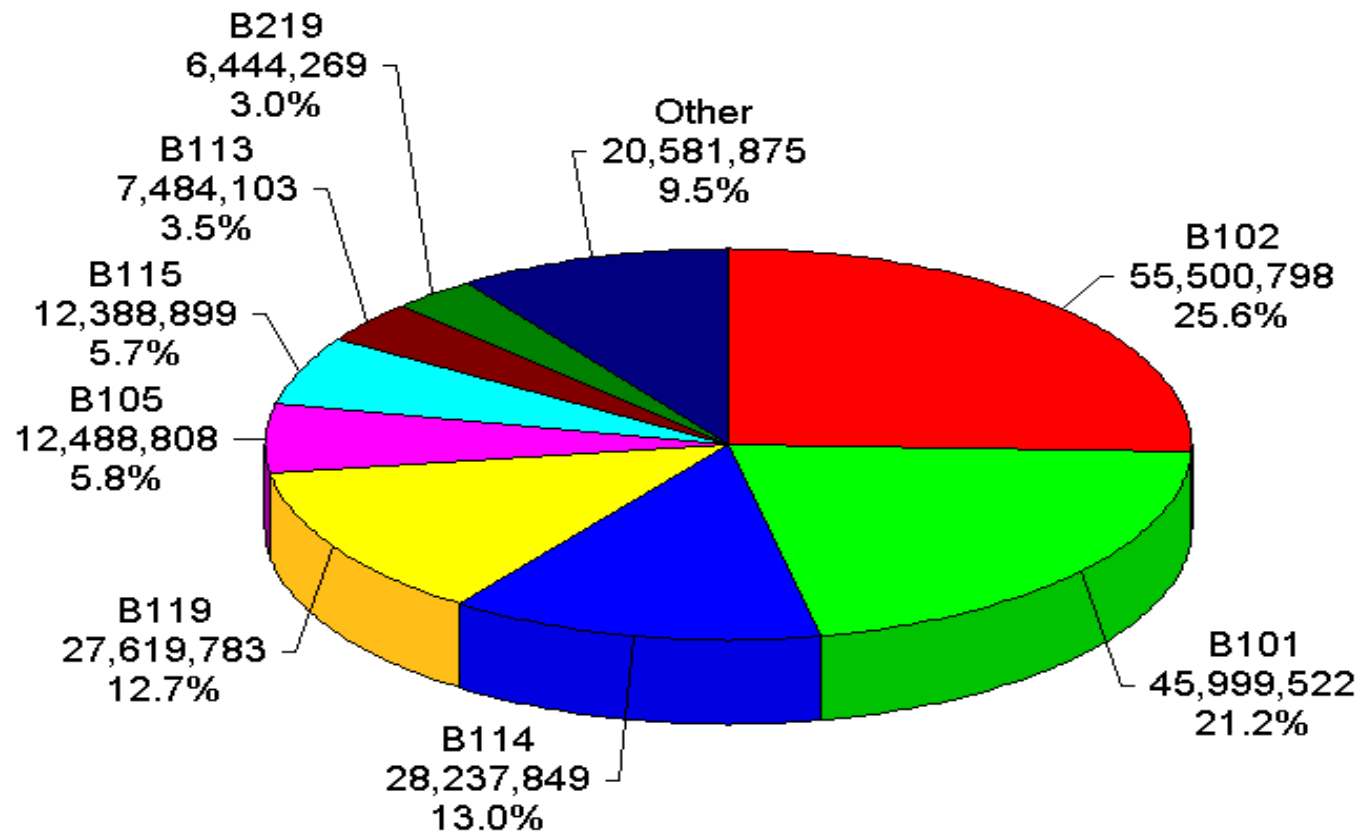


(Based on "Form Codes" Reported for NHWCS 216.7 million tons)

Part 1: **Attribute #8 of 12** of NHWCS Hazardous Wastes:
Physical Form Codes of RCRA Hazardous Wastes in the NHWCS

Summary of Physical Form Codes for NHWCS Waste Quantities

(Based on NHWCS Database 216.7 million tons)



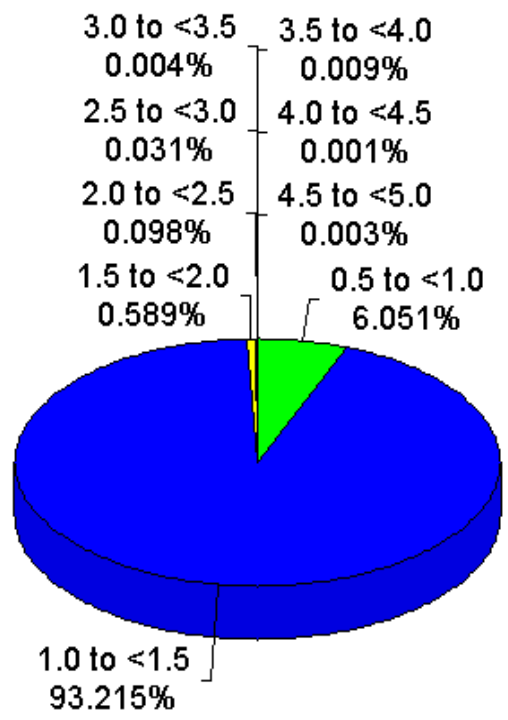
Part 1: **Attribute #8 of 12** (cont'd) of NHWCS Hazardous Wastes: Detailed Breakdown of **Physical Form Codes** in the NHWCS

Count	Form Code	Category*	Description	1993 tons	Count	Form Code	Category*	Description	1993 tons
1	B102	Inorganic liquids	Aqueous waste with low other toxic organics	55,500,798	38	B211	Organic liquids	Paint thinner or petroleum distillates	71,950
2	B101	Inorganic liquids	Aqueous waste with low solvents	45,999,522	39	B306	Inorganic solids	Dry lime or metal hydroxide solids not fixed	65,679
3	B114	Inorganic liquids	Other aqueous waste with low dissolved solids	28,237,849	40	B316	Inorganic solids	Other metal salts/chemicals	50,394
4	B119	Inorganic liquids	Other inorganic liquids	27,634,887	41	B208	Organic liquids	Concentrated phenolics	41,047
5	B105	Inorganic liquids	Acidic aqueous waste	12,488,808	42	B512	Inorganic sludges	Sediment or lagoon dragout contaminated with organics	40,769
6	B115	Inorganic liquids	Scrubber water	12,388,899	43	B407	Organic solids	Other halogenated organic solids	37,472
7	B113	Inorganic liquids	Other aqueous waste with high dissolved solids	7,484,103	44	B312	Inorganic solids	Metal-cyanide salts/chemicals	37,142
8	B219	Organic liquids	Other organic liquids	6,444,269	45	B606	Organic sludges	Resins, tars, or tarry sludge	34,049
9	B110	Inorganic liquids	Caustic aqueous waste	3,304,871	46	B505	Inorganic sludges	Untreated plating sludge without cyanides	31,776
10	B111	Inorganic liquids	Aqueous waste with reactive sulfides	2,768,101	47	B206	Organic liquids	Waste oil	30,759
11	B207	Organic liquids	Concentrated aqueous solution of other organics	1,084,621	48	B502	Inorganic sludges	Lime sludge with metals/metal hydroxide sludge	28,174
12	B116	Inorganic liquids	Leachate	1,082,561	49	B601	Organic sludges	Still bottoms of halogenated solvents or other organic liquids	28,160
13	B104	Inorganic liquids	Spent acid without metals	995,398	50	B310	Inorganic solids	Spent solid filters or adsorbents	22,515
14	B204	Organic liquids	Halogenated/nonhalogenated solvent mixture	723,994	51	B307	Inorganic solids	Metal scale, filings, or scrap	19,954
15	B106	Inorganic liquids	Caustic solution with metals but no cyanides	500,589	52	B315	Inorganic solids	Other reactive salts/chemicals	17,581
16	B301	Inorganic solids	Soil contaminated with organics	464,022	53	B212	Organic liquids	Reactive or polymerizable organic liquid	17,366
17	B103	Inorganic liquids	Spent acid with metals	445,419	54	B701	Inorganic gases	Inorganic gases	17,199
18	B319	Inorganic solids	Other waste inorganic solids	422,887	55	B112	Inorganic liquids	Aqueous waste with other reactives (e.g. explosives)	16,959
19	B203	Organic liquids	Nonhalogenated solvent	415,028	56	B209	Organic liquids	Organic paint, ink, lacquer, or varnish	10,837
20	B305	Inorganic solids	Dry lime or metal hydroxide solids chemically fixed	364,058	57	B519	Inorganic sludges	Other inorganic sludges	7,705
21	B309	Inorganic solids	Batteries or battery parts, casings, cores	326,993	58	B506	Inorganic sludges	Untreated plating sludge with cyanides	6,527
22	B302	Inorganic solids	Soil contaminated with inorganics only	316,368	59	B510	Inorganic sludges	Degreasing sludge with metal scale or filings	5,773
23	B109	Inorganic liquids	Spent caustic	232,504	60	B403	Organic solids	Solid resins or polymerized organics	5,773
24	B107	Inorganic liquids	Caustic solution with metals and cyanides	218,492	61	B609	Organic sludges	Other organic sludges	5,364
25	B603	Organic sludges	Oily sludge	197,187	62	B501	Inorganic sludges	Lime sludge without metals	4,641
26	B503	Inorganic sludges	Wastewater treatment sludge with toxic organics	187,938	63	B314	Inorganic solids	Reactive sulfide salts/chemicals	2,558
27	B205	Organic liquids	Oil-water emulsion or mixture	187,426	64	B210	Organic liquids	Adhesives or epoxies	1,709
28	B202	Organic liquids	Halogenated (e.g. chlorinated) solvent	150,928	65	B604	Organic sludges	Organic paint or ink sludge	1,703
29	B303	Inorganic solids	Ash, slag, or other residue from incineration	143,455	66	B401	Organic solids	Halogenated pesticide solid	909
30	B602	Organic sludges	Still bottoms of nonhalogenated solvents or other organic liquids	130,297	67	B001	Lab Packs	Lab packs of old chemicals only	13
31	B304	Inorganic solids	Other dry ash, slag, or thermal residue	119,504	68	NR	Not reported	Not reported in NHWCS	4,604,762
32	B513	Inorganic sludges	Sediment or lagoon dragout contaminated with inorganics only	108,342				Total =	216,230,636
33	B504	Inorganic sludges	Other wastewater treatment sludge	95,436	* The terms "organic" and "inorganic" historically connote two branches of chemical science, and their respective subject area categories of chemical substances (matter): Organic = substances derived from plants and animals (i.e. chemicals composed of carbon and hydrogen, and occasionally nitrogen or phosphorus). Inorganic = substances being or composed of matter other than plant or animal (i.e. mineral).				
34	B607	Organic sludges	Biological treatment sludge	87,049					
35	B409	Organic solids	Other nonhalogenated organic sludge	76,017					
36	B201	Organic liquids	Concentrated solvent-water solution	75,678					
37	B511	Inorganic sludges	Air pollution control device sludge (e.g. fly ash, wet scrubber sludge)	74,391					

Part 1: Attribute #9 of 12 of NHWCS Hazardous Wastes: Specific Gravity of RCRA Hazardous Wastes in the NHWCS

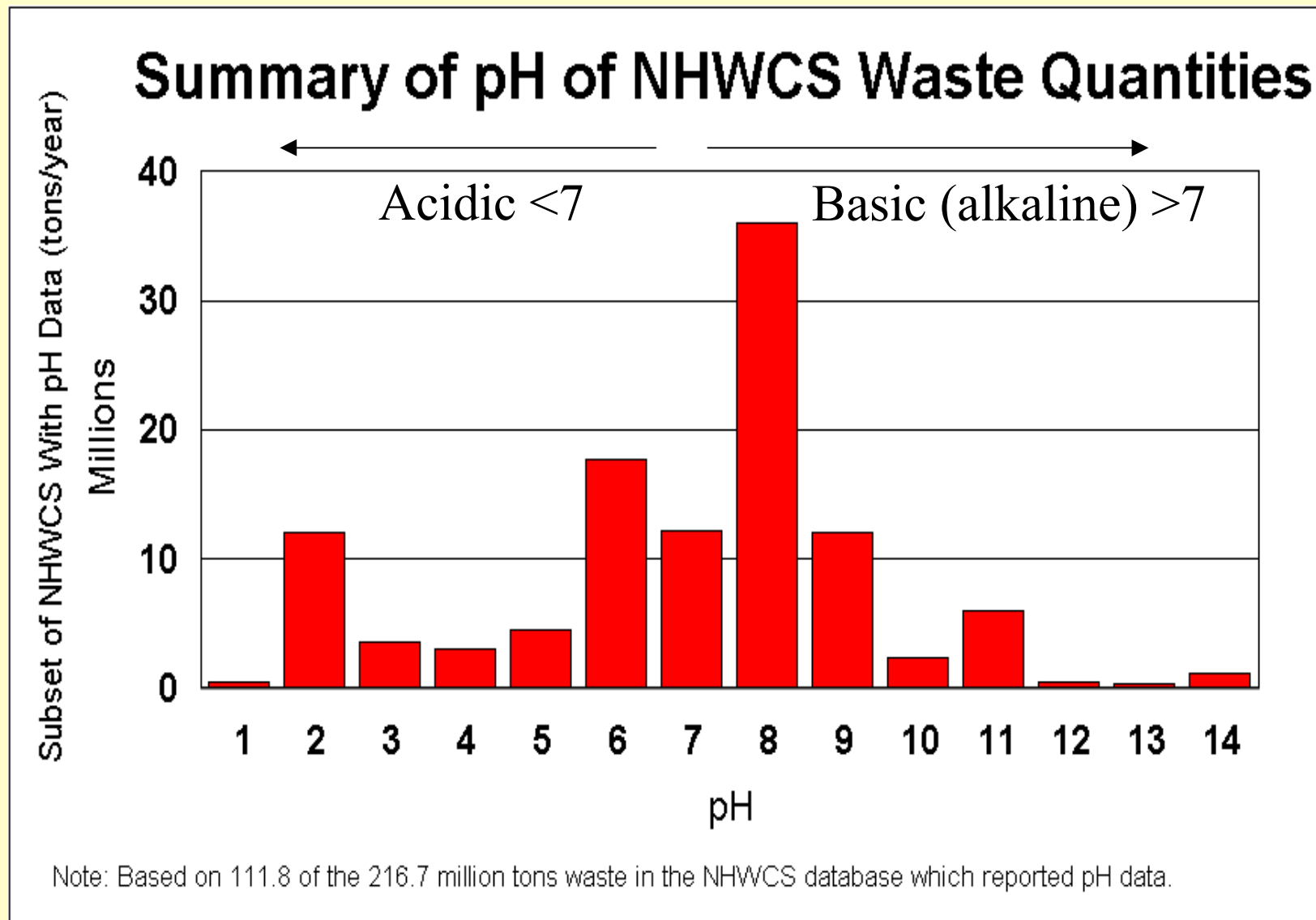
Summary of Specific Gravity (Density) of NHWCS Waste Quantities

(Based on All NHWCS 216.7 million tons)



Specific gravity = ratio of waste density (mass per unit volume), relative to density of pure water.

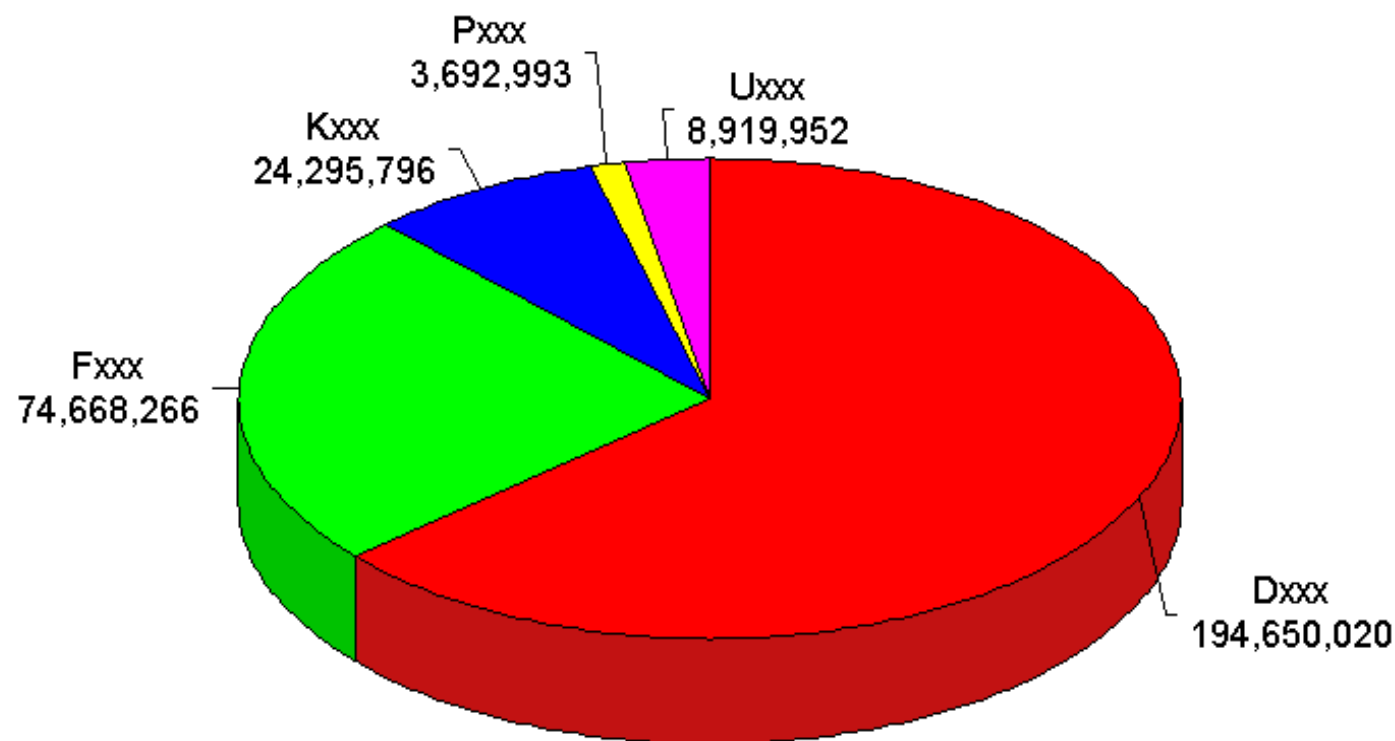
Part 1: **Attribute #10 of 12** of NHWCS Hazardous Wastes:
pH (acidity/basicity) of RCRA Hazardous Wastes in the NHWCS



Part 1: **Attribute #11 of 12** of NHWCS Hazardous Wastes: Summary of **RCRA Regulatory Wastecodes** in the NHWCS

Summary of RCRA Regulatory Wastecodes for NHWCS Wastes

(Based on All 216.7 million tons NHWCS Wastes; many wastes have more than one wastecode)



Note: RCRA wastecodes defined at 40 CFR Part 261 Subpart C & Subpart D

Part 1: **Attribute #12 of 12** of NHWCS Hazardous Wastes: Waste Management Systems Reported in the NHWCS

Item	Waste Management System Description	System Code	1993 tons	
WASTE TREATMENT:				
		Aqueous treatment subtotal (items 1 to 6) =	173,990,248	80.3%
1	Aqueous waste biological treatment	M081	92,590,786	42.7%
2	Aqueous waste carbon adsorption	M082	139,518	0.1%
3	Aqueous waste air/stream stripping	M083	1,158,635	0.5%
4	Aqueous waste chemical precipitation	M071,M072,M074,M077,M091,M092	49,134,480	22.7%
5	Aqueous waste neutralization/settling	M121,M122,M123	15,963,398	7.4%
6	Aqueous waste other treatment (e.g. red/oxid)	Remainder M07x,M08x,M09x	15,003,431	6.9%
7	Direct discharge to POTW or NPDES	M135,M136	12,315	0.0%
8	Incineration	M04x	2,283,555	1.1%
9	Stabilization	M111 to M119	835,334	0.4%
10	Sludge treatment (e.g. dewatering)	M10x	520,797	0.2%
11	Other treatment NEC	M124,M125,M129	7,045,150	3.3%
		Subtotal treatment =	184,687,399	85.2%
WASTE RECYCLING/MATERIAL RECOVERY:				
12	Fuel blending/ energy recovery	M05x,M06x	1,963,515	0.9%
13	Metals recovery	M01x	467,847	0.2%
14	Solvents recovery	M02x	297,990	0.1%
15	Other recycling/recovery NEC	M03x	3,906,515	1.8%
		Subtotal recycling/recovery =	6,635,868	3.1%
WASTE DISPOSAL:				
16	Deepwell injection	M134	16,077,530	7.4%
17	Landfill	M132	1,467,331	0.7%
18	Land farming	M131	183,150	0.1%
19	Other disposal NEC (e.g. surf.impd, transfer pile)	M133,M137,M141	635,917	0.3%
		Subtotal disposal =	18,363,927	8.5%
	System not reported in NHWCS	System not reported in NHWCS	7,058,712	3.3%
		Grand Total (NHWCS Database) =	216,745,906	100.0%

Part 2:

Queries for NHWCS **Constituent Data** on
RCRA “*Mixtures & Derived-from*” (M&DF)
Hazardous Wastes

Part 2: Description of RCRA Hazardous Waste Constituent Data Contained in the NHWCS Database

- The NHWCS database contains **36,609 chemical constituent data instances** associated with the NHWCS sample of 1,760 hazardous solid wastestreams. EPA pre-loaded constituent instances on the NHWCS questionnaires, based on EPA cross-referencing the survey sample TSDR's 1993 BRS wastecodes, to lists of chemicals associated with RCRA hazardous wastecodes (40 CFR 261 appendices VII & VIII, & 40 CFR 268.40 hazardous waste treatment standards).
- Survey respondents provided constituent data for **53%** of the 216.7 million tons NHWCS wastestream volume, resulting in **49%** coverage relative to 1993 BRS benchmark volume of 234.9 million tons RCRA hazardous solid waste.
- NHWC survey responses reported data on **11,921** chemical constituent data instances (data items) for RCRA hazardous solid wastes (i.e. >0 ppm*).
- 70% of the 156 NHWC survey respondents added constituents to their survey responses, to at least one wastestream, in addition to pre-loaded constituents.

* ppm = "**parts-per-million**", a measurement unit for **trace concentrations**, usually expressed as ²⁶a weight/weight basis, but may also be expressed as a weight/volume basis (e.g. for liquids).

Part 2: Description of NHWCS Database Waste Constituent **Concentration Data**

- NHWCS concentration data represent “*typical*”, “*average*”, or “*median*” values in **1993**, according to survey instructions.
- Concentration data for “*wholewaste*” or “*leachate*” (both identical for liquids).
- Five possible **concentration data responses** to NHWCS questionnaire:
 - **Numerical value** based either on:
 - “Estimate” (E) = Engineering judgement or process knowledge (or if <5 measurements)
 - “Analysis” (A) = Waste sampling/analysis (if ≥5 measurements)
 - Below detection and detection limit known (EPA assigned half the reported limit)
 - EPA assigned midpoint value in database to any concentration ranges reported
 - **PR** = Present at unknown concentration (EPA assigned “**0 ppm**” in database)
 - **ND** = Not detected and detection limit unknown (assigned “**0 ppm**” in database)
 - **NT** = Constituent might be present but not measured (assigned “**0 ppm**” in database)
 - **NA** = Generator has no reason to believe constituent is present (assigned “**0 ppm**” in database)
- Consequently, it is unknown how many of the “**0 ppm**” constituent instances in the database, are actually not present, because all data entries of PR, ND, NT, and NA, were assigned “0ppm” in database.

Part 2: **NHWCS Database Query Criteria** (i.e. *Datafield Operators*)
Applied in This Study for Extracting Constituent Data for
RCRA “*Mixtures & Derived-From*” (M&DF) Hazardous Wastes

- **ORIGCODE:** BRS haz waste origin codes.
- **POMCONC:** Point-of-measurement constituent concentration codes.
- **SOURCECODE:** BRS haz waste source codes.
- **WSTCODE:** RCRA haz wastecodes (Dxxx, Fxxx, Kxxx, Pxxx, Uxxx).
- **PCTDRVFR:** Percent of wastestream consisting of “derived-from” haz waste.

Note: See attachments at end of this presentation for respective NHWCS database waste quantities (tons) in each datafield.

Part 2: NHWCS Database Queries (cont'd):

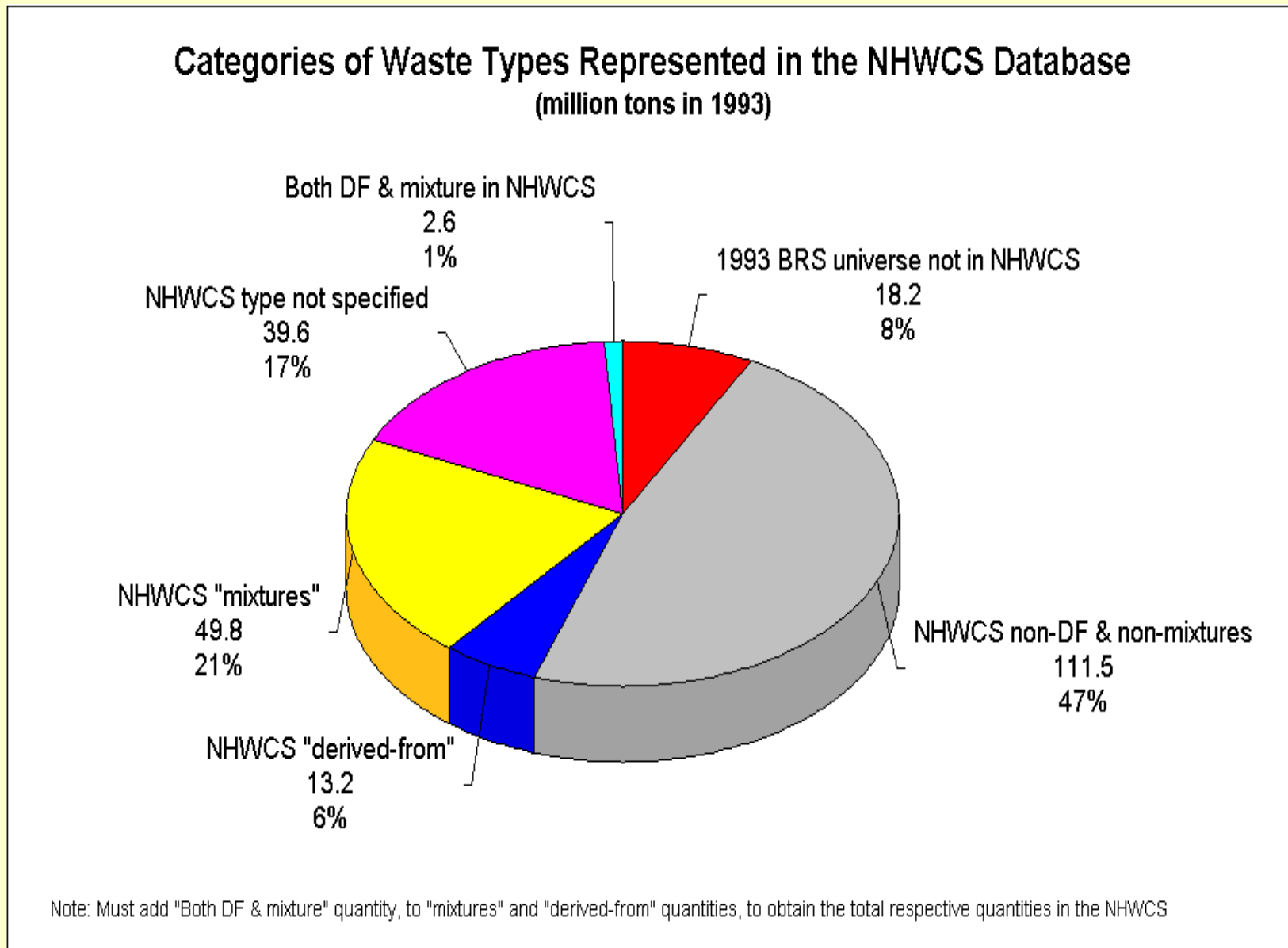
Quantity of RCRA M&DF Wastes Covered by the **NHWCS Database**

	<u>Million tons/year</u>	
• RCRA hazardous waste universe (1993 BRS baseline) =	234.9	(100%)
• NHWCS database hazardous waste universe =	216.7	(92% of 234.9)
– NHWCS wastestreams w/constituent data (0 & >0ppm) =	114.7	(49% of 234.9)
• NHWCS “ derived-from ” hazardous waste =	15.8*	(14% of 114.7)
(i.e. all NHWCS wastes with origin code = 5)		
– Data query subset for constituent analysis (if >0ppm)** =	2.7	(17% of 15.8)
• NHWCS hazardous waste “ mixtures ” =	52.4*	(46% of 114.7)
(i.e. all NHWCS wastes with POM code = 3 or 4)		
– Data query subset for constituent analysis (if >0ppm)** =	12.7	(24% of 52.4)

* Compared to 1993 BRS benchmark volumes above (“QTY93tons” datafield), the NHWCS survey responses as adjusted to 1994, 1995 or 1996 quantities by some respondents, and weighted to represent non-sampled wastestreams (“TOTWQTYtons” datafield), indicate that derived-from waste quantities decreased by 0.4%, and waste mixtures increased by 6.2%. These may be considered uncertainty bounds.

** For both “derived-from” and “mixtures”, the constituent data analysis in this study is based on subsets of the NHWCS waste data in each category, which reflect the data filtering steps described in a following slide.

Part 2: Quantities of RCRA "M&DF" Wastes in NHWCS Database



Part 2: NHWCS Database Queries (cont'd):

Summary of **Quantity of NHWCS Data Elements** on “*Derived-from*” & “*Mixtures*”

All “*derived-from*” data (ORIGCODE=5):

- 42 TSDR facilities
- 89 wastestreams
- 15.8 million tons (1993)
- 2,864 constituent items (0 & >0ppm)

Subset after excluding Dxxx-only wastes:

- 16 TSDR facilities
- 36 wastestreams
- 2.70 million tons (1993)
- 1,695 constituent items (0 & >0ppm)

Data subset if concentration >0ppm:

- **13 TSDR facilities**
- **25 wastestreams**
- **2.67 million tons (1993)**
- **610 constituent data instances >0ppm**

All “*mixtures*” data (POMconc= 3 or 4):

- 50 TSDR facilities
- 124 wastestreams
- 52.4 million tons (1993)
- 1,710 constituent items (0 & >0ppm)

Subset after excluding Dxxx-only wastes:

- 35 TSDR facilities
- 48 wastestreams
- 13.1 million tons (1993)
- 1,248 constituent items (0 & >0ppm)

Data subset if concentration >0ppm

- **34 TSDR facilities**
- **43 wastestreams**
- **12.7 million tons (1993)**
- **570 constituent data instances >0ppm**

Part 3

Findings of NHWCS Database Queries for RCRA “*Derived-From*” Hazardous Wastes

Part 3: **Database query criteria** applied for extracting constituent data for NHWCS “*derived-from*” wastes (**5 data query steps**)

- Data query steps applied to ensure that chemical constituent data extracted from the NHWCS database represents only “*derived-from*” wastes.
- **Five data query steps** to obtain “*derived-from*” constituent data:
 - Include only waste **origin code = 5**
(residual from on-site treatment, disposal or recycling of hazardous waste)
 - Include only waste constituent concentration **point-of-measurement code = 1**
(before any mixing with hazardous or non-hazardous wastes)
 - Include only waste generation **source codes = A38, A53, A60, A71 to A89**
(these source codes match the sources identified in the RCRA derived-from rule: sludges, spill residues, treatment wastes (ash, emission control, leachate))
 - **Exclude Dxxx** characteristic-only wastescodes
(which become eligible for exemption from MDF rules upon decharacterization)
 - Remove any wastestreams with “0 tons” survey-corrected responses.

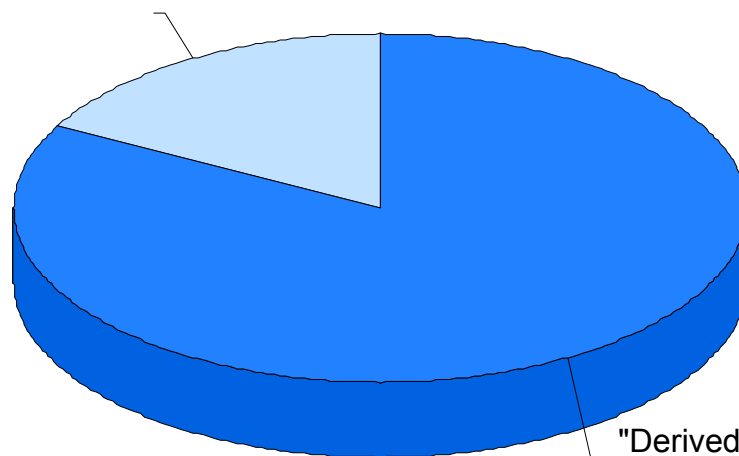
Note: It is also possible to query for wastestreams assigned “100%” in the physical characteristic datafield “PCTDRVFR” (percent derived-from). However, because of respondent interpretive difficulty with this survey item, only 123.0 of the 216.7 million tons (57%) NHWCS waste volume have an assigned value for this datafield (which represents **14.6%** of the 123.0 mill.tons as 100% PCTDRVFR). See section 10g of the March 1998 documentation memo at <http://www.epa.epaoswer/hazwaste/id/hwirwste/economic.htm>.

Part 3: Resultant volume of NHWCS waste for constituent data analysis, after applying **data query steps** to NHWCS “*derived-from*” wastes

NHWCS "Derived-from" Waste Volume and Data Query Subset for Constituent Analysis

Query steps subset for constituent data analysis

2.7
17%



"Derived-from" waste volume not in subset
13.1
83%

NHWCS database quantities in million tons waste (1993 BRS benchmark year)

Part 3: Comparison of **Eight Characteristics** Between the NHWCS Database on All “*Derived-from*” Wastes, to the NWHCS Data Subset for Constituent Analysis

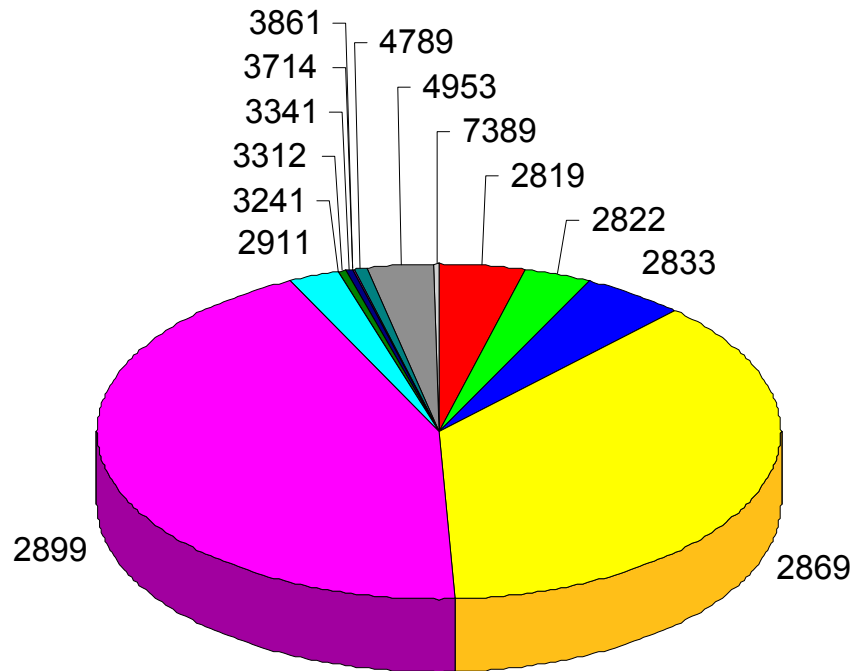
1. **Economic sectors** which generate D-f wastes
2. **States** which generate D-f wastes
3. **Industrial process sources** of D-f wastes
4. **Physical category** of D-f wastes
5. **Physical form codes** for D-f wastes
6. **Specific gravity** (density) of D-f wastes
7. **pH** of D-f wastes (acidity/alkalinity)
8. **RCRA hazardous wastecodes** for D-f wastes

Part 3: Comparison 1 of 8

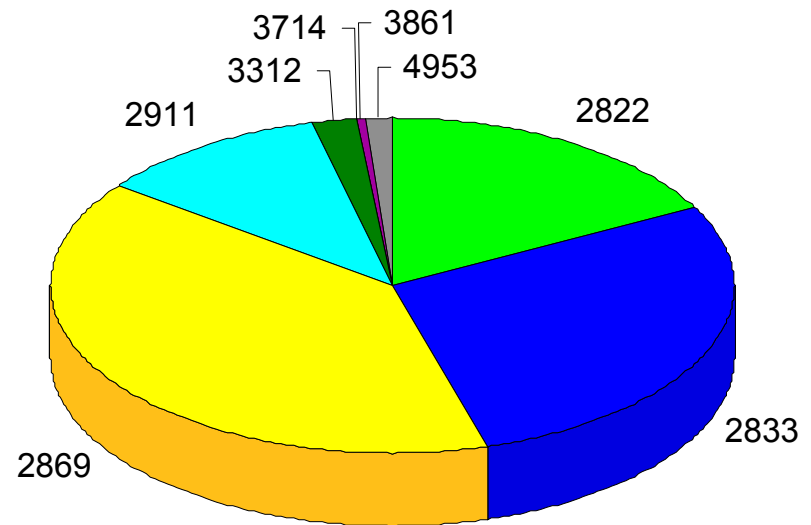
NHWCS “*derived-from*” waste were generated by 14 industrial sectors, 8 of which are represented in the data subset for constituent analysis

Identity of Economic Sectors Generating RCRA "Derived-From" Wastes (1993 waste volume proportions)

All NHWCS "Derived-from" Data



Subset of NHWCS "Derived-from" Data for Constituent Analysis



Note: Sector identification according to US Dept of Commerce 4-digit "Standard Industrial Classification" (SIC) codes.

Part 3: Comparison 1 of 8 (cont'd)

Economic Sub-Sectors Which Generated NHWCS “*Derived-from*” Wastes

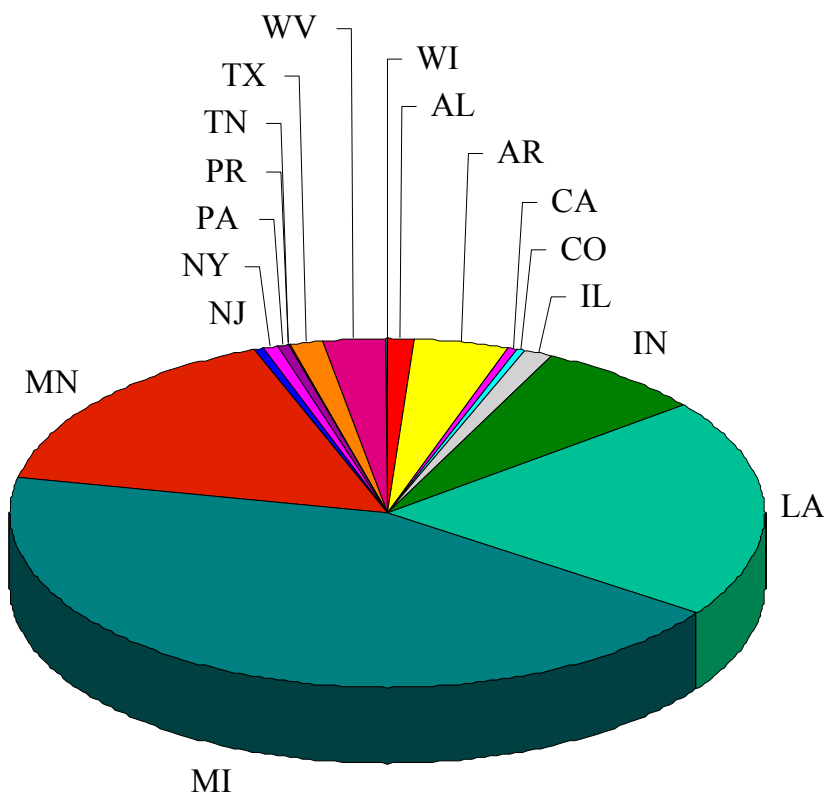
Rank	SIC	NAICS	Type of Economic Sector	All NHWCS "Derived-from" Wastes in Database (Origin code =5)		Subset of NHWCS "Derived-from" Wastes for constituent analysis	
				TOIWQIY	%	TOIWQIY	%
1	2899	325998	All Other Msc. Chemical Product Preparation & Mfg	6,891,229	43.6%	0	0%
2	2869	3251	Industrial Organic Chemicals Manufacturing	5,861,404	37.1%	1,076,025	39.8%
3	2833	325411	Medicinal Chemicals & Botanical Products Mfg	761,395	4.8%	761,395	28.2%
4	2819	325188	Industrial Inorganic Chemicals Manufacturing, NEC	644,806	4.1%	0	0%
5	2822	325212	Synthetic Rubber Manufacturing	503,202	3.2%	467,829	17.3%
6	4953	562	Refuse Systems	492,978	3.1%	35,534	1.3%
7	2911	32411	Petroleum Refining	381,747	2.4%	294,930	10.9%
8	4789	488999	Transportation Services NEC (not elsewhere classified)	101,545	0.6%	0	0%
9	3312	331	Steel Works, Blast Furnaces & Steel Rolling Mills	58,500	0.4%	58,500	2.2%
10	3341	331314, 331423, 331492	Secondary Smelting & Refining of Nonferrous Materials	43,779	0.3%	0	0%
11	7389	Multiple	Business Services, NEC	40,621	0.3%	0	0%
12	3861	333315, 325992	Photographic Equipment & Supplies Manufacturing	10,026	0.06%	10,026	0.4%
13	3241	32731	Cement Manufacturing	4,788	0.03%	0	0%
14	3714	3363	Motor Vehicles Parts & Accessories Manufacturing	207	0.001%	207	0.008%
Column total=				15,796,228	100.0%	2,704,446	100.0%

Part 3: Comparison 2 of 8

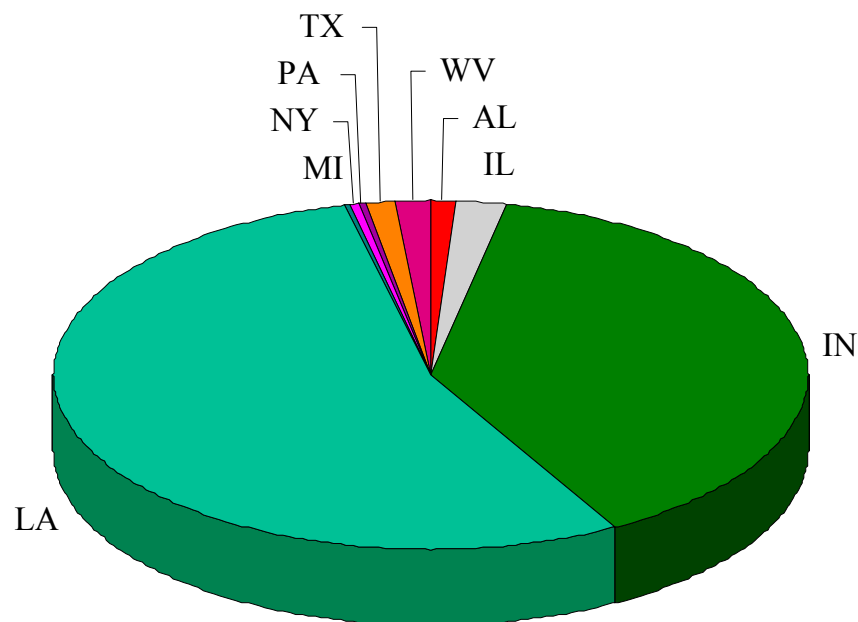
NHWCS “*derived-from*” wastes were generated in 17 states, nine of which are represented in the NHWCS data subset for constituent analysis

**States Generating RCRA "Derived-From" Wastes
(proportions based on 1993 waste volumes)**

All NHWCS "Derived-from" Data



Subset of NHWCS "Derived-from" Data for Constituent Analysis

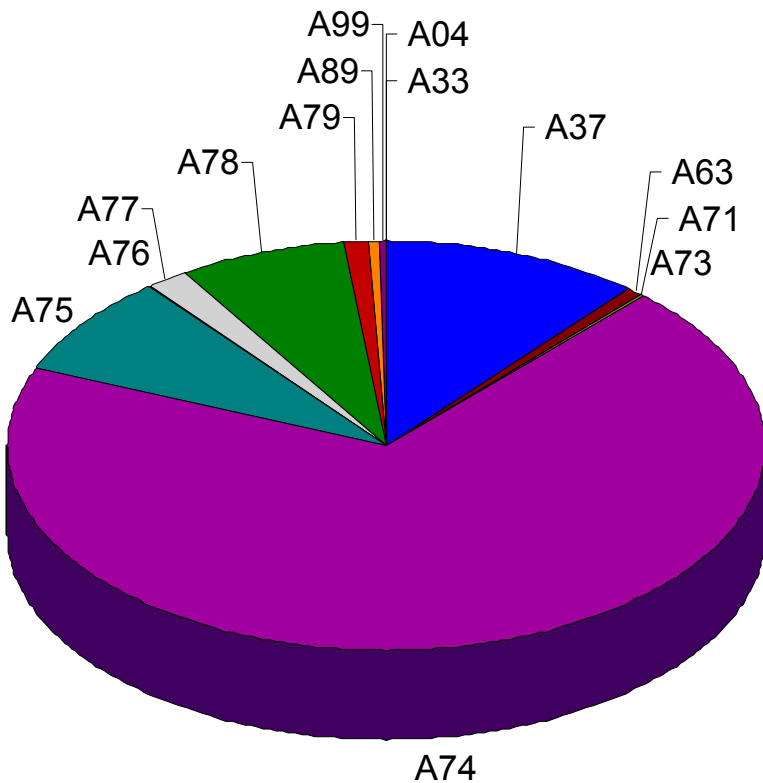


Part 3: Comparison 3 of 8

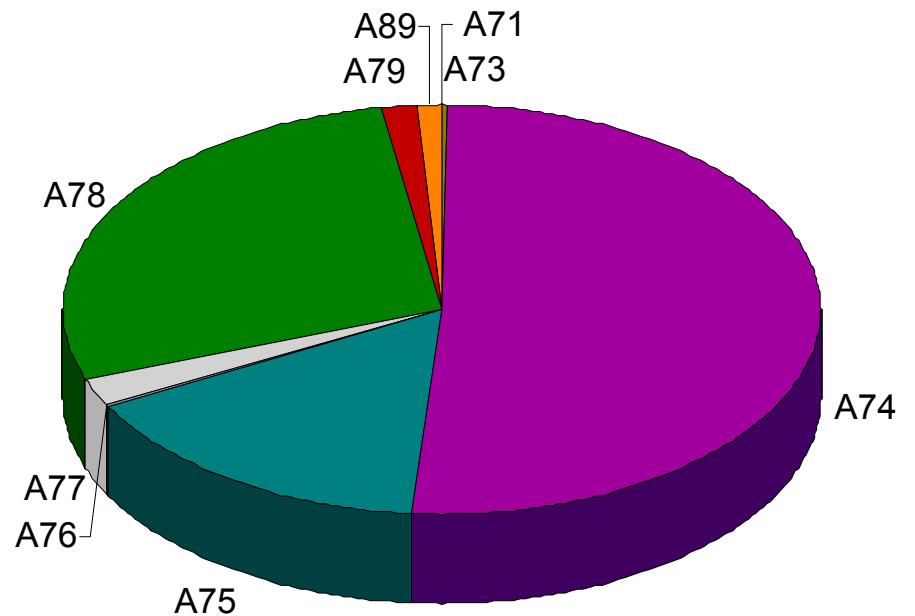
NHWCS “*derived-from*” waste data represent secondary wastes generated by 14 sources, nine of which are included in the data subset for constituent analysis

Industrial Process/Activity Sources of RCRA "Derived-From" Wastes

All NHWCS "Derived-from" Data



Subset of "Derived-from" Data for Constituent Analysis



Part 3: Comparison 3 of 8 (cont'd)

Detailed list of source codes for all NHWCS “*derived-from*” wastes, and for the NHWCS data subset for constituent analysis

Item	Source Code	Description of Industrial Waste "Source Code"	NHWCS Database "Derived-from" Waste Universe: (Origin code = 5)					Subset of NHWCS "Derived-from" Wastes for constituent analysis	
			SIC codes	TSDR facilities	Waste-streams	Waste qty 1993 tons	%	1993 tons	%
1	A74	Waste incineration/ thermal treatment	6	11	17	10,959,285	69.4%	1,379,456	51.0%
2	A37	Spent process liquids removal	2	2	6	1,755,613	11.1%	0	0%
3	A75	Wastewater treatment	10	25	34	1,251,604	7.9%	428,483	15.8%
4	A78	Air pollution control devices	6	11	14	1,135,016	7.2%	756,714	28.0%
5	A77	Waste stabilization	2	5	9	275,795	1.7%	58,500	2.2%
6	A79	Leachate collection	5	7	9	160,916	1.0%	40,150	1.5%
7	A63	RCRA corrective action at waste mgnt unit	1	1	1	101,545	0.6%	0	0%
8	A89	Other pollution control or waste treatment NEC	7	12	27	67,363	0.4%	29,619	1.1%
9	A99	Other NEC	2	2	2	53,264	0.3%	0	0%
10	A73	Waste solvents recovery	5	8	14	20,527	0.1%	7,305	0.3%
11	A76	Waste sludge dewatering	3	3	4	12,383	0.1%	3,663	0.1%
12	A04	Flush rinsing (cleaning & degreasing)	1	1	1	1,801	0.01%	0	0%
13	A33	Product distillation	1	1	1	560	0.004%	0	0%
14	A71	Waste filtering/ screening	1	1	1	557	0.004%	557	0.02%
15	A60	Sludge removal	NA	0	0	0	0%	0	0%
16	A53	Cleanup of spill residues	NA	0	0	0	0%	0	0%
17	A38	Tank sludge removal	NA	0	0	0	0%	0	0%
18	A72	Waste/scrap metals recovery	1	1	1	0	0%	0	0%
Totals & non-duplicative counts =			14	42	89	15,796,228	100.0%	2,704,446	100.0%

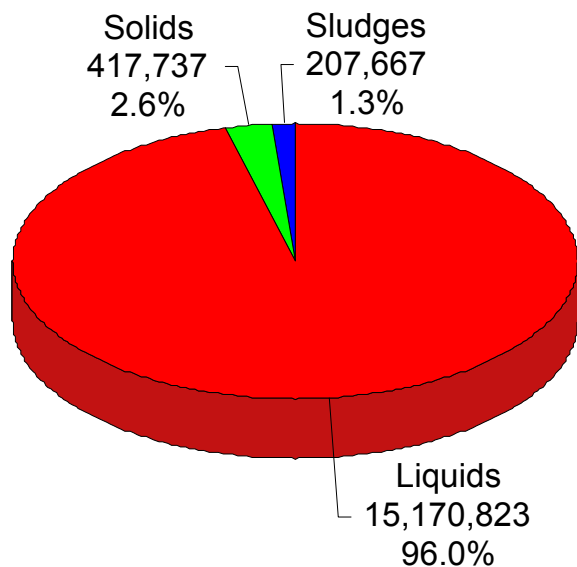
The 13 highlighted items above are types of processes/activities/sources identified in the RCRA "derived-from" rule (40 CFR 261.3(c)(2)(i)).

Part 3: Comparison 4 of 8

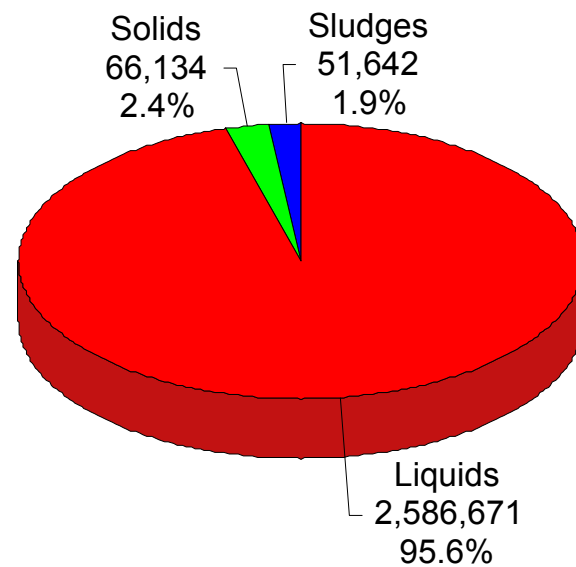
NHWCS “*derived-from*” waste data mostly represent liquids, but also represent sludges & solids

**Summary of Physical Form of RCRA "Derived-From" Wastes
(1993 waste volume proportions in million tons)**

All NHWCS "Derived-from" Data



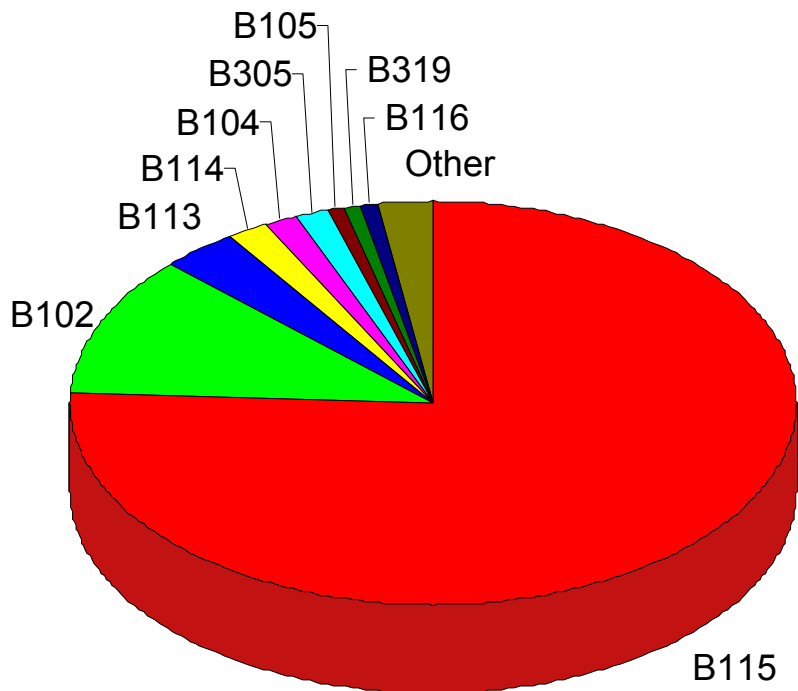
Subset of NHWCS "Derived-from" Wastes for Constituent Analysis



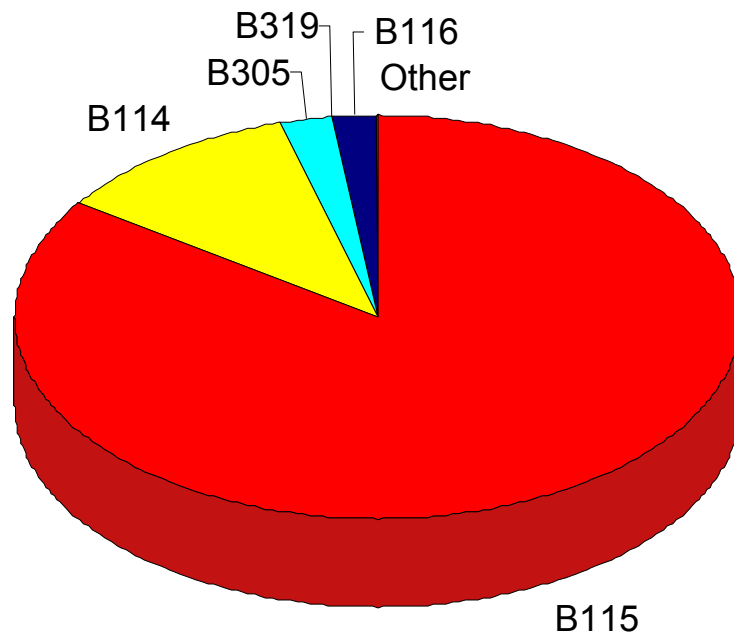
Part 3: Comparison 5 of 8
 NHWCS "*derived-from*" waste data mostly represent
 pollution control device scrubber water (B115)

**Physical Form Codes for RCRA "Derived-From" Wastes
 (proportionate 1993 waste volumes)**

All NHWCS "Derived-from" Wastes



Subset of NHWCS "Derived-from" Waste for Constituent Ar



Part 3: Comparison 5 of 8 (cont'd)

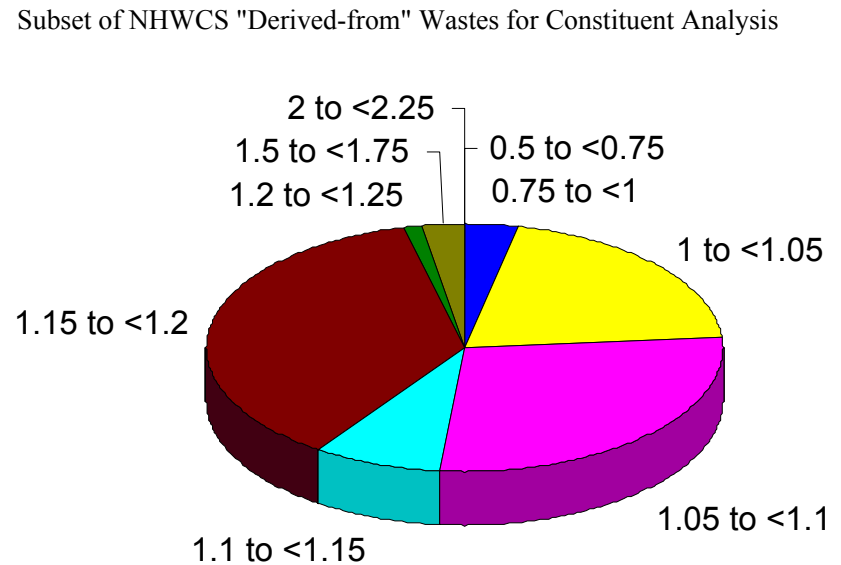
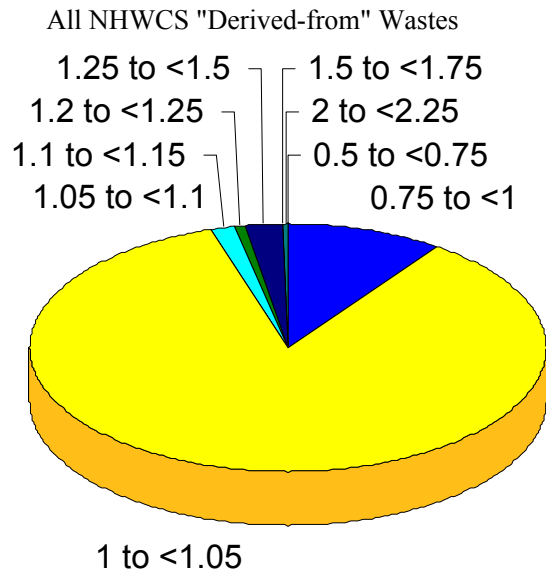
Detailed breakdown of NHWCS “*derived-from*” wastes according to physical form codes

Item	BRS Form Code	Description of Industrial Waste "Form Code"	NHWCS Database "Derived-from" Waste Universe (orig code= 5)		Subset of NHWCS "Derived-from" Wastes for constituent analysis	
			TOTWQTY	%	TOTWQTY	%
1	B101	Aqueous waste with low solvents	4,187	0.03%		
2	B102	Aqueous waste with low other toxic organics	1,785,241	11.3%		
3	B104	Spent acid without metals	232,565	1.5%		
4	B105	Acidic aqueous waste	122,591	0.8%		
5	B113	Other aqueous waste with high dissolved solids	537,499	3.4%		
6	B114	Inorganic Liquids - with low dissolved solids	288,062	1.8%	288,062	10.7%
7	B115	Inorganic Liquids - scrubber water	11,980,356	75.8%	2,208,740	81.7%
8	B116	Inorganic Liquids - leachate	114,990	0.7%	52,465	1.9%
9	B119	Other inorganic liquids	1,801	0.01%		
10	B201	Organic Liquids - concentrated solvent-water solution	5,899	0.04%	1,685	0.1%
11	B202	Halogenated solvent	26,687	0.17%		
12	B203	Organic Liquids - nonhalogenated solvent	455	0.003%	455	0.02%
13	B204	Organic Liquids - halogenated/nonhalogenated solvents	62,831	0.4%	34,784	1.3%
14	B205	Organic Liquids - oil/water emulsion	1,225	0.01%	479	0.02%
15	B206	Waste oil	6,433	0.04%		
Liquids subtotal =			15,170,823	96.0%	2,586,671	95.6%
16	B303	Inorganic Solids - ash, slag, or other residue from incineration of wastes	69,479	0.4%	5,555	0.2%
17	B305	Inorganic Solids - dry lime or metal hydroxide solids chemically "fixed"	224,293	1.4%	59,250	2.2%
18	B306	Dry" lime or metal hydroxide solids not "fixed"	2,275	0.01%		
19	B319	Inorganic Solids - other NEC	120,540	0.8%	207	0.01%
20	B409	Organic Solids - other nonhalogenated NEC	1,151	0.01%	1,122	0.04%
Solids subtotal =			417,737	2.6%	66,134	2.4%
21	B502	Lime sludge with metals/metal hydroxide sludge	12,346	0.08%		
22	B503	Inorganic Sludges - wastewater treatment sludge with toxic organics	9,171	0.06%	9,171	0.3%
23	B504	Other wastewater treatment sludge	16,740	0.1%		
24	B602	Still bottoms or nonhalogenated solvents or other organic liquids	9,567	0.06%		
25	B603	Oily sludge	73,279	0.5%		
26	B607	Organic Sludges - other NEC	86,564	0.5%	42,471	1.6%
Sludges subtotal =			207,667	1.3%	51,642	1.9%
			15,796,228	100.0%	2,704,446	100.0%

Part 3: Comparison 6 of 8

NHWCS “*derived-from*” waste data represent a wide range in waste specific gravity, and the data subset represents slightly denser waste

**Specific Gravity* of RCRA "Derived-From" Wastes
(proportions relative to 1993 waste volumes)**



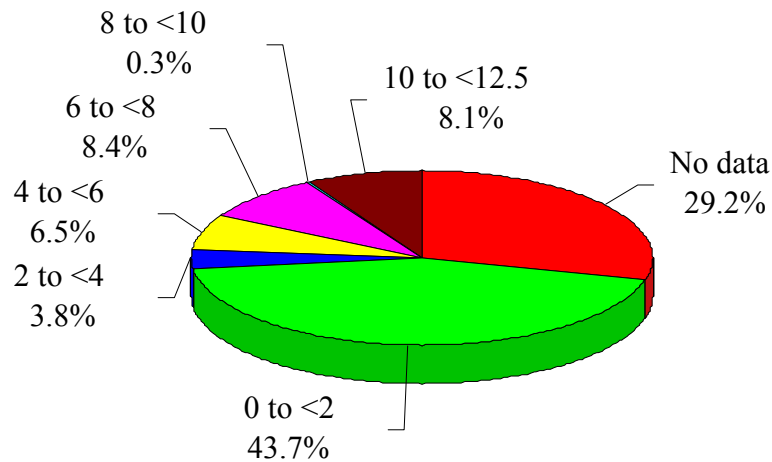
Note: "Specific Gravity" = ratio of the density of waste to the density of water (8.34 lbs/gal).

Part 3: Comparison 7 of 8

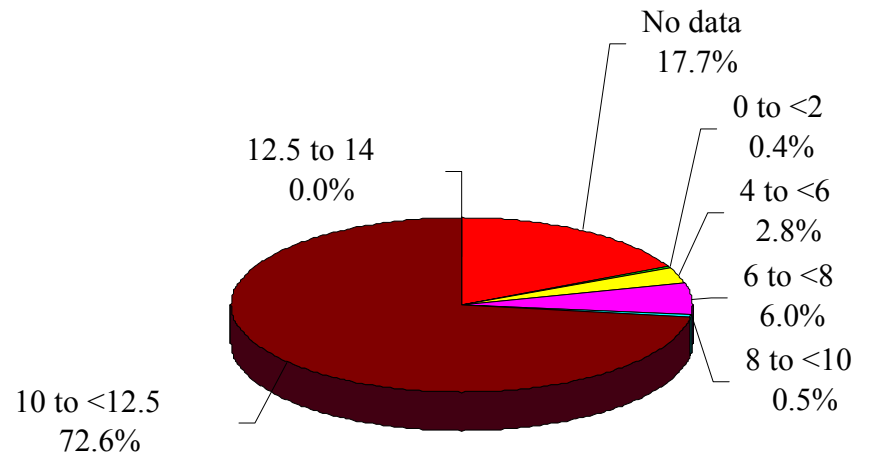
Most (62%) of the NHWCS “*derived-from*” waste volume is acidic (pH<2), but the data subset volume is mostly (88%) alkaline (pH>10)

pH of RCRA "Derived-From" Wastes (proportionate to 1993 waste volumes)

All NHWCS "Derived-from" Data



Subset of NHWCS "Derived-from" for Constituent Analysis



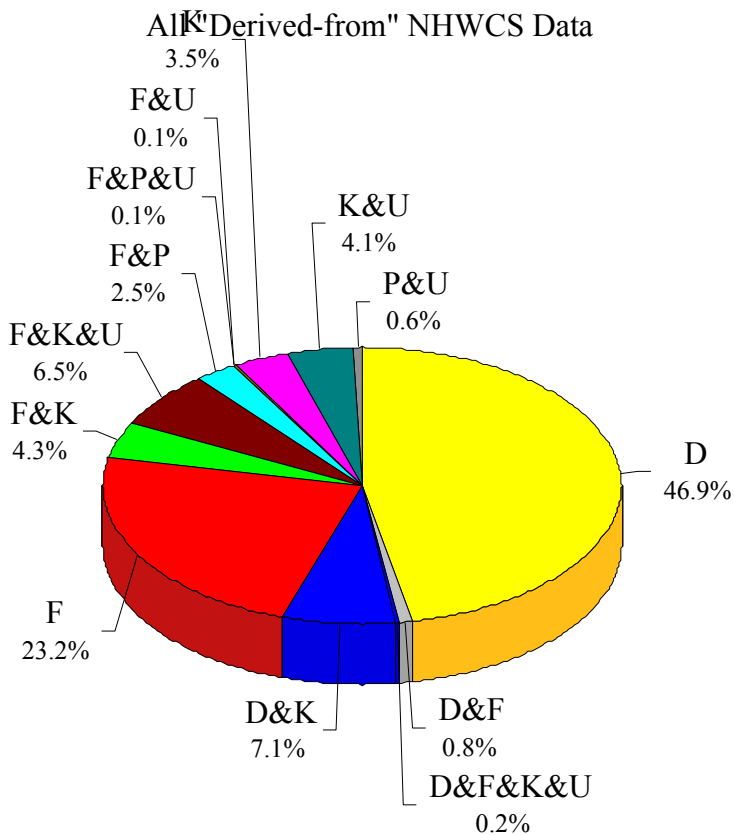
"pH" = measure of acidity and alkalinity on a scale of >0 to <14, where pH=7 represents neutrality (pure water), pH<7 acidity, pH>7 alkalinity.

As a benchmark, the acceptable pH range of aquatic ecosystems for viability is between pH = 6 to 8.

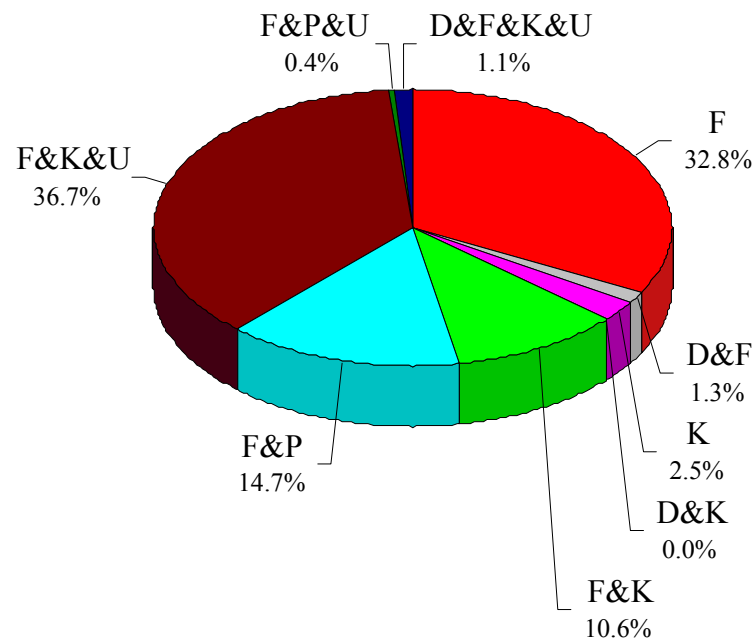
Data subset query step to exclude characteristic-only (Dxxx) waste "mixtures" effectively reduced pH<2 and pH>12.5, which is the D002 definition of corrosive wastes.

Part 3: Comparison 8 of 8
 RCRA Hazardous Wastecodes Reported for NHWCS "Derived-From" Wastes

RCRA Hazardous Wastecodes Assigned to "Derived-from" Solid Wastes
 (proportionate to 1993 waste volumes)



Subset of NHWCS "Derived-from" for Constituent Analysis



Note: RCRA wastecodes (Dxxx, Fxxx, Kxxx, Pxxx, Uxxx) are defined at 40 CFR 261 Subpart C & Subpart D.

Part 3: **Findings** of comparison of **eight characteristics** between all NHWCS “*derived-from*” waste data, to the NHWCS data subset for constituent data analysis:

Only **3 of 8** comparison attributes are similar; subset **representativeness not assured**

<u>Waste Attribute</u>	NHWCS <u>Drvd-from</u>	<u>Relative waste volume (1993)</u>	
		<u>All d-f %</u>	<u>Subset%</u>
1. Economic sectors	SIC = 2899	44%	0%
2. Origin states	MI	44%	0.2%
3. Process sources	Thermal treatment	69%	51%
4. Physical forms	Liquid	96%	96%
5. Form codes	Scrubber water	76%	82%
6. Spec. gravity	1.00 to 1.05	85%	20%
7. pH	0 to <2	62%	0.5%*
8. RCRA haz codes	Dxxx	55%	0%*

* Data subset query step to exclude characteristic-only (Dxxx) “derived-from” wastes effectively resulted in excluding most pH<2 and pH>12.5 wastes, which is the D002 definition of corrosive wastes, as well as Dxxx wastes from data subset.

Part 3: NHWC survey participant descriptions of NHWCS “*derived-from*” wastes in NHWCS data subset for constituent analysis (19 of 36 provided descriptions)

- WASTE FLAMMABLE LIQUIDS & SOLIDS FROM FUEL BLENDING
- STABILIZED MATERIAL
- SCRUBBER SLURRY GENERATED FROM INCINERATOR OFF-GAS WET SCRUBBER
- BIOLOGICAL TREATMENT SLUDGE
- CONCENTRATED SOLVENT/WATER WASTE FROM SOLVENT RECOVERY
- NON-HALOGENATED SOLVENT WASTE FROM SOLVENT RECOVERY OPERATION
- BIOLOGICAL TREATMENT SLUDGE FOR ONSITE LIQUIDS INCINERATION
- SCRUBBER WATER FROM INCINERATION OF LIQUID HAZARDOUS WASTE
- TOXIC, CORROSIVE SCRUBBER WATER FROM ABSORPTION SYSTEM
- ASH FROM INCINERATION OF WASTE
- PARTICULATES FROM INCINERATION OF WASTES
- LEACHATE AND RUNOFF FROM HAZARDOUS WASTE LANDFILL OPERATION
- WASTEWATER TREATMENT PLANT FILTER CAKE
- SLUDGE FROM WASTEWATER TREATMENT PLANT
- API SEPARATOR SLUDGE
- ORGANICS, WATER INSOLUBLE
- OIL & WATER SLUDGE
- WASTEWATER BASIN SLUDGE
- ASH FROM INCINERATION OF SOLVENTS/SLUDGE IN FLUID BED INCINERATOR

Part 3: Identity of chemical constituents in NHWCS “*derived-from*” wastes

- Chemical constituents* >0 ppm reported in:
 - 25 of the 36 “derived-from” subset wastestreams (69%)
 - 2.67 million of the 2.70 million tons/year subset (**99%**)
 - 13 of the 16 “derived-from” subset facilities (81%)
- 610 reported instances (data items) of constituents* >0 ppm
- **175 different chemical constituents*** reported in “derived-from” wastes >0 ppm
- Number of constituents* >0 ppm per subset wastestream:
 - Mean = 25
 - Median = 24
 - Standard deviation = 25
 - Min = 1
 - Max = 113

* Five data instances of water as constituent excluded from statistical profile.
Instances include count of wholewaste and/or leachate concentrations if >0ppm.

Part 3: Identity of 175 chemical constituents in NHWCS “*derived-from*” wastes (if >0ppm)

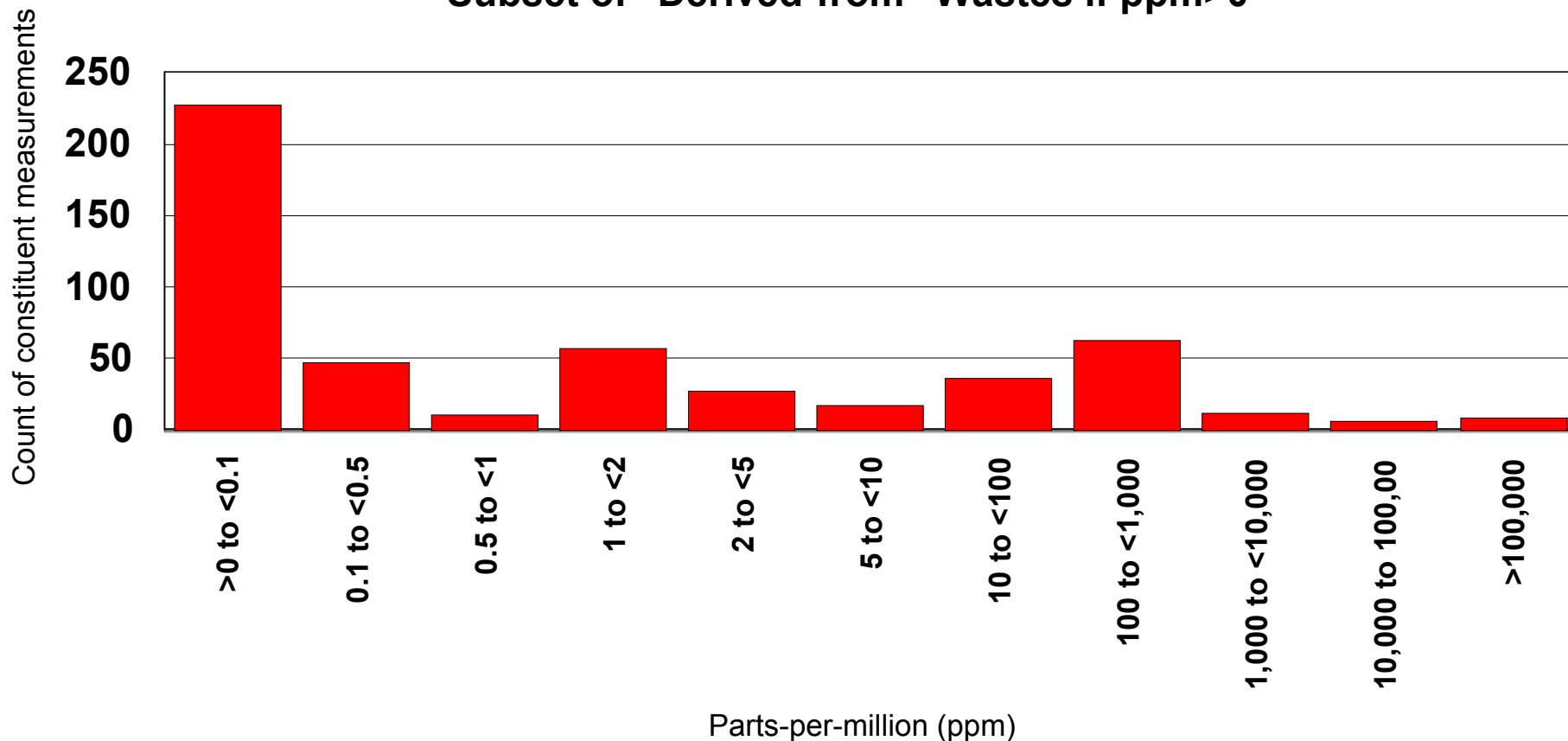
1	627-22-5	1-Chloro-1,3-butadiene	60	56-55-3	Benzo[a]anthracene	119	7439-96-5	Manganese
2	75-34-3	1,1-Dichloroethane [Ethylene dichloride]	61	7440-41-7	Beryllium	120	7439-97-6	Mercury
3	75-35-4	1,1-Dichloroethene [Vinylidene chloride]	62	111-91-1	Bis-(2-chloroethoxy)methane [Dichloromethane]	121	67-56-1	Methanol [Methyl alcohol]
4	71-55-6	1,1,1-Trichloroethane [Methylchloroform]	63	111-44-4	Bis(2-chloroethyl) ether [Dichloroethyl ether]	122	72-43-5	Methoxychlor
5	630-20-6	1,1,1,2-Tetra chloroethane	64	39638-32-9	Bis(2-chloroisopropyl) ether [2,2'-Oxybis(2-chloropropane)]	123	78-93-3	Methyl ethyl ketone [2-Butanone][MEK]
6	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane [Freon 113]	65	117-81-7	Bis(2-ethylhexyl) phthalate [Di-2-ethylhexyl phthalate]	124	108-10-1	Methyl isobutyl ketone [Hexone][4-Methyl-2-pentanone]
7	79-00-5	1,1,2-Trichloroethane [Vinyl trichloride]	66	75-27-4	Bromodichloromethane [Dichlorobromomethane]	125	80-62-6	Methyl methacrylate
8	79-34-5	1,1,2,2-Tetra chloroethane	67	75-25-2	Bromoform [Tribromomethane]	126	75-09-2	Methylene chloride [Dichloromethane]
9	95-50-1	1,2-Dichlorobenzene [o-Dichlorobenzene]	68	74-83-9	Bromomethane [Methyl bromide]	127	71-36-3	n-Butyl alcohol [n-Butanol]
10	107-06-2	1,2-Dichloroethane [Ethylene dichloride]	69	85-68-7	Butyl benzyl phthalate	128	109-65-9	n-Butyl bromide
11	78-87-5	1,2-Dichloropropane [Propylene dichloride]	70	7440-43-9	Cadmium	129	142-82-5	n-Heptane
12	120-82-1	1,2,4-Trichlorobenzene	71	10043-52-4	Calcium chloride	130	110-54-3	n-Hexane
13	541-73-1	1,3-Dichlorobenzene [m-Dichlorobenzene]	72	75-15-0	Carbon disulfide	131	621-64-7	N-Nitrosodipropylamine [Di-n-propyl nitrosamine]
14	542-75-6	1,3-Dichloropropane [1,3-Dichloro-1-propanol]	73	56-23-5	Carbon tetrachloride	132	86-30-6	N-Nitrosodiphenylamine [Diphenyl nitrosamine]
15	764-41-0	1,4-Dichloro-2-butene, mixed isomers	74	57-74-9	Chlordane	133	91-20-3	Naphthalene
16	106-46-7	1,4-Dichlorobenzene [p-Dichlorobenzene]	75	108-90-7	Chlorobenzene	134	7440-02-0	Nickel
17	123-91-1	1,4-Dioxane [1,4-Dioxolane oxide]	76	75-00-3	Chloroethane [Ethyl chloride]	135	98-95-3	Nitrobenzene
18	91-58-7	2-Chloronaphthalene [beta-Chloronaphthalene]	77	67-66-3	Chloroform	136	127-19-5	N,N'-Dimethylacetamide
19	95-57-8	2-Chlorophenol [o-Chlorophenol]	78	74-87-3	Chloromethane [Methyl chloride]	137	95-48-7	o-Cresol [2-Methylphenol]
20	110-80-5	2-Ethoxyethanol [Ethylene glycol monoethyl ether]	79	126-99-8	Chloroprene [2-Chloro-1,3-butadiene]	138	59-50-7	p-Chloro-m-cresol
21	591-78-6	2-Hexanone	80	25168-05-2	Chlorotoluene, mixed isomers	139	106-47-8	p-Chloroaniline [4-Chloroaniline]
22	91-57-6	2-Methylnaphthalene	81	7440-47-3	Chromium	140	106-44-5	p-Cresol [4-Methylphenol]
23	88-74-4	2-Nitroaniline [o-Nitroaniline]	82	218-01-9	Chrysene	141	27323-18-8	PCB's
24	88-75-5	2-Nitrophenol [o-Nitrophenol]	83	10061-01-5	cis-1,3-Dichloropropylene [cis-1,3-Dichloro-1-propene]	142	87-86-5	Pentachlorophenol [PCP]
25	67-63-0	2-Propanol [Isopropyl alcohol][Isopropanol]	84	7440-48-4	Cobalt	143	62-44-2	Phenacetin
26	94-75-7	2,4-D [2,4-Dichlorophenoxyacetic acid]	85	7440-50-8	Copper	144	85-01-8	Phenanthrene
27	120-83-2	2,4-Dichlorophenol	86	93-51-6	Cresol [2-Methoxy-p-cresol]	145	108-95-2	Phenol
28	105-67-9	2,4-Dimethylphenol	87	1319-77-3	Cresols, mixed isomers	146	2807-30-9	Propylcellulose
29	51-28-5	2,4-Dinitrophenol	88	57-12-5	Cyanides	147	129-00-0	Pyrene
30	121-14-2	2,4-Dinitrotoluene	89	108-94-1	Cyclohexanone	148	110-86-1	Pyridine
31	95-95-4	2,4,5-Trichlorophenol	90	117-84-0	Di-n-octyl phthalate	149	72-55-9	p,p'-DDE [p,p'-TDE]
32	88-06-2	2,4,6-Trichlorophenol	91	132-64-9	Dibenzofuran	150	50-29-3	p,p'-DDT
33	606-20-2	2,6-Dinitrotoluene	92	53-70-3	Dibenz(a,h)anthracene	151	7782-49-2	Selenium
34	99-09-2	3-Nitroaniline [m-Nitroaniline]	93	124-48-1	Dibromochloromethane [Chlorodibromomethane]	152	7440-22-4	Silver
35	91-94-1	3,3'-Dichlorobenzidine	94	84-66-2	Diethyl phthalate	153	93-72-1	Silver x [2,4,5-Trichlorophenoxypropionic acid]
36	64037-54-3	3,4-Dichlorobutene-1	95	131-11-3	Dimethyl phthalate	154	7647-14-5	Sodium chloride
37	101-55-3	4-Bromophenylphenylether [p-Bromodiphenylether]	96	959-98-8	Endosulfan I [alpha-Endosulfan]	155	143-33-9	Sodium cyanide
38	7005-72-3	4-Chlorophenylphenylether	97	72-20-8	Endrin	156	1310-73-2	Sodium hydroxide
39	100-01-6	4-Nitroaniline [p-Nitroaniline][4-Nitrobenzenamine]	98	64-17-5	Ethanol [Ethyl alcohol]	157	3810-74-0	Streptomycin sulfate
40	100-02-7	4-Nitrophenol [p-Nitrophenol]	99	141-78-6	Ethyl acetate	158	100-42-5	Styrene [Vinylbenzene][Phenylethylene]
41	534-52-1	4,6-Dinitro-o-cresol [4,6-Dinitro-2-methylphenol]	100	60-29-7	Ethylether [Ethane, 1,1'-oxybis]	159	18496-25-8	Sulfide
42	83-32-9	Acenaphthene	101	100-41-4	Ethylbenzene	160	127-18-4	Tetra chloroethene [Perchloroethene]
43	208-96-8	Acenaphthylene	102	206-44-0	Fluoranthene	161	109-99-9	Tetrahydrofuran
44	67-64-1	Acetone [2-Propanone]	103	86-73-7	Fluorene	162	7440-28-0	Thallium
45	75-05-8	Acetonitrile [Methyl cyanide]	104	76-44-8	Heptachlor	163	7440-31-5	Tin
46	7429-90-5	Aluminum	105	87-68-3	Hexachloro-1,3-butadiene [Hexachlorobutadiene]	164	108-88-3	Toluene [Methylbenzene]
47	628-63-7	Amly acetate	106	118-74-1	Hexachlorobenzene	165	8001-35-2	Toxaphene [Chlorinated camphene]
48	120-12-7	Anthracene	107	77-47-4	Hexachlorocyclopentadiene	166	10061-02-6	trans-1,3-Dichloropropylene [trans-1,3-Dichloropropene]
49	7440-36-0	Antimony	108	67-72-1	Hexachloroethane	167	79-01-6	Trichloroethene
50	12672-29-6	Aroclor 1248 [PCB 1248]	109	74-90-8	Hydrogen cyanide [Hydrocyanic acid]	168	75-69-4	Trichlorofluoromethane [Trichloromonofluoroethane]
51	7440-38-2	Arsenic	110	7783-06-4	Hydrogen sulfide	169	7440-62-2	Vanadium
52	7440-39-3	Barium	111	193-39-5	Indeno(1,2,3-cd)pyrene	170	108-05-4	Vinyl acetate
53	71-43-2	Benzene	112	74-88-4	lodomethane [Methyl iodide]	171	75-01-4	Vinyl chloride [Chloroethene][Ethylene Chloride]
54	65-85-0	Benzoic acid	113	7439-89-6	Iron	172	1330-20-7	Xylenes, mixed isomers [Xylenes, total]
55	50-32-8	Benzo(a)pyrene	114	78-83-1	Isobutyl alcohol	173	7440-66-6	Zinc
56	205-99-2	Benzo(b)fluoranthene	115	78-59-1	Isophorone	174	No CASRN	**OTHER UNSPECIFIED ORGANICS
57	207-08-9	Benzo(k)fluoranthene	116	7439-92-1	Lead	175	No CASRN	**UNSPECIFIED HYDROCARBONS
58	191-24-2	Benzo[g,h,i]perylene	117	58-89-9	Lindane [gamma-Hexachlorocyclohexane][gamma-BHC]			
59	100-51-6	Benzyl alcohol	118	108-39-4	m-Cresol [3-Methylphenol]			

Part 3: Identity of constituents >100ppm by weight in NHWCS “*derived-from*” wastes
 (94 wholewaste constituent instances >100ppm, of the 610 NHWCS data instances >0ppm)

Item	CAS	CONSTITUENT	CONC (ppm)	Item	CAS	CONSTITUENT	CONC (ppm)
1	142-82-5	n-Heptane	950,000	48	71-43-2	Benzene	550
2	75-09-2	Methylene chloride [Dichloromethane]	200,000	49	67-66-3	Chloroform	550
3	67-64-1	Acetone [2-Propanone]	200,000	50	64-17-5	Ethanol [Ethylalcohol]	550
4	108-88-3	Toluene [Methylbenzene]	200,000	51	25168-05-2	Chlorotoluene, mixed isomers	550
5	67-56-1	Methanol [Methylalcohol]	200,000	52	67-63-0	2-Propanol [Isopropylalcohol][Isopropanol]	550
6	7647-14-5	Sodium chloride	170,000	53	67-56-1	Methanol [Methylalcohol]	550
7	No CASRN	**OTHER ORGANICS	120,000	54	64-17-5	Ethanol [Ethylalcohol]	550
8	No CASRN	**OTHER ORGANICS	120,000	55	628-63-7	Amylacetate	550
9	109-65-9	n-Butyl bromide	50,000	56	3810-74-0	Streptomycin sulfate	550
10	10043-52-4	Calcium chloride	25,000	57	67-56-1	Methanol [Methylalcohol]	550
11	10043-52-4	Calcium chloride	25,000	58	127-19-5	N,N'-Dimethylacetamide	550
12	1310-73-2	Sodium hydroxide	20,000	59	628-63-7	Amylacetate	550
13	100-41-4	Ethylbenzene	15,000	60	110-54-3	n-Hexane	550
14	1330-20-7	Xylenes, mixed isomers [Xylenes, total]	12,000	61	60-29-7	Ethylether [Ethane 1,1'-oxybis]	550
15	108-88-3	Toluene [Methylbenzene]	6,000	62	107-06-2	1,2-Dichloroethane [Ethylene dichloride]	550
16	78-93-3	Methyl ethyl ketone [2-Butanone][MEK]	5,000	63	108-10-1	Methylisobutyl ketone [Hexone][4-Methyl-2-pentanone]	550
17	67-64-1	Acetone [2-Propanone]	5,000	64	109-99-9	Tetrahydrofuran	550
18	143-33-9	Sodium cyanide	5,000	65	108-88-3	Toluene [Methylbenzene]	550
19	143-33-9	Sodium cyanide	5,000	66	127-19-5	N,N'-Dimethylacetamide	550
20	7439-96-5	Manganese	4,870	67	1330-20-7	Xylenes, mixed isomers [Xylenes, total]	550
21	7440-66-6	Zinc	3,070	68	3810-74-0	Streptomycin sulfate	550
22	7440-39-3	Barium	2,618	69	141-78-6	Ethylacetate	550
23	108-10-1	Methylisobutyl ketone [Hexone][4-Methyl-2-pentanone]	2,500	70	142-82-5	n-Heptane	550
24	75-09-2	Methylene chloride [Dichloromethane]	2,500	71	25168-05-2	Chlorotoluene, mixed isomers	550
25	7440-22-4	Silver	1,489	72	74-87-3	Chloromethane [Methylchloride]	500
26	100-42-5	Styrene [Vinylbenzene][Phenylethylene]	1,200	73	75-69-4	Trichlorofluoromethane [Trichloromonofluoromethane]	500
27	No CASRN	**UNSPECIFIED HYDROCARBONS	1,000	74	7440-50-8	Copper	308
28	1330-20-7	Xylenes, mixed isomers [Xylenes, total]	550	75	7439-92-1	Lead	296
29	109-99-9	Tetrahydrofuran	550	76	7440-36-0	Antimony	283
30	108-88-3	Toluene [Methylbenzene]	550	77	7440-66-6	Zinc	260
31	110-54-3	n-Hexane	550	78	108-90-7	Chlorobenzene	250
32	75-09-2	Methylene chloride [Dichloromethane]	550	79	71-43-2	Benzene	250
33	108-10-1	Methylisobutyl ketone [Hexone][4-Methyl-2-pentanone]	550	80	56-23-5	Carbon tetrachloride	250
34	107-06-2	1,2-Dichloroethane [Ethylene dichloride]	550	81	71-55-6	1,1,1-Trichloroethane [Methylchloroform]	250
35	78-93-3	Methyl ethyl ketone [2-Butanone][MEK]	550	82	127-18-4	Tetrachloroethylene [Perchloroethylene]	250
36	75-05-8	Acetonitrile [Methylcyanide]	550	83	67-66-3	Chloroform	250
37	71-43-2	Benzene	550	84	107-06-2	1,2-Dichloroethane [Ethylene dichloride]	250
38	67-66-3	Chloroform	550	85	75-15-0	Carbon disulfide	250
39	67-64-1	Acetone [2-Propanone]	550	86	79-00-5	1,1,2-Trichloroethane [Vinyltrichloride]	250
40	67-63-0	2-Propanol [Isopropylalcohol][Isopropanol]	550	87	79-01-6	Trichloroethylene	250
41	141-78-6	Ethylacetate	550	88	7440-47-3	Chromium	130
42	60-29-7	Ethylether [Ethane 1,1'-oxybis]	550	89	85-01-8	Phenanthrene	120
43	142-82-5	n-Heptane	550	90	2807-30-9	Propylcellulose	100
44	67-64-1	Acetone [2-Propanone]	550	91	No CASRN	**UNSPECIFIED ORGANICS	100
45	78-93-3	Methyl ethyl ketone [2-Butanone][MEK]	550	92	No CASRN	**UNSPECIFIED ORGANICS	100
46	75-09-2	Methylene chloride [Dichloromethane]	550	93	7440-66-6	Zinc	100
47	75-05-8	Acetonitrile [Methylcyanide]	550	94	7440-66-6	Zinc	100

Part 3: Chemical constituent concentration distribution for NHWCS “*derived-from*” wastes

Summary Profile of Chemical Constituent Concentrations
 Subset of "Derived-from" Wastes if ppm>0



Note: Based on 511 constituent measurements >0ppm wholewaste concentration.

Part 3: Statistical summary of chemical constituent **concentrations** (measured as wholewaste ppm) in NHWCS “*derived-from*” wastes

- Number of data instances (>0 ppm) = 511*
- Minimum = 0.00003 ppm
- Maximum = 950,000 ppm
- Average (simple mean) = 4,664 ppm
- Standard deviation = 46,687 ppm
- Weighted mean = 736 ppm
(weighted by respective tons of wastestream quantities)
- Median = 0.3 ppm

* Note: This summary does not include NHWCS “derived-from” waste constituent concentrations measured on a leachate test basis.

Part 3: Evaluation of the degree of “*intrinsic hazard*”
of constituents measured in NHWCS “*derived-from*” wastes
(97 of the 175 constituents (55%) reported in “derived-from” wastes have PBT data)

SUMMARY OF PBT CHARACTERISTICS (PERSISTANCE, BIOACCUMULATION, TOXICITY) FOR 97 OF THE 175 CHEMICAL CONSTITUENTS REPORTED IN NHWCS "DERIVED-FROM" WASTES											
A. COMPOSITE RANK			B. HUMAN CANCER TOXICITY			C. HUMAN DISEASE TOXICITY			D. ECOLOGICAL TOXICITY		
Composite degree of concern	Count of constits	%	Human cancer toxicity	Count of constits	%	Human other disease toxicity	Count of constits	%	Ecological toxicity	Count of constits	%
9 (high concern)	26	27%	A	5	8%	3	21	28%	3	68	71%
8	11	11%	B	27	41%	2	37	50%	2	21	22%
7	29	30%	C	12	18%	1	16	22%	1	7	7%
6	22	23%	D	22	33%						
5	4	4%									
4	5	5%									
3 (low concern)	0	0%									
Subtotal w/data=	97	100%	Subtotal w/data=	66	100%	Subtotal w/data=	74	100%	Subtotal w/data=	96	100%
% of 97 constits=	100%		% of 97 constits=	68%		% of 97 constits=	76%		% of 97 constits=	99%	

Explanatory Notes:

- (a) "Composite" = highest score of "human concern" or of "ecological concern" scores, which are based on four separate PBT assessment indicator scores (9= highest, 3= lowest).
- (b) Human cancer toxicity = Human carcinogenicity "weight-of-evidence" (WOE) scores:

A= highest WOE (known human carcinogen)	C= medium WOE (possible human carcinogen)
B = high WOE (probable human carcinogen)	D= low WOE (not sufficient data to classify carcinogenicity)
- (c) Human disease toxicity = Based on RfDs (reference dosages), RfCs (reference concentrations), and other numerical indicators of potential to produce other non-cancer diseases (i.e. 1= temporary, 2= permanent, 3= life-threatening adverse health effects).
- (d) Ecological toxicity = based only on numerical indicators for aquatic ecosystem toxicity (3= highest, 2=medium, 1= low toxicity).
- (e) "Constits = constituents (chemicals) in waste.
- (f) Source: PBT scores database on approximately 1,300 chemicals, published by the EPA Office of Solid Waste: USEPA "Waste Minimization Prioritization Tool Spreadsheet Document for the RCRA Waste Minimization PBT Chemical List Docket" (RCRA Docket nr. F-98-MMLP-FFFFF), released to the public in the 09 Nov 1998 Federal Register, Vol.63, Nr.216, pp. 60332-60343).
The 1,319 PBT database chemicals represent a subset of chemicals which have complete PBT score data; chemicals not appearing in the PBT database may still be of potential concern, but have not been completely evaluated for all potential PBT effects.

Part 4

Findings of NHWCS Database Queries for RCRA Hazardous Waste “*Mixtures*”

Part 4: **Database query criteria** applied for extracting constituent data for NHWCS waste “*mixtures*” (3 data query steps)

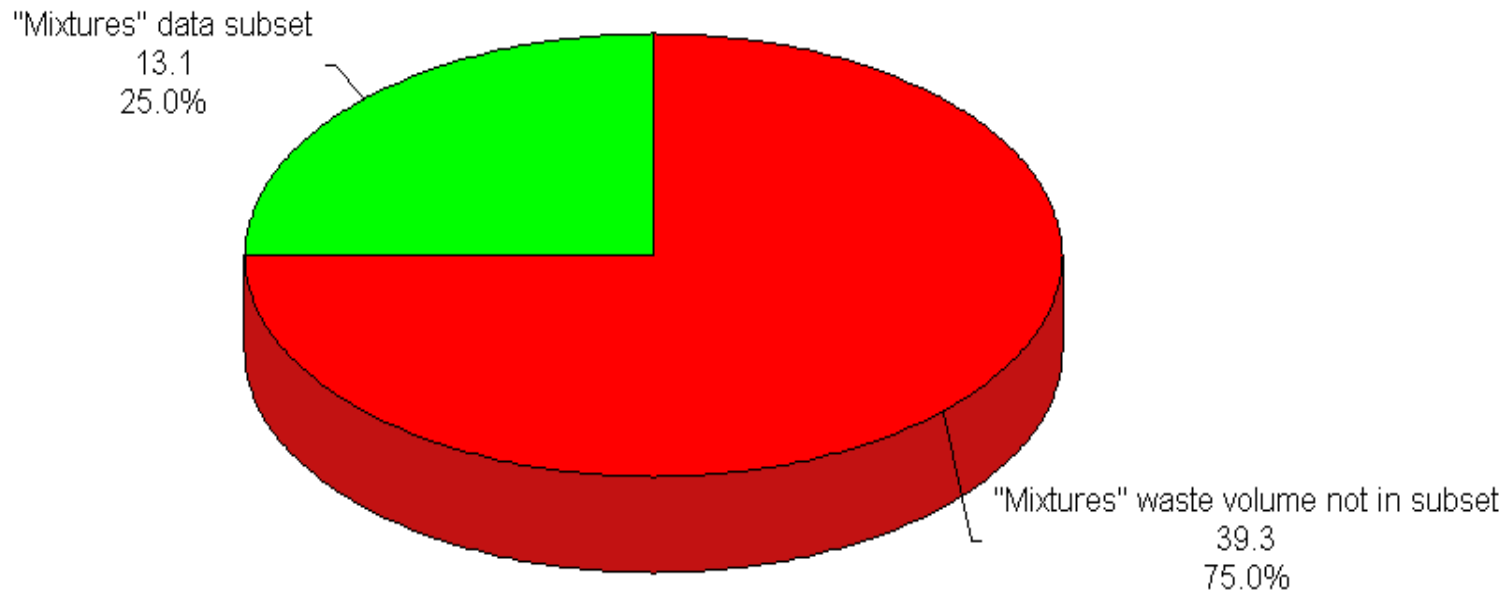
- **Data query steps** applied to ensure that constituent data extracted from the NHWCS database represents only waste “*mixtures*”
- Three data query steps to obtain “*mixtures*” constituent data:
 - Include waste constituent concentration **point-of-measurement (concentration) codes* = 3 or 4**
 - POM = 3: after mixing with non-hazardous wastes only
 - POM = 4: after mixing with other hazardous and non-hazardous wastes
 - Exclude **Dxxx characteristic-only** wastecodes.
(which become exempt from M&DF rules upon decharacterization)
 - Remove wastestreams with “0 tons” survey-corrected responses.

* Note: NHWCS mixtures coded POM=2, involving only hazardous wastes, have been excluded from this analysis.⁵⁶

Part 4: Resultant volume of NHWCS waste for constituent data analysis, after applying data query steps to NHWCS waste “*mixtures*”

NHWCS Waste "Mixtures" Quantities and Data Subset for Constituent Analysis

(1993 NHWCS waste quantities in million tons)



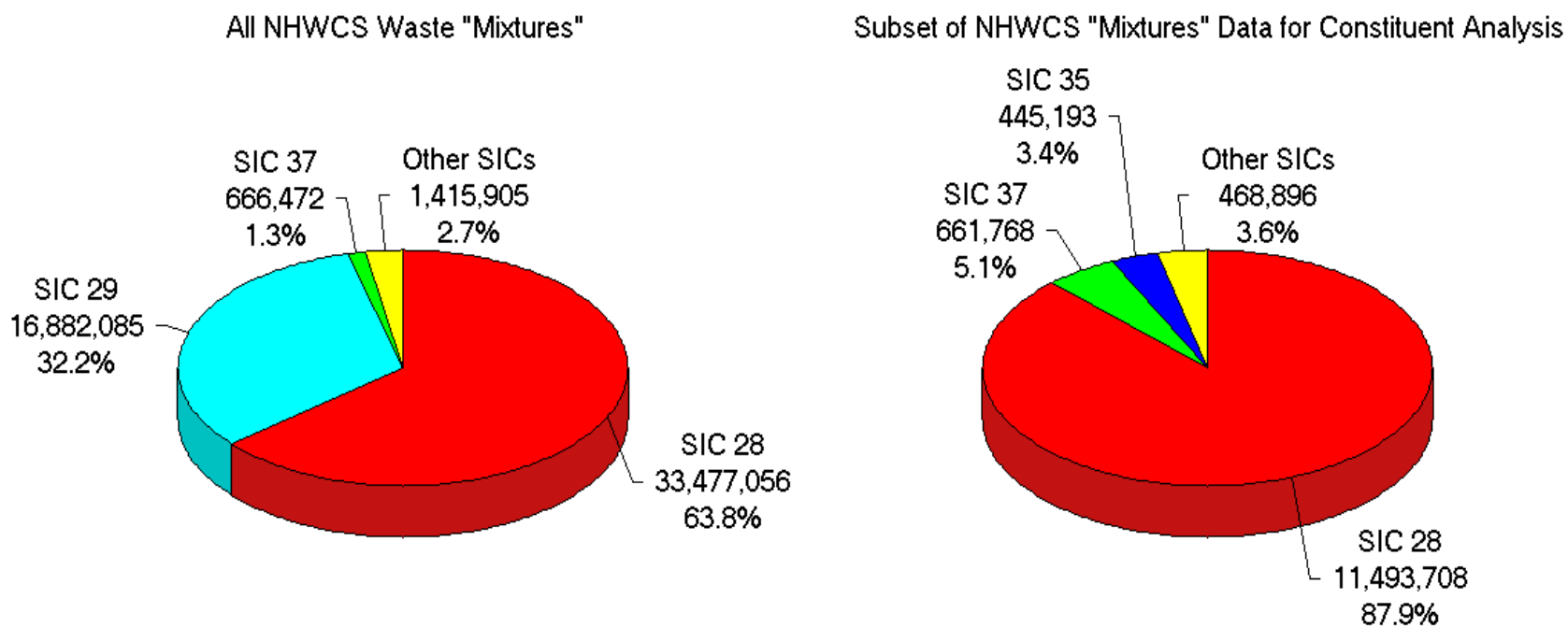
Part 4: Comparison of **Eight Characteristics** Between the NHWCS Database on Waste “*Mixtures*”, to the NHWCS Data Subset for Constituent Analysis

1. **Economic sectors** which generated mixtures
2. **States** which generated mixtures
3. **Industrial process sources** of waste mixtures
4. **Physical category** of waste mixtures
5. **Physical form codes** for waste mixtures
6. **Specific gravity** (density) of waste mixtures
7. **pH** of waste mixtures (acidity/alkalinity)
8. **RCRA hazardous wastecodes** for mixtures

Part 4: Comparison 1 of 8

NHWCS waste “*mixtures*” were generated primarily by the chemical manufacturing (SIC 28) & petroleum refining (SIC29) sectors; only SIC28 is primarily represented in the data subset for constituent analysis

Identity of Economic Sectors Generating NHWCS Waste "Mixtures"
(1993 waste quantities in tons)



Note: Sector identification according to US Dept of Commerce 2-digit "Standard Industrial Classification" (SIC) codes.

Part 4: Comparison 1 of 8 (cont'd)

Economic Sub-Sectors Which Generated NHWCS Waste “*Mixtures*”

Rank	SIC	NAICS*	Economic Sub-Sector	NHWCS database waste "mixtures" (POMconc= 3 or 4)		Subset of NHWCS waste "mixtures" for constit analysis	
				TOTWQTY	%	TOTWQTY	%
1	28	325	Chemicals & allied products mfg	33,477,056	63.8%	11,493,708	87.9%
2	29	3241	Petroleum refining & coal products mfg	16,882,085	32.2%	87,066	0.7%
3	37	336	Transportation equipment mfg	666,472	1.3%	661,768	5.1%
4	34	332	Fabricated metal products mfg	495,311	0.9%	108,748	0.8%
5	35	333, 334	Industrial machinery & equipment mfg	445,193	0.8%	445,193	3.4%
6	49	221, 562	Electric, gas & sanitary services	253,783	0.5%	208,842	1.6%
7	36	334, 335	Electronic & other electric equipment mfg	138,286	0.3%	1,008	0.008%
8	89	512, 541, 7115	Services NEC (not elsewhere classified)	23,138	0.04%	23,138	0.2%
9	NR	None	Not reported in NHWCS database**	22,102	0.04%	17,323	0.13%
10	42	484, 493, 562	Trucking & warehousing	16,845	0.03%	16,169	0.12%
11	51	422	Wholesale trade, nondurable goods	11,371	0.022%	0	0%
12	99	None	Nonclassifiable establishments	8,616	0.016%	6,601	0.05%
13	33	331	Primary metal industries mfg	590	0.0011%	0	0%
14	46	486	Pipelines, except natural gas	445	0.0008%	0	0%
15	11	None	Miscoded in survey data (there is no SIC 11)	130	0.0002%	0	0%
16	30	316, 326	Rubber & miscellaneous plastic products mfg	94	0.0002%	0	0%
Column total =				52,441,517	100.0%	13,069,566	100.0%

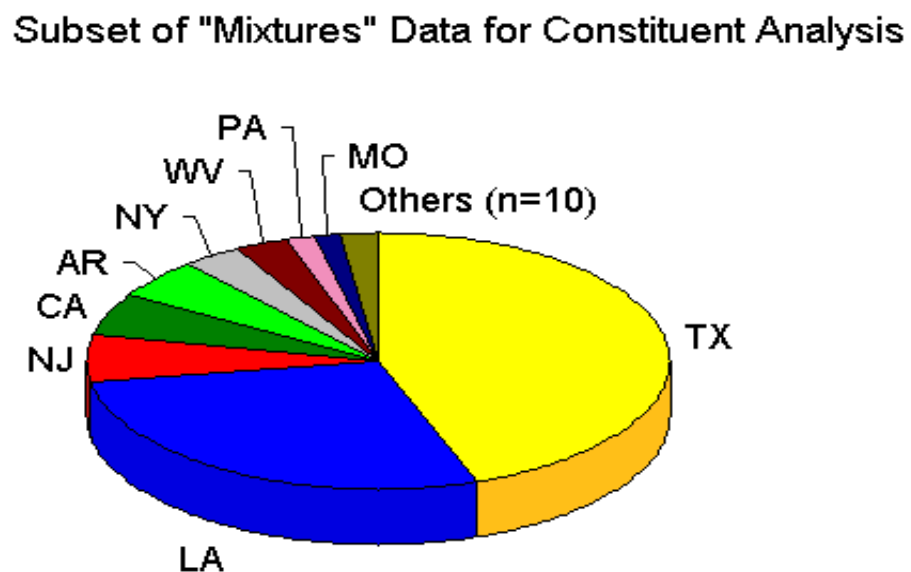
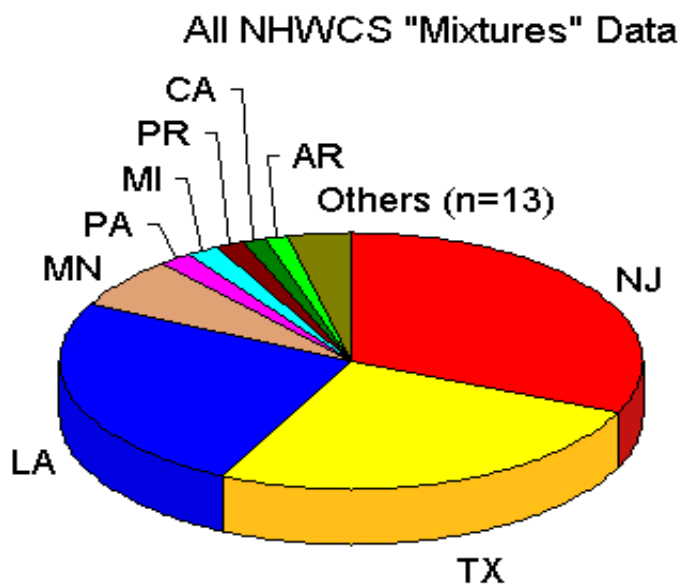
* NAICS codes shown above encompass most, but not necessarily all corresponding NAICS codes matching the 2-digit SIC code.

** NR = SIC code not preloaded on the NHWCS questionnaire by EPA, or otherwise not reported by NHWCS survey respondent.

Part 4: Comparison 2 of 8

NHWCS waste “*mixtures*” were generated in 24 states, 19 of which are represented in the data subset for constituent analysis

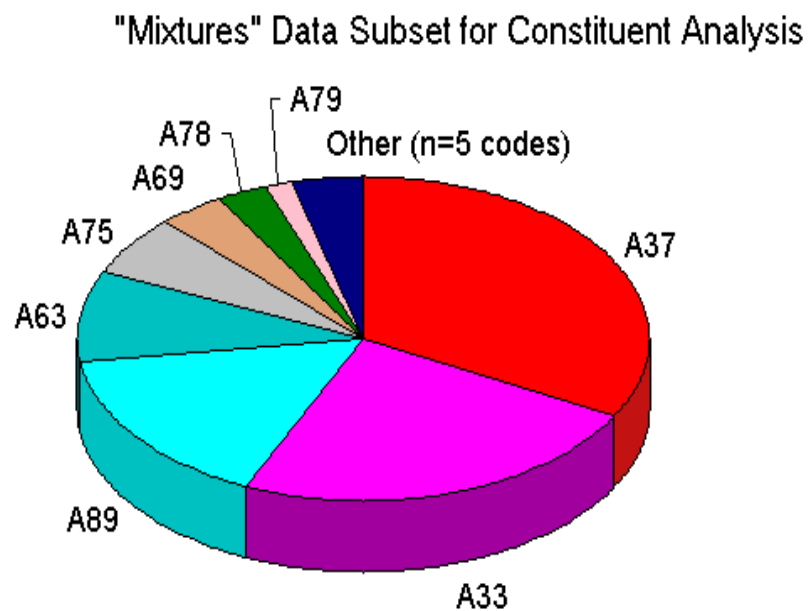
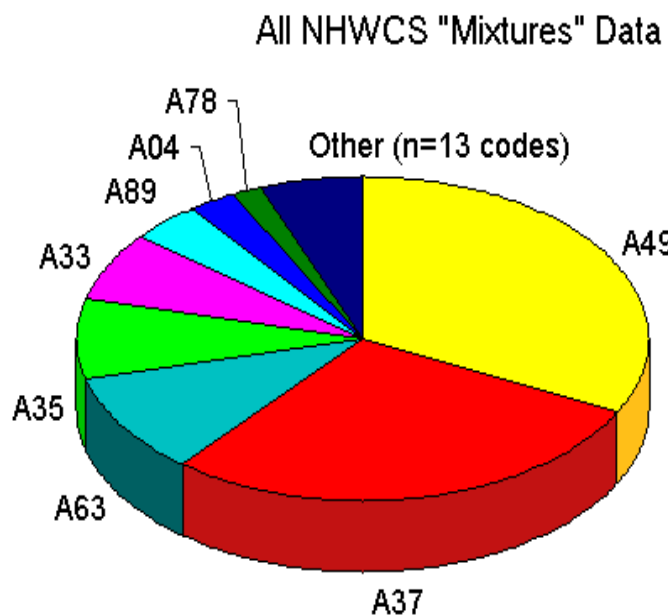
**States Which Generated NHWCS Waste "Mixtures"
(1993 NHWCS waste quantity proportions)**



Part 4: Comparison 3 of 8

NHWCS waste “*mixtures*” data represent wastes generated by 21 sources, 14 of which are included in the NHWCS data subset for constituent analysis

Industrial Process/Activity Sources of NHWCS Waste "Mixtures"
 (1993 NHWCS waste quantity proportions)



Part 4: Comparison 3 of 8 (cont'd)

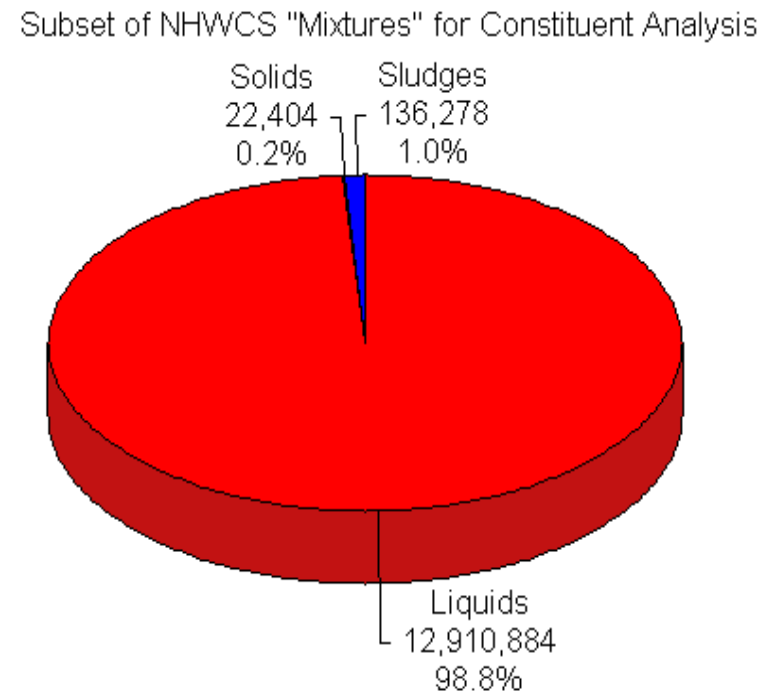
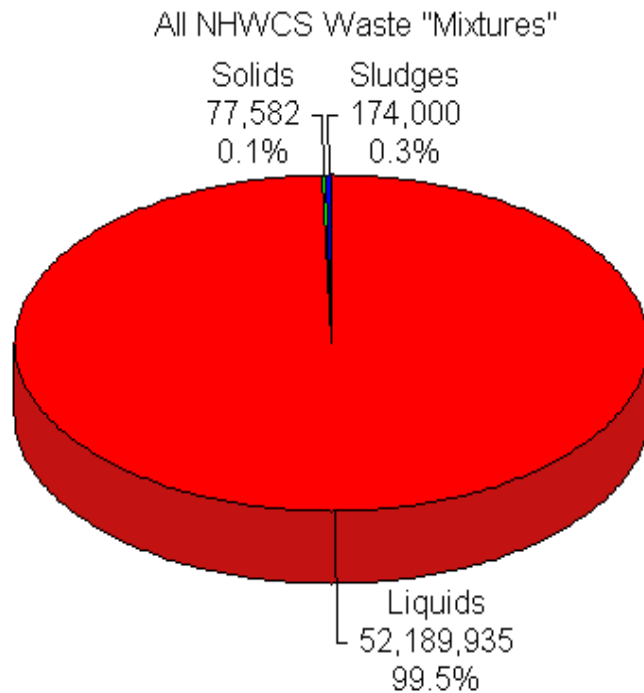
Detailed list of source codes for all NHWCS waste “*mixtures*”, and for the NHWCS data subset for constituent analysis

			NHWCS Database for Waste "Mixtures": (Based on database query POMconc = 3 or 4)					Subset of NHWCS "Mixtures" Waste Data for constituent analysis	
Item	Source code	Description of Industrial Waste "Source Code"	4-digit SIC codes	TSDR facilities	Waste- streams	Waste qty (1993 tons)	%	(1993 tons)	%
1	A49	Other processes other than surface preparation	6	3	6	17,089,761	32.6%	165,665	1.3%
2	A37	Spent process liquids removal	4	4	20	14,840,350	28.3%	4,310,879	33.0%
3	A63	RCRA corrective action at solid waste mngt unit	2	2	4	5,217,202	9.9%	1,213,226	9.3%
4	A35	By-product processing	5	3	6	4,324,754	8.2%	9,181	0.1%
5	A33	Product distillation	7	3	10	3,568,974	6.8%	3,113,668	23.8%
6	A89	Other pollution control or waste treatment process	4	3	6	2,064,520	3.9%	2,064,520	15.8%
7	A04	Flush rinsing	3	3	3	1,402,977	2.7%	892	0.01%
8	A78	Air pollution control devices	2	1	2	898,219	1.7%	378,302	2.9%
9	A75	Wastewater treatment	8	5	8	882,326	1.7%	780,145	6.0%
10	A51	Leak collection	1	1	1	519,915	1.0%	0	0%
11	A69	Other remediation	1	1	1	481,768	0.9%	481,768	3.7%
12	A19	Other cleaning & degreasing process	1	1	1	386,563	0.7%	0	0%
13	A79	Leachate collection	2	1	2	194,016	0.4%	194,016	1.5%
14	A31	Product rinsing	2	2	2	183,955	0.4%	183,955	1.4%
15	A22	Electroplating	1	1	1	107,777	0.21%	107,777	0.8%
16	N/A	Not specified	12	16	45	100,367	0.19%	65,572	0.5%
17	A01	Stripping (cleaning & degreasing)	1	1	1	97,257	0.19%	0	0%
18	A02	Acid cleaning	1	1	1	40,020	0.08%	0	0%
19	A77	Waste treatment stabilization	1	1	1	24,080	0.05%	0	0%
20	A99	Other NEC (not elsewhere classified)	2	2	2	15,549	0.03%	0	0%
21	A94	Laboratory wastes	1	1	1	1,164	0.002%	0	0%
Totals & non-duplicative counts =			28	50	124	52,441,517	100.0%	13,069,566	100.0%

Part 4: Comparison 4 of 8

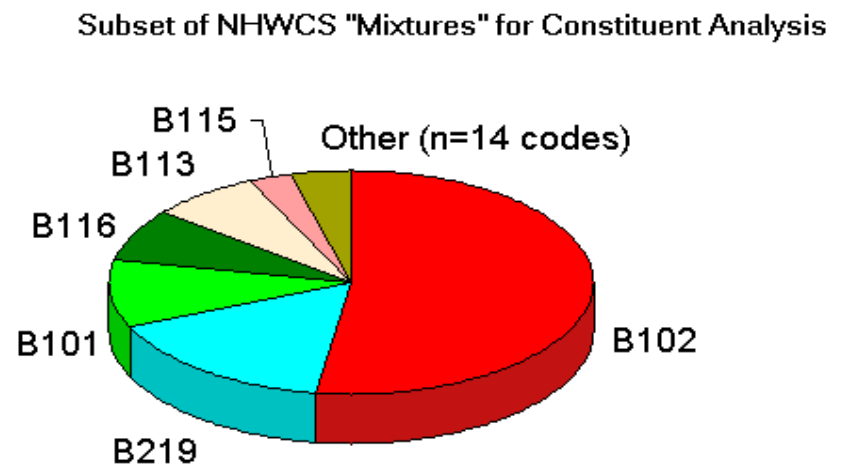
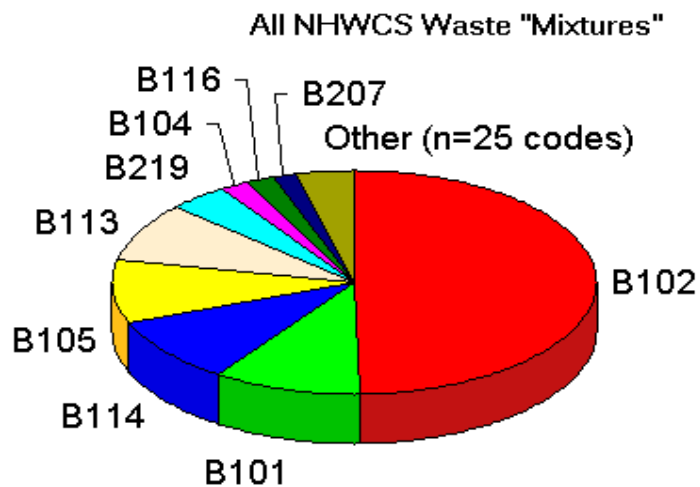
NHWCS waste “*mixtures*” data mostly represent **liquids**, but also represent sludges & solids

**Summary of Physical Form of NHWCS Waste "Mixtures"
(1993 NHWCS waste quantity proportions in tons)**



Part 4: Comparison 5 of 8
 NHWCS waste “*mixtures*” mostly represent
 aqueous wastes with toxic organics (B102)

Physical Form Codes for NHWCS Waste "Mixtures"
 (proportionate to 1993 NHWCS waste quantities)



Part 4: Comparison 5 of 8 (cont'd)

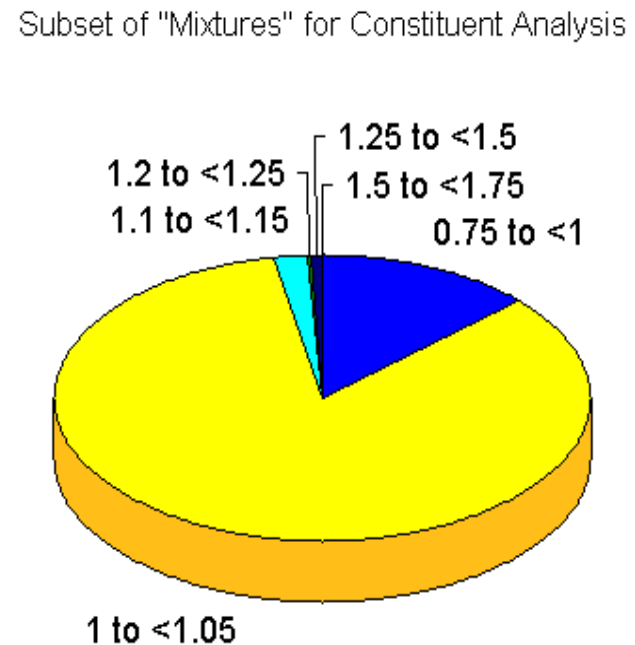
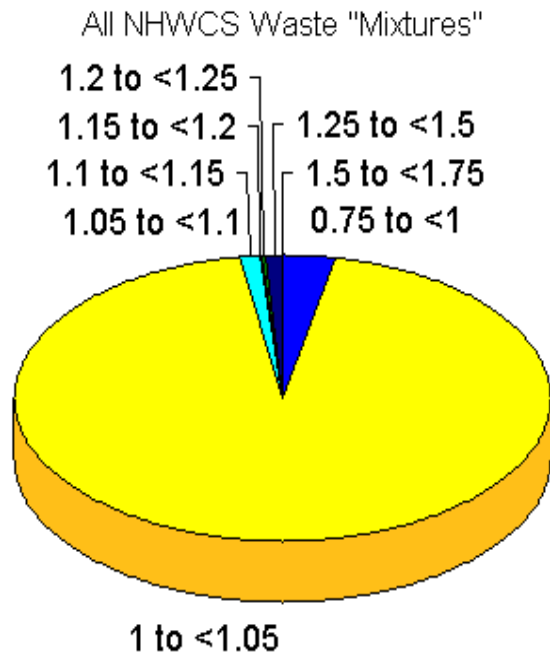
Detailed breakdown of NHWCS waste “*mixtures*” according to physical form codes

Item	BRS Form Code	Description of Waste "Form Code"	All NHWCS waste "mixtures" in Database (POMCONC = 3 or 4)		Subset of NHWCS waste "mixtures" for constit analysis	
			1993 tons	%	1993 tons	%
1	B101	Aqueous waste with low solvents	5,191,229	9.9%	1,313,150	10.0%
2	B102	Aqueous waste with low other toxic organics	25,997,283	49.6%	6,855,901	52.5%
3	B103	Spent acid with metals	137,277	0.3%	0	0%
4	B104	Spent acid without metals	995,398	1.9%	0	0%
5	B105	Acidic aqueous waste	4,890,262	9.3%	0	0%
6	B106	Caustic solution with metals but no cyanides	386,563	0.7%	0	0%
7	B107	Caustic solution with metals and cyanides	107,777	0.2%	107,777	0.8%
8	B110	Caustic aqueous waste	519,917	1.0%	0	0%
9	B113	Other aqueous waste with high dissolved solids	4,381,423	8.4%	958,516	7.3%
10	B114	Inorganic Liquids - with low dissolved solids	5,043,811	9.6%	0	0%
11	B115	Inorganic Liquids - scrubber water	378,302	0.7%	378,302	2.9%
12	B116	Inorganic Liquids - leachate	962,049	1.8%	962,049	7.4%
13	B119	Other inorganic liquids	193,565	0.4%	180,000	1.4%
14	B201	Organic Liquids - concentrated solvent-water solution	3,955	0.01%	3,955	0.03%
15	B202	Halogenated solvent	892	0.002%	892	0.01%
16	B204	Organic Liquids - halogenated/nonhalogenated solvents	42,160	0.1%	42,160	0.3%
17	B206	Waste oil	9,230	0.02%	9,181	0.07%
18	B207	Concentrated aqueous solution of other organics	836,820	1.6%	0	0%
19	B208	Concentrated phenolics	18,464	0.04%	18,464	0.14%
20	B211	Paint thinner or petroleum distillates	4,631	0.01%	0	0%
21	B219	Other organic liquids NEC (not elsewhere classified)	2,088,927	4.0%	2,080,538	15.9%
Liquids subtotal =			52,189,935	99.5%	12,910,884	98.8%
22	B301	Soil contaminated with organics	10,398	0.02%	9,808	0.08%
23	B302	Soil contaminated with inorganics only	2,873	0.01%	0	0%
24	B303	Inorganic Solids - ash, slag, or other residue from incineration of wastes	7,375	0.01%	0	0%
25	B305	Inorganic Solids - dry lime or metal hydroxide solids chemically "fixed"	48,066	0.09%	8,486	0.1%
26	B310	Spent solid filters or adsorbents	4,703	0.01%	0	0%
27	B316	Other metal salts/chemicals	57	0.0001%	0	0%
28	B409	Organic Solids - other nonhalogenated NEC	4,110	0.01%	4,110	0.03%
Solids subtotal =			77,582	0.15%	22,404	0.2%
29	B502	Lime sludge with metals/metal hydroxide sludge	12,346	0.02%	12,346	0.09%
30	B504	Other wastewater treatment sludge	17,748	0.03%	17,748	0.14%
31	B602	Still bottoms or nonhalogenated solvents or other organic liquids	36,721	0.07%	0	0%
32	B603	Oily sludge	71,290	0.14%	70,326	0.5%
33	B604	Organic paint or ink sludge	37	0.00%	0	0%
34	B607	Organic Sludges - other NEC	35,858	0.07%	35,858	0.3%
Sludges subtotal =			174,000	0.33%	136,278	1.0%
			52,441,517	100.0%	13,069,566	100.0%

Part 4: Comparison 6 of 8

The specific gravity of NHWCS waste “*mixtures*” is mostly similar to water

Specific Gravity* of NHWCS Waste "Mixtures"
 (proportionate to 1993 NHWCS waste quantities)

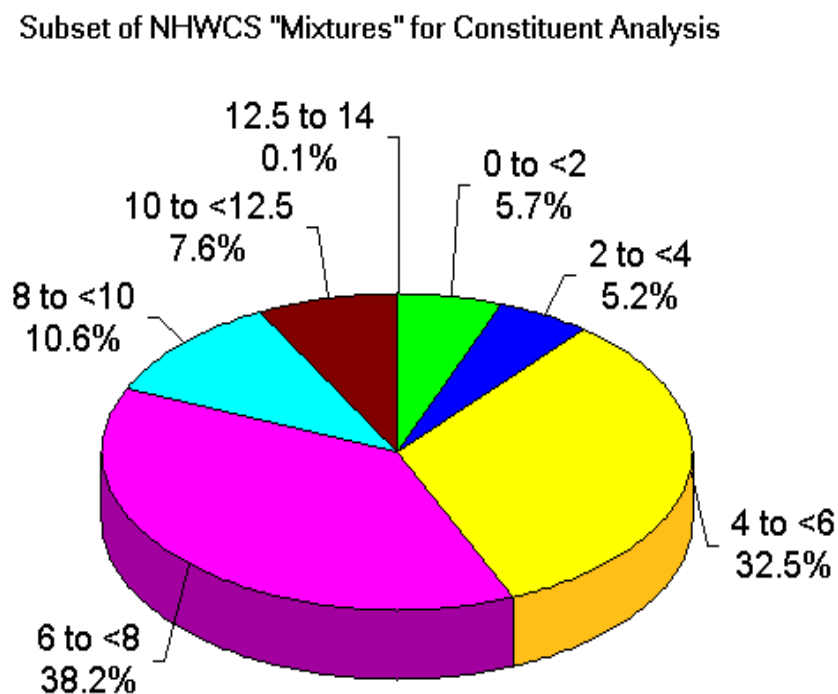
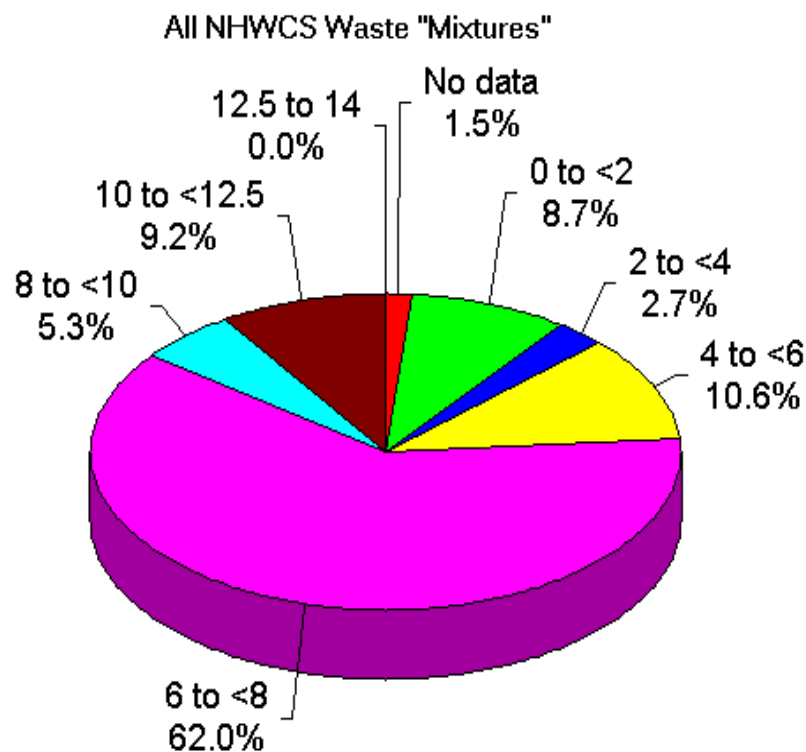


Note: "Specific Gravity" = ratio of the density of waste to the density of water (8.34 lbs/gal).

Part 4: Comparison 7 of 8

Most of the NHWCS waste "*mixtures*" are neutral (pH 6 to 8)

pH of NHWCS Waste "Mixtures"
(proportionate to 1993 NHWCS waste quantities)

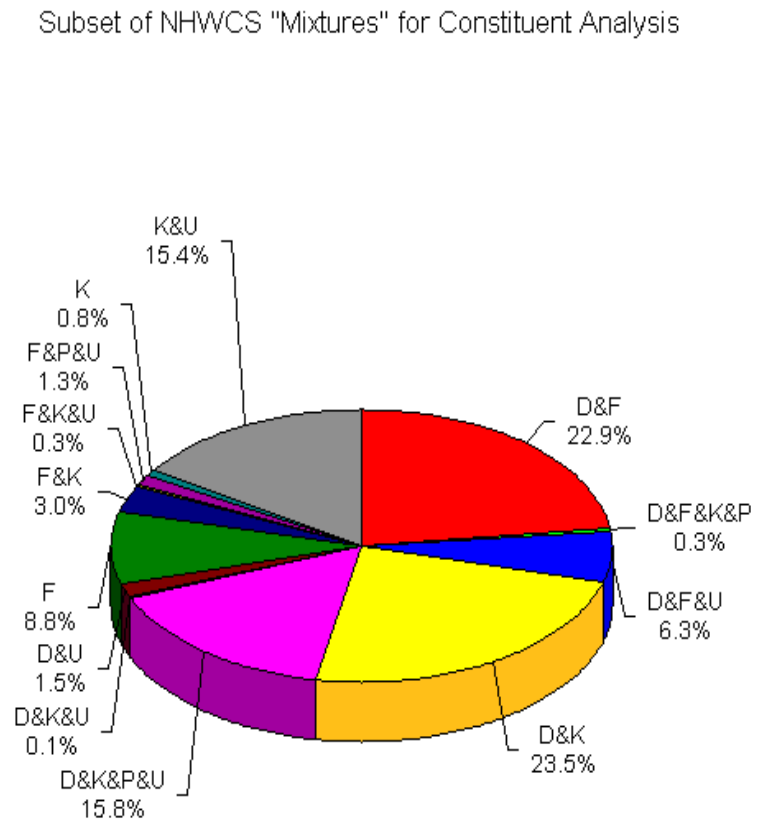
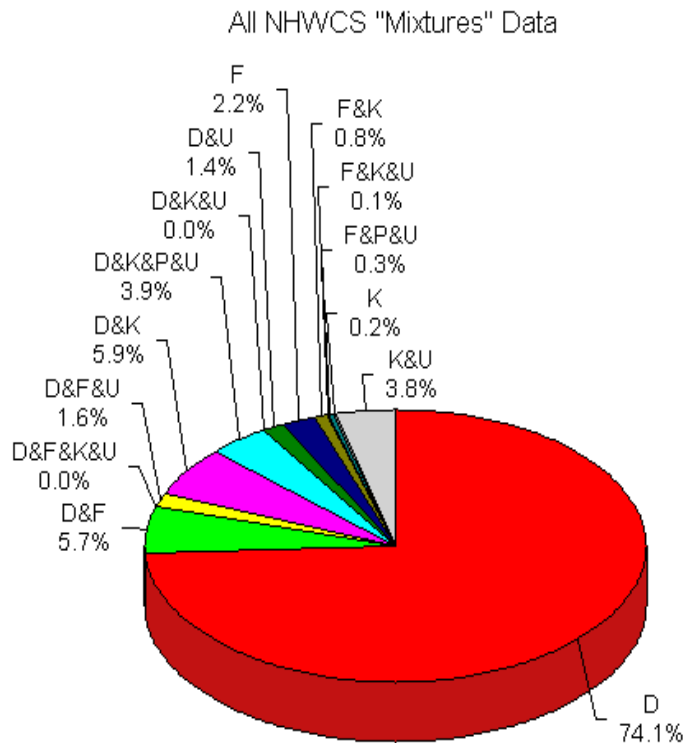


"pH" = measure of acidity and alkalinity on a scale of >0 to <14, where pH=7 represents neutrality (pure water), pH<7 acidity, pH>7 alkalinity. As a benchmark, the acceptable pH range of aquatic ecosystems for viability is between pH = 6 to 8.

Part 4: Comparison 8 of 8

RCRA Hazardous Wastecodes Reported for NHWCS Waste “*Mixtures*”

RCRA Hazardous Wastecodes Assigned to NHWCS Waste "Mixtures"
(Proportionate to 1993 NHWCS waste quantities)



Note: RCRA wastecodes (Dxxx, Fxxx, Kxxx, Pxxx, Uxxx) are defined at 40 CFR 261 Subpart C & Subpart D.

Part 4: **Findings** of Comparison of **Eight Characteristics**
 Between All NHWCS Waste “*Mixtures*” Data,
 to the NHWCS Data Subset for Constituent Data Analysis:

Three of 8 comparison attributes are similar; subset **representativeness not assured**

<u>Waste Attribute</u>	NHWCS <u>mixtures</u>	<u>Relative waste volume (1993)</u>	
		<u>All mxtrs%</u>	<u>Subset%</u>
1. Economic sectors	SIC = 28	64%	88%
2. Origin states	TX	44%	26%
3. Process sources	Processes n.e.c.	33%	1.3%
4. Physical forms	Liquid	99%	99%
5. Form codes	Aqueous w/organics	50%	52%
6. Spec. gravity	1.00 to 1.05	94%	84%
7. pH	6 to <8	62%	38%
8. RCRA haz codes	Dxxx	93%	70%*

*Data query step to exclude characteristic-only (Dxxx) waste “mixtures” effectively resulted in reducing proportion relative to universe.

Part 4: NHWC survey participant descriptions of NHWCS waste “*mixtures*” in the NHWCS data subset for constituent analysis (43 of 48 provided descriptions)

- HAZARDOUS WASTE LIQUID; PROCESS RINSE WATER FROM METAL FINISHING
- GROUNDWATER PUMPED AND TREATED ON SITE
- IGNITABLE SPENT HALOGENATED AND NON-HALOGENATED SOLVENTS
- CONTAMINATED SOILS - PROFILE 1745
- LIQUID ORGANIC SOLVENT WASTE CONTAINING IGNITABLE, TOXIC CN WASTEWATER
- CHEM FUEL: BLENDING IGNITABLE SOLVENTS, OILS, PAINTS & MISC.
- BLENDING & BULKING MIXED SOLVENTS
- DISSOLVED AIR FLOTATION (DAF) & API SLUDGE FILTER CAKE G WASTE SOLVENTS
- 1,1,1 TRICHLOROETHANE SOLVENT FOR FLUSHING PCB TRANSFORMER MIXTURE (INCLUDES NUMEROUS PROCESS STREAMS AND CONTAINMENT BOTTOMS STREAM FROM THE WASTEWATER STRIPPER IN THE MIXTURE (INCLUDES NUMEROUS PROCESS STREAMS AND CONTAINMENT BOTTOMS STREAM FROM THE WASTEWATER STRIPPER IN THE PRODUCTION SEF/PT SYSTEM (UIC WASTEWATER PRETREATMENT SYSTEM)
- WASTE USED FOR ENERGY RECOVERY
- AQUEOUS AND ORGANIC WASTEWATER FROM PHOSPHATE, TERBUFOSAN
- AQUEOUS AND ORGANIC WASTE FROM THE PRODUCTION OF PENDAMINE
- IGNITABLE K-LISTED FUEL WITH BENZENE FROM PETROLEUM REFINERY
- IGNITABLE PRIMARY, SECONDARY SEPARATION SLUDGE AND K-LISTED
- IGNITABLE WASTE PROCESS WATER WITH BENZENE FROM AUTOMOTIVE
- SOLVENT CONTAMINATED GROUNDWATER REMEDIATION USING AN AERATION
- WASTE FROM MANUFACTURE OF LUBE & FUEL ADDITIVE
- MIXED DISTILLATION BOTTOMS PHENOL AND ANILINE
- PICKLE LIQUOR SLUDGE
- CONTAMINATED SOIL
- METAL HYDROXIDE SLUDGE FROM WASTEWATER TREATMENT.
- WOOD TREATING / PRESERVATION
- MULTI-SOURCE LEACHATE/GROUNDWATER FROM INACTIVE HAZARDOUS WASTE
- LIQUID SLUDGE GENERATED FROM THE TREATMENT OF MULTI-SOURCE
- MULTI SOURCE LEACHATE GROUNDWATER FROM INACTIVE HAZARDOUS WASTE
- LIQUID SLUDGE GENERATED FROM THE TREATMENT OF MULTI SOURCE
- LEGACY WASTE TREATMENT SLUDGES
- NON-RCRA WASTE RENDERED HAZARDOUS BY BLENDING
- WASTE WATER, INDUSTRIAL PROCESS, CONTAINS ORGANIC COMPOUNDS
- WASTEWATER, INDUSTRIAL PROCESS, HYDROCARBON CONTAINING
- WASTEWATER, PROCESS
- WASTEWATER, INDUSTRIAL PROCESS(DOMESTIC-INDUSTRIAL GRADE)
- WASTEWATER CONTAINING ORGANICS
- WASTEWATER CONTAINING ORGANICS, TRACE METALS, AND OIL
- LIQUID FLAMMABLE WASTE (METHANOL, TOLUENE)
- SCRUBBER WASTE FROM FLUID BED INCINERATION

Part 4: Identity of chemical constituents measured in NHWCS waste “*mixtures*”

- Chemical constituents* >0 ppm reported in:
 - 43 of the 48 “mixtures” wastestreams subset (90%)
 - 12.7 million of the 13.1 million tons/year subset (97%)
 - 34 of the 35 “mixtures” subset facilities (97%)
- 570 reported instances (data items) of constituents* >0 ppm
- **103 different chemical constituents*** reported in waste “mixtures” >0 ppm
- Number of constituents* >0 ppm per data subset wastestream:
 - Mean = 13
 - Median = 10
 - Standard deviation = 11
 - Min = 1
 - Max = 43

* Data instances of water as constituent excluded from statistical profile.

Instances include count of wholewaste and/or leachate concentrations >0ppm.

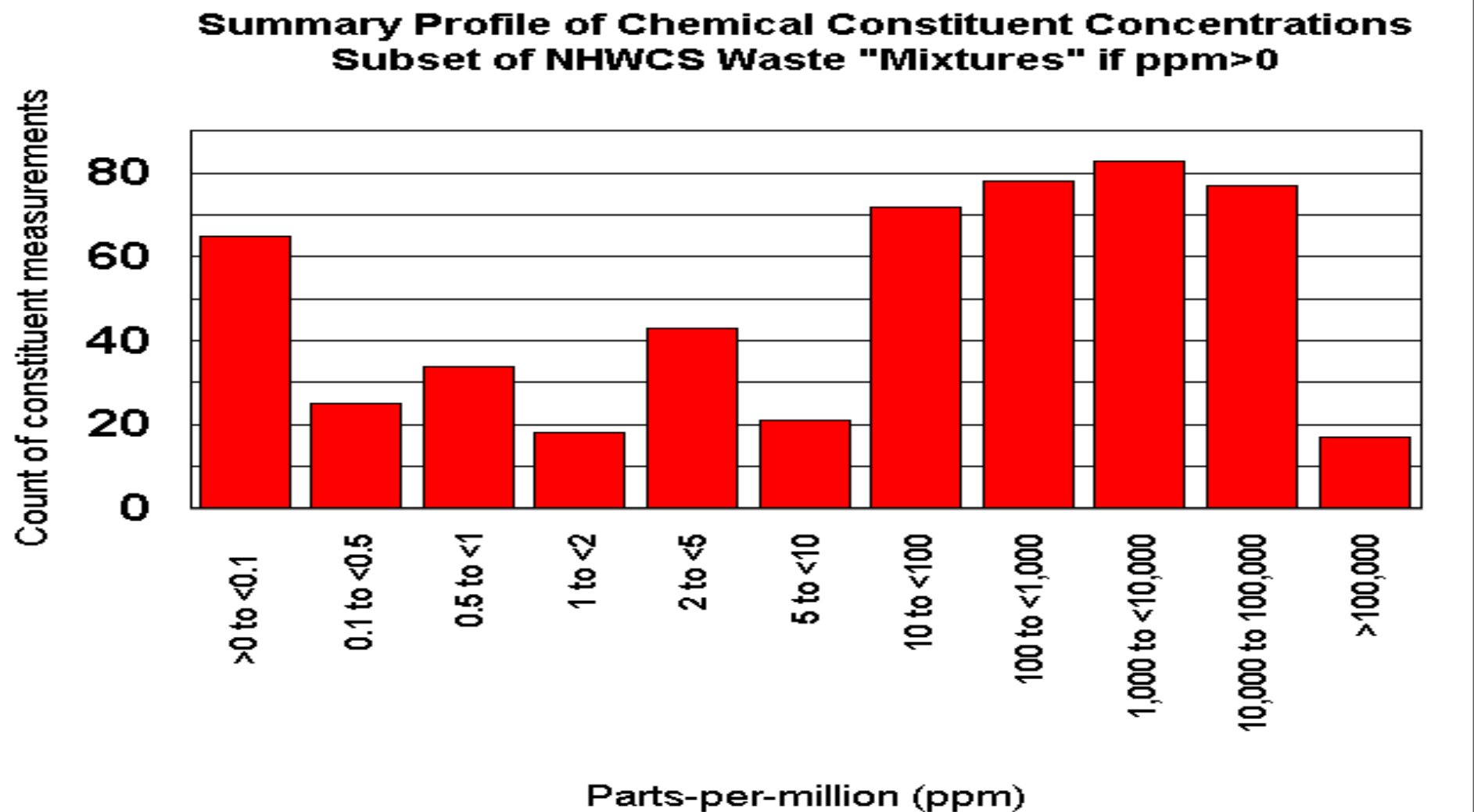
Part 4: Identity of **103 chemical constituents** in NHWCS waste “*mixtures*”(if>0ppm)

1	71-55-6	1,1,1-Trichloroethane [Methyl chloroform]	53	131-11-3	Dimethyl phthalate
2	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane [Freon 113]	54	77-78-1	Dimethyl sulfate
3	79-0-5	1,1,2-Trichloroethane [Vinyl trichloride]	55	122-39-4	Diphenylamine
4	95-50-1	1,2-Dichlorobenzene [o-Dichlorobenzene]	56	141-78-6	Ethyl acetate
5	107-6-2	1,2-Dichloroethane [Ethylene dichloride]	57	60-29-7	Ethyl ether [Ethane 1,1'-oxybis]
6	70648-26-9	1,2,3,4,7,8-Hexachlorodibenzofuran	58	100-41-4	Ethylbenzene
7	57653-85-7	1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	59	151-56-4	Ethylenimine
8	40321-76-4	1,2,3,7,8-Pentachlorodibenzo-p-dioxin	60	86-73-7	Fluorene
9	110-80-5	2-Ethoxyethanol [Ethylene glycol monoethyl ether][Cellosolve]	61	16984-48-8	Fluoride
10	57117-31-4	2,3,4,7,8-Pentachlorodibenzofuran	62	50-0-0	Formaldehyde
11	1746-1-6	2,3,7,8-Tetrachlorodibenzo-p-Dioxin	63	64-18-6	Formic Acid
12	51207-31-9	2,3,7,8-Tetrachlorodibenzofuran	64	37871-0-4	Heptachlorodibenzo-p-dioxins
13	105-67-9	2,4-Dimethylphenol	65	38998-75-3	Heptachlorodibenzofurans
14	51-28-5	2,4-Dinitrophenol	66	74-90-8	Hydrogen cyanide [Hydrocyanic acid]
15	83-32-9	Acenaphthene	67	7664-39-3	Hydrogen fluoride [Hydrofluoric acid]
16	67-64-1	Acetone [2-Propanone]	68	193-39-5	Indeno(1,2,3-cd) pyrene
17	75-5-8	Acetonitrile [Methyl cyanide]	69	74-88-4	Iodomethane [Methyl iodide]
18	98-86-2	Acetophenone	70	78-83-1	Isobutyl alcohol
19	107-2-8	Acrolein [2-Propenal]	71	7439-92-1	Lead
20	79-6-1	Acrylamide	72	108-39-4	m-Cresol [3-Methyl phenol]
21	79-10-7	Acrylic acid	73	7439-97-6	Mercury
22	107-13-1	Acrylonitrile [2-Propenenitrile]	74	67-56-1	Methanol [Methyl alcohol]
23	62-53-3	Aniline	75	78-93-3	Methyl ethyl ketone [2-Butanone][MEK]
24	120-12-7	Anthracene	76	108-10-1	Methyl isobutyl ketone [Hexone][4-Methyl-2-pentanone]
25	7440-38-2	Arsenic	77	75-9-2	Methylene chloride [Dichloromethane]
26	7778-39-4	Arsenic Acid	78	71-36-3	n-Butyl alcohol [n-Butanol]
27	7440-39-3	Barium	79	86-30-6	N-Nitrosodiphenylamine [Diphenylnitrosamine]
28	71-43-2	Benzene	80	91-20-3	Naphthalene
29	98-9-9	Benzenesulfonyl chloride	81	7440-2-0	Nickel
30	50-32-8	Benzo(a)pyrene	82	98-95-3	Nitrobenzene
31	207-8-9	Benzo(k)fluoranthene	83	95-48-7	o-Cresol [2-Methyl phenol]
32	56-55-3	Benz[a]anthracene	84	106-44-5	p-Cresol [4-Methyl phenol]
33	117-81-7	Bis(2-ethylhexyl) phthalate [Di-2-ethylhexyl phthalate]	85	106-49-0	p-Toluidine [4-Methylaniline]
34	85-68-7	Butyl benzyl phthalate	86	123-63-7	Paraldehyde
35	7440-43-9	Cadmium	87	85-1-8	Phenanthrene
36	75-15-0	Carbon disulfide	88	108-95-2	Phenol
37	56-23-5	Carbon tetrachloride	89	25265-76-3	Phenylenediamine, mixed isomers
38	107-20-0	Chloroacetaldehyde	90	No CAS nr.	Phosphorothioic acid esters
39	108-90-7	Chlorobenzene	91	151-50-8	Potassium Cyanide
40	67-66-3	Chloroform	92	129-0-0	Pyrene
41	74-87-3	Chloromethane [Methyl chloride]	93	110-86-1	Pyridine
42	7440-47-3	Chromium	94	106-51-4	Quinone [p-Benzoquinone]
43	218-1-9	Chrysene	95	7440-22-4	Silver
44	8007-45-2	Coal tar creosote	96	127-18-4	Tetrachloroethylene [Perchloroethylene]
45	1319-77-3	Cresols, mixed isomers	97	108-88-3	Toluene [Methylbenzene]
46	57-12-5	Cyanides	98	25376-45-8	Toluenediamine [Diaminotoluene]
47	110-82-7	Cyclohexane	99	79-1-6	Trichloroethylene
48	108-94-1	Cyclohexanone	100	75-69-4	Trichlorofluoromethane [Trichloromonofluoromethane][CFC-11]
49	84-74-2	Di-n-butyl phthalate	101	1330-20-7	Xylenes, mixed isomers [Xyenes, total]
50	117-84-0	Di-n-octyl phthalate	102	79-46-9	2-NITROPROPANE
51	53-70-3	Dibenz(a,h)anthracene	103	109-6-8	2-PICOLINE [ALPHA-PICOLINE][2-METHYLPYRIDINE]
52	84-66-2	Diethyl phthalate			

Part 4: Identity of constituents >100 ppm by weight in NHWCS waste “mixtures” (251 wholewaste constituent instances >100 ppm, of 570 NHWCS data instances >0 ppm)

1	71-55-6	1,1,1-Trichloroethane [Methyl chloroform]	990,000	85	141-78-6	Ethyl acetate	10,000	169	64-19-7	Acetic acid	1,368
2	64-19-7	Acetic acid	260,000	86	71-55-6	1,1,1-Trichloroethane [Methyl chloroform]	10,000	170	64-19-7	Acetic acid	1,368
3	108-88-3	Toluene [Methylbenzene]	225,000	87	127-18-4	Tetrachloroethylene [Perchloroethylene]	10,000	171	71-43-2	Benzene	1,335
4	98-86-2	Acetophenone	177,000	88	108-10-1	Methyl isobutyl ketone [Hexone][4-Methyl-2-pentanone]	10,000	172	108-10-1	Methyl isobutyl ketone [Hexone][4-Methyl-2-pentanone]	1,300
5	108-88-3	Toluene [Methylbenzene]	150,000	89	631-61-8	Ammonium acetate	10,000	173		TOTAL KJELDAHL NITROGEN	1,267
6	1330-20-7	Xylenes, mixed isomers [Xyenes, total]	150,000	90	75-85-4	tert-Amyl alcohol [2-Methyl-2-butanol][tert-Pentanol]	10,000	174		TOTAL KJELDAHL NITROGEN	1,267
7	108-88-3	Toluene [Methylbenzene]	150,000	91	101-84-8	Diphenyl ether [diphenyl oxide]	10,000	175		ORGANIC NITROGEN	1,100
8	62-53-3	Aniline	147,500	92	71-36-3	n-Butyl alcohol [n-Butanol]	10,000	176		ORGANIC NITROGEN	1,100
9	75-9-2	Methylene chloride [Dichloromethane]	142,148	93	71-36-3	n-Butyl alcohol [n-Butanol]	10,000	177	7440-2-0	Nickel	1,034
10	83-41-0	3-NITRO-O-XYLENE	120,000	94	127-18-4	Tetrachloroethylene [Perchloroethylene]	10,000	178	79-6-1	Acrylamide	875
11	1330-20-7	Xylenes, mixed isomers [Xyenes, total]	117,300	95	120-72-9	Indole	9,800	179	79-6-1	Acrylamide	875
12	108-88-3	Toluene [Methylbenzene]	115,800	96	67-68-5	Dimethyl sulfoxide	9,700	180	764-42-1	Fumaronitrile [Fumaric acid dinitrile]	863
13	68-12-2	N,N-Dimethyl formamide	110,000	97	98-95-3	Nitrobenzene	9,600	181	764-42-1	Fumaronitrile [Fumaric acid dinitrile]	863
14	67-64-1	Acetone [2-Propanone]	100,000	98	7664-93-9	Sulfuric acid	9,550	182	110-61-2	Succinonitrile [Butanedinitrile]	859
15	8030-30-6	Naphtha [Petroleum benzin]	100,000	99	7664-93-9	Sulfuric acid	9,550	183	110-61-2	Succinonitrile [Butanedinitrile]	859
16	78-93-3	Methyl ethyl ketone [2-Butanone][MEK]	100,000	100	142-82-5	n-Heptane	9,477	184	75-66-1	2-METHYL-2-PROPANETHIOL [TERT-BUTYL MERCAPTAN]	750
17	141-78-6	Ethyl acetate	100,000	101	1330-20-7	Xylenes, mixed isomers [Xyenes, total]	9,477	185	64-18-6	Formic Acid	750
18	584-84-9	2,4-Toluene diisocyanate	94,500	102	75-5-8	Acetonitrile [Methyl cyanide]	9,477	186	64-18-6	Formic Acid	750
19	7440-47-3	Chromium	92,000	103	75-9-2	Methylene chloride [Dichloromethane]	9,000	187	4097-61-4	Dinitroxylenols	750
20	67-64-1	Acetone [2-Propanone]	91,607	104	108-91-8	Cyclohexylamine	8,500	188	75-9-2	Methylene chloride [Dichloromethane]	600
21	67-63-0	2-PROPANOL [ISOPROPYL ALCOHOL][ISOPROPANOL]	80,000	105	99-51-4	4-NITRO-O-XYLENE	8,100	189	96-22-0	3-PENTANONE [DIETHYL KETONE]	590
22	78-93-3	Methyl ethyl ketone [2-Butanone][MEK]	78,971	106	71-55-6	1,1,1-Trichloroethane [Methyl chloroform]	7,900	190	75-7-0	Acetaldehyde [Ethanal]	551
23		PEATANANE TECHNICAL	78,971	107	79-10-7	Acrylic acid	7,709	191	7439-92-1	Lead	540
24	71-43-2	Benzene	75,700	108	79-10-7	Acrylic acid	7,709	192	95-50-1	1,2-Dichlorobenzene [o-Dichlorobenzene]	500
25	78-93-3	Methyl ethyl ketone [2-Butanone][MEK]	75,000	109	1634-4-4	Methyl tert-butyl ether	6,318	193	120-82-1	1,2,4-Trichlorobenzene	500
26	7732-18-5	Water	75,000	110	40487-42-1	Pendimethalin	5,700	194	91-20-3	Naphthalene	500
27	108-95-2	Phenol	72,000	111	100-41-4	Ethylbenzene	5,600	195	85-68-7	Butyl benzyl phthalate	500
28	108-88-3	Toluene [Methylbenzene]	63,177	112	107-6-2	1,2-Dichloroethane [Ethylene dichloride]	5,300	196	79-0-5	1,1,2-Trichloroethane [Vinyl trichloride]	500
29	1330-20-7	Xylenes, mixed isomers [Xyenes, total]	55,000	113	No CASRN	**OTHERS	5,000	197	107-13-1	Acrylonitrile [2-Propenenitrile]	500
30	67-56-1	Methanol [Methyl alcohol]	53,700	114	71-55-6	1,1,1-Trichloroethane [Methyl chloroform]	5,000	198	85-44-9	Phthalic anhydride	500
31	127-19-5	N,N-Dimethyl acetamide	53,700	115	109-99-9	Tetrahydrofuran	5,000	199	14808-79-8	Sulfate	469
32	14808-79-8	Sulfate	50,425	116	108-95-2	Phenol	5,000	200	14808-79-8	Sulfate	469
33	14808-79-8	Sulfate	50,425	117	50-0-0	Formaldehyde	5,000	201	12672-29-6	Aroclor 1248 [PCB 1248]	450
34	108-10-1	Methyl isobutyl ketone [Hexone][4-Methyl-2-pentanone]	50,000	118	75-9-2	Methylene chloride [Dichloromethane]	5,000	202	75-5-8	Acetonitrile [Methyl cyanide]	435
35	67-56-1	Methanol [Methyl alcohol]	50,000	119	75-5-8	Acetonitrile [Methyl cyanide]	5,000	203	1319-77-3	Cresols, mixed isomers	412
36	67-64-1	Acetone [2-Propanone]	50,000	120	100-41-4	Ethylbenzene	5,000	204	7440-39-3	Barium	404
37	142-82-5	n-Heptane	50,000	121	110-82-7	Cyclohexane	5,000	205	107-13-1	Acrylonitrile [2-Propenenitrile]	398
38	64-17-5	Ethanol [Ethyl alcohol]	50,000	122		ORGANIC NITROGEN	4,750	206	107-13-1	Acrylonitrile [2-Propenenitrile]	398
39	67-56-1	Methanol [Methyl alcohol]	50,000	123		ORGANIC NITROGEN	4,750	207	7664-41-7	Ammonia, gas	388
40	64-17-5	Ethanol [Ethyl alcohol]	47,383	124	127-18-4	Tetrachloroethylene [Perchloroethylene]	4,600	208	7664-41-7	Ammonia, gas	388
41	67-63-0	2-PROPANOL [ISOPROPYL ALCOHOL][ISOPROPANOL]	47,383	125	100-41-4	Ethylbenzene	4,210	209	79-6-1	Acrylamide	368
42	100-42-5	Styrene [Vinyl benzene][Phenylethylene]	40,400	126	67-56-1	Methanol [Methyl alcohol]	4,000	210	79-41-4	Methacrylic acid	359
43	100-41-4	Ethylbenzene	39,500	127	60-29-7	Ethyl ether [Ethane 1,1'-oxybis]	3,900	211	79-41-4	Methacrylic acid	359
44	122-39-4	Diphenylamine	38,100	128	79-10-7	Acrylic acid	3,700	212	57-12-5	Cyanides	348
45	78-93-3	Methyl ethyl ketone [2-Butanone][MEK]	34,300	129	95-53-4	o-Toluidine [2-Methylaniline]	3,700	213	57-12-5	Cyanides	348
46	122-39-4	Diphenylamine	32,000	130	823-40-5	2,6-Toluenediamine [2,6-Diaminotoluene]	3,600	214	110-86-1	Pyridine	339
47	141-78-6	Ethyl acetate	31,588	131	298-2-2	Phorate	3,600	215	110-86-1	Pyridine	339
48		ACETATE	31,588	132	108-88-3	Toluene [Methylbenzene]	3,500	216	563-80-4	3-METHYL-2-BUTANONE [METHYL ISOPROPYL KETONE]	330
49	108-21-4	Isopropyl acetate	31,588	133	67-64-1	Acetone [2-Propanone]	3,500	217	57-12-5A	Cyanides (Amenable)	330
50	67-56-1	Methanol [Methyl alcohol]	30,000	134	75-5-8	Acetonitrile [Methyl cyanide]	3,316	218	57-12-5A	Cyanides (Amenable)	330
51	67-64-1	Acetone [2-Propanone]	30,000	135	75-5-8	Acetonitrile [Methyl cyanide]	3,316	219	62-53-3	Aniline	319
52	N230	Glycol ethers	28,900	136	57-55-6	Propylene glycol [1,2-Propane diol]	3,159	220	79-1-6	Trichloroethylene	310
53	260-94-6	Acridine	27,800	137	62-55-5	Thioacetamide	3,159	221	7440-2-0	Nickel	310
54	86-74-8	Carbazole	27,800	138	67-66-3	Chloroform	3,159	222	56-23-5	Carbon tetrachloride	310
55	91-8-7	2,6-Toluene diisocyanate	23,700	139	60-29-7	Ethyl ether [Ethane 1,1'-oxybis]	3,159	223	108-90-7	Chlorobenzene	310
56	67-64-1	Acetone [2-Propanone]	20,100	140	627-20-3	Beta-cis-amyrene [2-Pentene-cis]	3,159	224	127-18-4	Tetrachloroethylene [Perchloroethylene]	310
57	64-17-5	Ethanol [Ethyl alcohol]	20,000	141	110-86-1	Pyridine	3,159	225	51-28-5	2,4-Dinitrophenol	306
58	7732-18-5	Water	20,000	142	71-55-6	1,1,1-Trichloroethane [Methyl chloroform]	3,159	226	108-95-2	Phenol	300
59	1330-20-7	Xylenes, mixed isomers [Xyenes, total]	20,000	143	75-0-6	tert-Butanol [2-Methyl-2-propanol]	3,159	227	67-56-1	Methanol [Methyl alcohol]	289
60		TRIMETHYLAMINE ACETATE	20,000	144	127-18-4	Tetrachloroethylene [Perchloroethylene]	3,100	228	67-56-1	Methanol [Methyl alcohol]	289
61	91-22-5	Quinoline	19,600	145	79-1-6	Trichloroethylene	3,000	229	56038-89-2	N-(1-Ethylpropyl)-3,4-dimethyl benzamide	280
62	67-56-1	Methanol [Methyl alcohol]	19,000	146	108-90-7	Chlorobenzene	2,800	230	110-61-2	Succinonitrile [Butanedinitrile]	272
63		TOTAL KJELDAHL NITROGEN	16,250	147	75-9-2	Methylene chloride [Dichloromethane]	2,700	231	110-61-2	Succinonitrile [Butanedinitrile]	272
64		TOTAL KJELDAHL NITROGEN	16,250	148	13071-79-9	Terbufos	2,600	232	67-56-1	Methanol [Methyl alcohol]	260
65	67-72-1	Hexachloroethane	15,950	149	71-55-6	1,1,1-Trichloroethane [Methyl chloroform]	2,500	233	7440-39-3	Barium	250
66	107-6-2	1,2-Dichloromethane [Ethylene dichloride]	15,794	150	67-66-3	Chloroform	2,500	234	67-56-1	Methanol [Methyl alcohol]	237
67	91-66-7	N,N-Diethyl aniline	15,794	151	79-1-6	Trichloroethylene	2,500	235	67-56-1	Methanol [Methyl alcohol]	237
68	109-99-9	Tetrahydrofuran	15,794	152	57-12-5C	Cyanides (Cyanohydrins)	1,783	236	79-6-1	Acrylamide	223
69	110-54-3	n-Hexane	15,794	153	57-12-5C	Cyanides (Cyanohydrins)	1,783	237	79-6-1	Acrylamide	223
70	7664-41-7	Ammonia, gas	15,625	154	1330-20-7	Xylenes, mixed isomers [Xyenes, total]	1,700	238	67-64-1	Acetone [2-Propanone]	209
71	7664-41-7	Ammonia, gas	15,625	155	7439-92-1	Lead	1,664	239	67-64-1	Acetone [2-Propanone]	209
72	108-88-3	Toluene [Methylbenzene]	15,000	156	75-9-2	Methylene chloride [Dichloromethane]	1,600	240	64-19-7	Acetic acid	197
73	95-80-7	2,4-Toluenediamine [2,4-Diaminotoluene]	14,600	157	563-80-4	3-METHYL-2-BUTANONE [METHYL ISOPROPYL KETONE]	1,600	241	64-19-7	Acetic acid	197
74	108-10-1	Methyl isobutyl ketone [Hexone][4-Methyl-2-pentanone]	13,200	158	603-6-5	Dinitro-o-xylenes (3,4 & 3,5)	1,600	242	67-56-1	Methanol [Methyl alcohol]	181
75	108-90-7	Chlorobenzene	10,000	159	108-95-2	Phenol	1,579	243	7439-92-1	Lead	150
76	79-1-6	Trichloroethylene	10,000	160	100-41-4	Ethylbenzene	1,579	244	57-12-5C	Cyanides (Cyanohydrins)	143
77	75-9-2	Methylene chloride [Dichloromethane]	10,000	161	75-5-8	Acetonitrile [Methyl cyanide]	1,557	245	57-12-5C	Cyanides (Cyanohydrins)	143
78	75-69-4	Trichlorofluoromethane [Trichloromonofluoromethane][CFC-113]	10,000	162	75-5-8	Acetonitrile [Methyl cyanide]	1,557	246	98-82-8	Cumene [Isopropyl benzene]	140
79	78-83-1	Isobutyl alcohol	10,000	163	108-95-2	Phenol	1,500	247	7439-92-1	Lead	133
80	108-39-4	m-Cresol [3-Methyl phenol]	10,000	164	75-9-2	Methylene chloride [Dichloromethane]	1,500	248	79-10-7	Acrylic acid	131
81	107-21-1	Ethylene glycol	10,000	165	67-68-5	Dimethyl sulfoxide	1,400	249	79-10-7	Acrylic acid	131
82	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane [Freon 113]	10,000	166	108-88-3	Toluene [Methylbenzene]	1,400	250	98-95-3	Nitrobenzene	120
83	71-36-3	n-Butyl alcohol [n-Butanol]	10,000	167	95-50-1	1,2-Dichlorobenzene [o-Dichlorobenzene]	1,400	251	7439-92-1	Lead	106
84	100-41-4	Ethylbenzene	10,000	168	108-10-1	Methyl isobutyl ketone [Hexone][4-Methyl-2-pentanone]	1,400				

Part 4: Chemical constituent concentration distribution for NHWCS waste “*mixtures*”



Note: Based on 533 NHWCS "mixtures" constituent measurements >0 ppm wholewaste concentration

Part 4: Statistical summary of chemical constituent
concentrations (measured as wholewaste ppm)
in NHWCS waste “*mixtures*”

- Number data instances (>0ppm) = 533*
- Minimum = 0.00005 ppm
- Maximum = 990,000 ppm
- Average (simple mean) = 11,495 ppm
- Standard deviation = 51,080 ppm
- Weighted mean = 1,323 ppm
(weighted by respective tons of wastestream quantities)
- Median = 60 ppm

* Note: This summary does not include NHWCS “mixtures” waste constituent concentrations measured on a leachate test basis.

Part 4: Evaluation of the degree of “*intrinsic hazard*”
of constituents measured in NHWCS waste “*mixtures*”
(54 of the 103 constituents (52%) reported in waste “mixtures” have PBT data)

SUMMARY OF PBT CHARACTERISTICS (PERSISTANCE, BIOACCUMULATION, TOXICITY) FOR 54 OF THE 103 CHEMICAL CONSTITUENTS REPORTED IN NHWCS WASTE "MIXTURES"											
A. COMPOSITE RANK			B. HUMAN CANCER TOXICITY			C. HUMAN DISEASE TOXICITY			D. ECOLOGICAL TOXICITY:		
Composite degree of concern	Count of constits	%	Human cancer toxicity	Count of constits	%	Human other disease toxicity	Count of constits	%	Ecological toxicity	Count of constits	%
9 (high concern)	8	15%	A	3	7%	3	12	26%	3	35	66%
8	5	10%	B	16	38%	2	22	48%	2	14	26%
7	19	35%	C	9	22%	1	12	26%	1	4	8%
6	14	26%	D	14	33%						
5	4	7%									
4	4	7%									
3 (low concern)											
Subtotal w/data=	54	100%	Subtotal w/data=	42	100%	Subtotal w/data=	46	100%	Subtotal w/data=	53	100%
% of 54 constits=	100%		% of 54 constits=	78%		% of 54 constits=	85%		% of 54 constits=	98%	

Explanatory Notes:

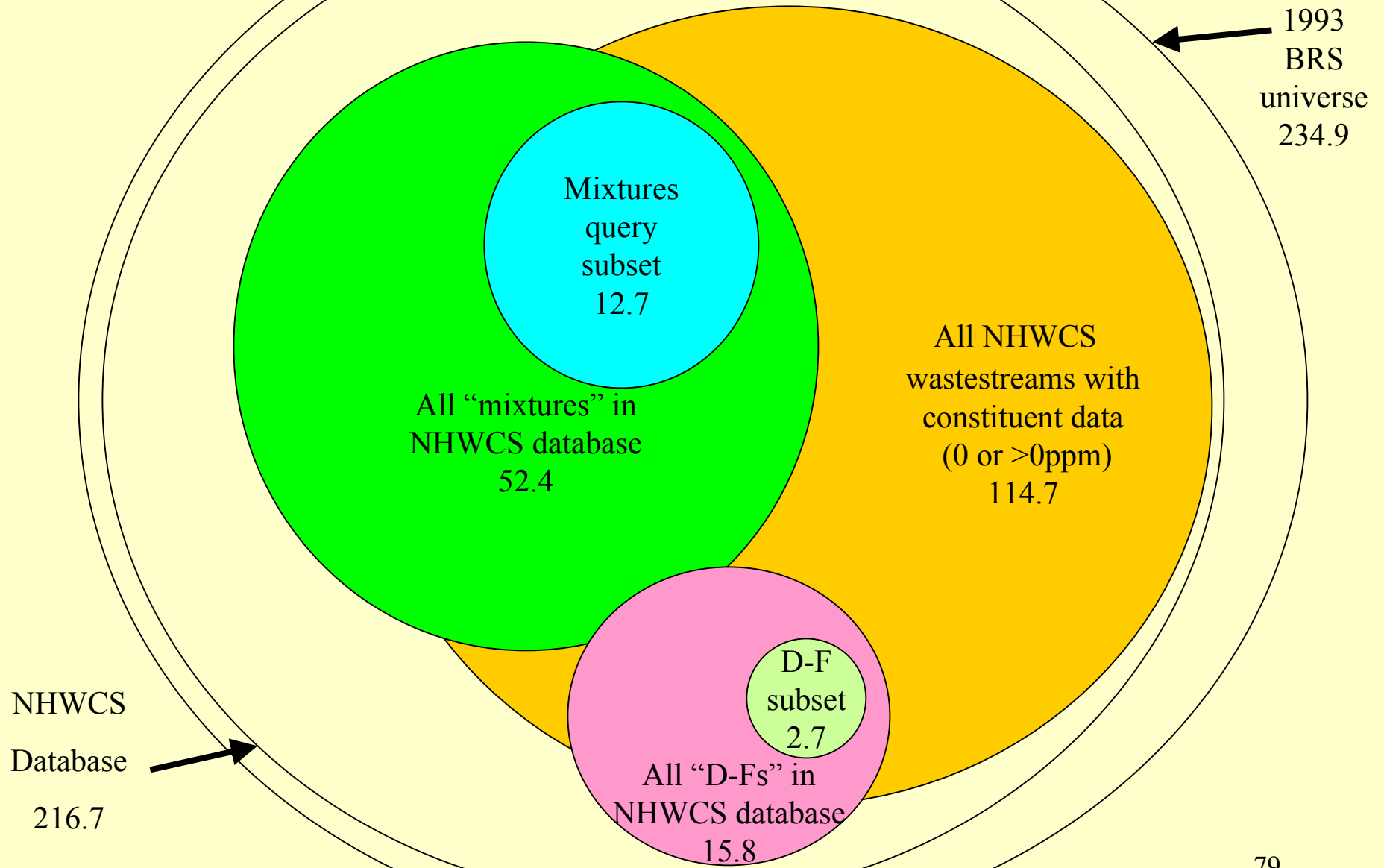
- (a) "Composite" = highest score of "human concern" or of "ecological concern" scores, which are based on four separate PBT assessment indicator scores (9= highest, 3= lowest).
- (b) Human cancer toxicity = Human carcinogenicity "weight-of-evidence" (WOE) scores:

A= highest WOE (known human carcinogen)	C= medium WOE (possible human carcinogen)
B = high WOE (probable human carcinogen)	D= low WOE (not sufficient data to classify carcinogenicity)
- (c) Human disease toxicity = Based on RfDs (reference dosages), RfCs (reference concentrations), and other numerical indicators of potential to produce other non-cancer diseases (i.e. 1= temporary, 2= permanent, 3= life-threatening adverse health effects).
- (d) Ecological toxicity = based only on numerical indicators for aquatic ecosystem toxicity (3= highest, 2=medium, 1= low toxicity).
- (e) "Constits = constituents (chemicals) in waste.
- (f) Source: PBT scores database on approximately 1,300 chemicals, published by the US EPA Office of Solid Waste: USEPA "Waste Minimization Prioritization Tool Spreadsheet Document for the RCRA Waste Minimization PBT Chemical List Docket" (RCRA Docket nr. F-98-MMLP-FFFFF), released to the public in the 09 Nov 1998 Federal Register, Vol.63, Nr.216, pp. 60332-60343).
The 1,300 PBT database chemicals represent a subset of chemicals which have complete PBT score data; chemicals not appearing in the PBT database may still be of potential concern, but have not been completely evaluated for all potential PBT effects.

Part 5

Conclusions

Part 5: Summary of M&DF Waste Quantities Analyzed in this Study: 1993 BRS "Universe" Compared to NHWCS Database Query Subsets



Note: Circular areas above drawn approximate to relative proportions based on 1993 waste volumes in million tons

Part 5: Conclusions (cont'd)

- **Empirical data** extracted and analyzed from EPA's 1996 NHWC Survey database confirm the presence of intrinsically hazardous, PBT constituents in NHWCS hazardous waste "*mixtures*" and in "*derived-from*" wastes. The NHWCS data samples examined reveal that:
 - 99% of the NHWCS sub-sample quantity of RCRA "*derived-from*" wastes contain a median number of 24 of 175 different chemical constituents, of which 27% have highest PBT concern.
 - 97% of the NHWCS sub-sample quantity of RCRA waste "*mixtures*" contain a median number of 10 of 103 different chemical constituents, of which 8% have highest PBT concern.

Part 6

ATTACHMENTS

Part 6: Attachments

- A: List and Definition of All **Datafields** Contained in EPA's 1996 NHWCS Database
- B: NHWCS Waste Volume Subtotals Corresponding to Data Query Operators (Selected Datafields)
- C: PBT Scores for Chemical Constituents in NHWCS "*Derived-from*" Wastes & Waste "*Mixtures*"
- D: Data Analysis Quality Control (QC) Techniques Applied in this Study

Attachment A

List and Definition of All **Datafields** Contained in EPA's 1996 NHWCS Database*

* EPA made the NHWCS database available to the public with notice in the 19 Nov 1999 Federal Register, Vol. 64, Nr. 223, pp. 63382-63461 (the NHWCS is referenced on pages 63447-63448). The NHWCS database is available at EPA's website: <http://www.epa.gov/epaoswer/hazwste/id/hwirwste/economic.htm>

List of Datafields in EPA's NHWCS Database: WASTESTR.DB (1 of 5 database files)

Item	Datafield name	Datafield definition	Size
1	EPAID	12-digit EPA identification number for TSDR facility	15
2	WSNUM	Sequential 1- or 2-digit ID number assigned to each wastestream within a facility	2
3	SICCODE	4-digit "Standard Industrial Classification" code for process which generated waste	5
4	GM WR	BRS reporting form: <ul style="list-style-type: none"> • "GM" (wastestream was generated on-site) or • "WR" (wastestream was received waste from offsite) 	5
5	FORMCODE	BRS waste physical form & chemical characteristic code (B001 to B801)	4
6	WASTEWATER	Is the hazardous wastestream a wastewater physical form? (Y=yes, N=no)	1
7	WSTCODE	RCRA hazardous wastecode(s) assigned to the wastestream: <ul style="list-style-type: none"> • Characteristic wastes = Dxxx • Listed wastes = Fxxx, Kxxx, Uxxx, Pxxx 	200
8	WSTDESC	Written description of the hazardous wastestream (origin, industrial process, constituents, etc.)	150
9	WSTORG	"Generated on-site" or "Received from <u>EPA ID number</u> "	35
10	RCRAEXMP	Is wastestream exempt from RCRA? (Y=yes; N=no)	1
11	ORIGCODE	BRS hazardous waste origin code: 1= Generated on-site from a production process, service activity, or routine cleanup 2= Result of a spill cleanup, equipment decommissioning, or other remedial cleanup 3= Derived from the management of non-hazardous waste 4= Received from off-site and was not recycled or treated on-site 5= Residual from the on-site treatment, disposal or recycling of a previous haz waste	3
12	SRCCODE	BRS hazardous waste source code (A01 to A99)	3
13	QTY93ton	Quantity of waste (tons) as reported in the 1993 BRS	

List of Datafields in EPA's NHWCS Database: WASTESTR.DB (continued 1 of 5 files)

Item	Datafield name	Datafield definition	Size
14	QTYRCVDton	1993 tons of waste received from offsite generator	
15	OFFSITEID	Offsite waste generator's 12-digit EPA identification number	12
16	SYSTYPE1	BRS hazardous waste management system treatment or disposal code (M011 to M141)	10
17	SYSQTY1ton	1993 quantity (tons) treated or disposed in waste management system #1	
18	SYSTYPE2	BRS hazardous waste management system treatment or disposal code (M011 to M141)	4
19	SYSQTY2ton	1993 quantity (tons) treated or disposed in waste management system #2	
20	TOTQTYton	Total quantity of this wastestream (tons) managed in all systems in 1993	
21	TOTWQTYton	Total weighted quantity (tons) to include non-surveyed but similar wastestreams	
22	SAMPWGT	Survey sampling weight (i.e. sampling ratio) for the selection of 20 wastestreams, if there were more than 20 large wastestreams at the facility	
23	AGGWGT	Survey sampling weight for the selection of one of several similar (aggregate) wastestreams	
24	POMCONC	BRS "point-of-measurement" code for wastestream constituent concentrations: 1= Before any mixing of haz wastes, or mixing of haz & non-hazardous wastes 2= After mixing of hazardous wastes 3= After mixing with non-hazardous wastes 4= After mixing with multiple hazardous wastes, and with non-hazardous wastes 8= Don't know	
25	POMQTY	BRS "point-of-measurement" code for wastestream quantity: 1= Before any mixing of haz wastes, or mixing of haz & non-hazardous wastes 2= After mixing of hazardous wastes 3= After mixing with non-hazardous wastes 4= After mixing with multiple hazardous wastes, and with non-hazardous wastes 8= Don't know	

Note: Shaded (colored) datafields indicate datafields needed for linking this data file with the other four NHWCS data files (i.e. for "inner joining" or "defining relations" between multiple data files in executing database queries).

List of Datafields in EPA's NHWCS Database: FACILITY.DB (2 of 5 files)

Ite m	Datafield name	Datafield definition	Size
1	EPAID	12-digit EPA identification number for TSDR facility	13
2	FACNAME	TSDR facility name	50
3	ADDRESS	TSDR facility street address	50
4	CITY	TSDR facility city location	15
5	STATE	TSDR facility state location	2
6	ZIPCODE	TSDR facility postal zip code	10
7	TRID	TSDR facility's EPA "Toxics Release Inventory" 15-digit identification number	15
8	NPDES	TSDR facility's EPA "National Pollutant Discharge Elimination System" 9-digit permit number	15
9	DNB	TSDR facility's Dun & Bradstreet Inc. "Data Universal Numbering System" 9-digit identification number	12
10	NAME	Name of survey questionnaire respondent at TSDR facility	25
11	TITLE	Occupational title of survey questionnaire respondent at TSDR facility	25
12	PHONE	Telephone number for survey questionnaire respondent at TSDR facility	20
13	FACTYPE	Facility type = role played by TSDR in survey (pretest survey or main survey)	7

Note: Shaded (colored) datafields indicate datafields needed for linking this data file with the other four NHWCS data files (i.e. for "inner joining" or "defining relations" between multiple data files in executing database queries).

List of Datafields in EPA's NHWCS Database: CONSTIT.DB (3 of 5 files)

Item	Datafield name	Datafield definition	Size
1	EPAID	12-digit EPA identification number for TSDR facility	13
2	WSNUM	Sequential 1- or 2-digit ID number assigned to each wastestream within a facility	
3	CAS	Chemical Abstract System number of chemical constituent possibly present in waste*	11
4	CONSTITUENT	Chemical name of constituents possibly present in waste*	82
5	WWCONCppm	Wholewaste concentration (average, median or typical, in parts-per-million)	
6	WWBASIS	Basis for and year of wholewaste concentration measurement: <ul style="list-style-type: none"> • A= analysis based on 5 or more samples • E= based on less than 5 samples, or is an estimate 	5
7	LEACHATppm	Leachate concentration (average, median or typical, in parts-per-million)	
8	LCBASIS	Basis for and year of leachate concentration measurement: <ul style="list-style-type: none"> • A= analysis based on 5 or more samples • E= based on less than 5 samples, or is an estimate based on process knowledge, on engineering judgement, or samples from other years than 1993. 	5
9	CHMMASSton	Chemical mass of constituent in wastestream (tons), computed using the algorithm: <ul style="list-style-type: none"> • If WWCONCppm>0: $[TOTQTYtons] \times [WWCONCppm] = \text{mass}$ • If LEACHATppm>0: $[TOTQTYtons] \times [LEACHATppm \times 20] = \text{mass}$ 	
10	CONSTNUM	Sequential 1- or 2-digit number identifying each constituent within each wastestream	

* OSW preloaded each NHWCS questionnaire with information collected from the 1993 BRS, as well as the underlying constituents of concern corresponding to each wastestream's 1993 BRS RCRA hazardous wastecode designation(s).

Note: Shaded (colored) datafields indicate datafields needed for linking this data file with the other four NHWCS data files (i.e. for "inner joining" or "defining relations" between multiple data files in executing database queries).

List of Datafields in EPA's NHWCS Database: PHYSCHAR.DB (4 of 5 files)

Item	Datafield name	Datafield Definition	Size
1	EPAID	12-digit EPA identification number for TSDR facility	15
2	WSNUM	Sequential 1- or 2-digit ID number assigned to each wastestream within a facility	
3	PCTSOLID	Percent of solids by weight	
4	PCTTSS	Percent of total suspended solids (TSS) by weight	
5	PCTASH	Percent of ash by weight	
6	PCTWATER	Percent of water by weight	
7	PCTTOC	Percent of total organic carbon (TOC) by weight	
8	PCTOIL	Percent of oil by weight	
9	SPECGRAV	Specific gravity or density	
10	PH	pH of wastestream	
11	BTUperLB	BTU content per pound of waste	
12	FLASHPTcel	Flash point in celsius	
13	BIO5DAYppm	Five-day biological oxygen demand (parts-per-million)	
14	CHMOXppm	Chemical oxygen demand (parts-per-million)	
15	HALOGppm	Total organic halogen (parts-per-million)	
16	PCTDRVFR	Percent of wastestream consisting of RCRA "derived-from" hazardous waste	
17	PCTNOHAZ	Percent of non-hazardous waste in the wastestream	
18	PHYSCHAR	BRS "point-of-measurement" code for the wastestream characteristics: 1= Before any mixing of haz wastes, or mixing of haz & non-hazardous wastes 2= After mixing of hazardous wastes 3= After mixing with non-hazardous wastes 4= After mixing with multiple hazardous wastes, and with non-hazardous wastes 8= Don't know	4

Note: Shaded (colored) datafields indicate datafields needed for linking this data file with the other four NHWCS data files (i.e. for "inner joining" or "defining relations" between multiple data files in executing database queries).

List of Datafields in EPA's NHWCS Database: COMMENT.DB (5 of 5 files)

Item	Datafield name	Datafield definition	Size
1	EPAID	12-digit EPA identification number for TSDR facility	12
2	WSNUM	Sequential 1- or 2-digit ID number assigned to each wastestream within a facility	5
3	QUES	Number of the survey questionnaire question to which the open comment applies	5
4	COMMENT	Written text of open comment	149
5	CONSTNUM	Sequential 1- or 2-digit number identifying each constituent within each wastestream	

Note: Shaded (colored) datafields indicate datafields needed for linking this data file with the other four NHWCS data files (i.e. for "inner joining" or "defining relations" between multiple data files in executing database queries).

Attachment B:

Waste Quantity Subtotals
Corresponding to
NHWCS Database Query Operators
Applied in this Study

Attachment B: Waste Quantity Subtotals for All NHWCS Data

PCTDRVFR	TOTWQTY		SRC CODE	TOTWQTY	
Not reported	93,784,199	43%	Not reported	45,852,662	21%
0.0	98,198,636		A01	97,257	
0.4	1,214,480		A02	40,020	
0.5	1,263		A03	113,383	
4.0	1,377,392		A04	3,259,546	
5.0	701,112		A09	928,042	
10.0	4,350		A19	10,205,284	
13.8	640,619		A22	111,913	
20.0	1,512		A26	257,178	
25.0	1,070		A29	2,852,538	
29.0	1,882,822		A31	663,176	
30.0	10,374		A32	377,963	
35.0	0		A33	18,931,262	
40.0	62,525		A34	203,356	
50.0	29,345		A35	9,060,330	
60.0	0		A36	12,679	
67.0	1,575		A37	33,560,738	
70.0	1,575		A38	5,955	
80.0	753,178		A39	5,654	
83.0	1,575		A49	36,187,001	
90.0	1,589		A51	519,915	
95.0	4,704		A53	7,013	
97.0	0		A56	5,198	
99.0	3,150		A57	28,583	
99.9	70,326		A59	18,212	
100.0	17,998,534		A60	5,197	
Total =	216,745,906		A63	5,318,744	
			A64	119,249	
			A69	2,190,199	
ORIGCODE	TOTWQTY		A71	557	
Not reported	43,221,378	20%	A72	49,487	
1	152,043,399		A73	92,926	
2	4,958,895		A74	10,916,657	
3	48,761		A75	19,095,065	
4	736,021		A76	12,386	
5	15,737,452		A77	283,775	
Total =	216,745,906		A78	2,781,298	
			A79	416,442	
			A89	4,329,475	
POMCONC	TOTWQTY		A92	490,397	
Not reported	111,981,605	52%	A94	1,568	
1	39,122,782		A99	7,336,392	
2	10,651,904		B33	1,234	
3	11,734,875		Total =	216,745,906	
4	40,706,642				
8	2,548,098				
Total =	216,745,906				

Attachment B (cont'd): Waste Quantity Subtotals for NHWCS Query Datafields

SUMMARY OF DATAFIELD QUERY SUBTOTALS SUBTOTAL WASTE QUANTITIES (1993) CONTAINED IN EPA'S NHWCS DATABASE				
			1993 BRS benchmark waste quantity (tons)	Respondent adjusted 1993 waste quantity (tons)
	ORIGCODE	POMconc		
		8	37,327,280.3	37,420,662.5
	1	1	1,209,300.0	1,209,300.0
	1	1	2,714.0	2,385.0
	1	1	60,355,991.3	60,300,299.7
	1	1	32,560,097.1	33,429,135.0
	1	2	9,112,065.7	9,107,322.9
	1	3	9,739,413.9	10,258,958.5
	1	4	35,503,170.6	37,731,648.0
	1	8	1,209,677.0	1,213,650.0
	2		45,374.3	2,230,230.4
	2	1	528,304.5	540,071.7
	2	2	1,130,140.0	1,130,140.0
	2	3	576,699.5	1,058,452.8
	3	1	48,762.3	48,760.7
	4		1,336.0	20,686.7
	4	1	43,685.0	35,260.0
	4	4	607,917.0	680,074.0
	5		9,800,810.7	9,794,437.0
	5	1	3,276,948.1	3,209,560.0
	5	2	67,803.0	116,807.2
	5	3	384,690.8	377,762.4
	5	4	2,265,975.1	2,238,885.7
	N/A			2,215,288.9
	N/A	1		1,857,609.4
	N/A	2		297,633.6
	N/A	3		39,701.1
	N/A	4		56,034.6
	N/A	8		125,147.9
Column totals =			205,798,156	216,745,906
Survey respondent adjusted change compared to 1993 =				5.3%
Subtotals:				
Subtotal if ORIGCODE = 5			15,796,228	15,737,452
Subtotal if POMconc = 3 or 4 =			49,077,867	52,441,517
Subtotal if both OC=5 & POM=3 or 4 =			2,650,666	2,616,648
Both fields missing data =			37,327,280	39,635,951
Only one field missing data =			70,203,512	74,560,943

Attachment C:

PBT Scores

for Chemical Constituents Measured in NHWCS Database “*Derived-from*” Wastes & Waste “*Mixtures*”

Source: EPA Office of Solid Waste, “Waste Minimization Prioritization Tool Spreadsheet Document for the RCRA Waste Minimization PBT Chemical List Docket” (RCRA Docket nr. F-98-MMLP-FFFFF), released to the public on 09 Nov 1998, Federal Register, Vol.63, Nr.216, pp. 60332-60343.

EPA’s RCRA Docket: 800-424-9346, or via the Internet at <http://www.epa.gov/epaoswer/hotline> 93

Attachment C: PBT Scores for NHWCS “*Derived-from*” Chemical Constituents

Item	CASRN	Chemical Name	Composite	Cancer	Disease	Eco.Tox	Item	CASRN	Chemical Name	Composite	Cancer	Disease	Eco.Tox
1	75343	1,1-Dichloroethane	7	C	1	3	50	57125	Cyanide	6	D	2	3
2	71556	1,1,1-Trichloroethane	7	D	1	3	51	72559	DDE, p,p'-	9	B	2	3
3	76131	1,1,2-Trichloro-1,2,2-trifluoroethane	6		1	2	52	50293	DDT, p,p'-	9	B	3	3
4	79005	1,1,2-Trichloroethane	6	B	2	2	53	117840	Di-n-octyl phthalate	5		2	0
5	95501	1,2-Dichlorobenzene	7	D	1	3	54	132649	Dibenzofuran	9		2	3
6	107062	1,2-Dichloroethane	6	B	1	2	55	53703	Dibenzo(a,h)anthracene	9	B		3
7	120821	1,2,4-Trichlorobenzene	8	D	2	2	56	84662	Diethyl phthalate	6	C	1	2
8	541731	1,3-Dichlorobenzene	7			3	57	959988	Endosulfan, alpha-	9			3
9	106467	1,4-Dichlorobenzene	7	B	1	3	58	72208	Endrin	9	D	3	3
10	91576	2-Methylnaphthalene	6			3	59	64175	Ethyl alcohol [ethanol]	4			2
11	94757	2,4-D	7		2	3	60	206440	Fluoranthene	8	C	2	3
12	120832	2,4-Dichlorophenol	7		2	3	61	86737	Fluorene	9	D	2	3
13	105679	2,4-Dimethylphenol	4		2	2	62	76448	Heptachlor	9	B	3	3
14	51285	2,4-Dinitrophenol	7		2	3	63	118741	Hexachlorobenzene	9	B	2	3
15	93721	2,4,5-TP (Silvex)	7	D	2	3	64	87683	Hexachlorobutadiene	9	C	3	3
16	95954	2,4,5-Trichlorophenol	9		1	3	65	58899	Hexachlorocyclohexane, gamma-	9	B	3	3
17	101553	4-Bromophenyl phenyl ether	9			3	66	77474	Hexachlorocyclopentadiene	6	D	2	3
18	7005723	4-Chlorophenyl phenyl ether	8			3	67	67721	Hexachloroethane	8	B	2	3
19	534521	4,6-Dinitro-o-cresol	7		2	3	68	68553140	Hydrocarbons, C8-11	7			3
20	83329	Acenaphthene	8		2	3	69	74908	Hydrocyanic acid	7		2	3
21	208968	Acenaphthylene	8			3	70	193395	Indeno(1,2,3-cd)pyrene	9	C		3
22	67641	Acetone	4	D	1	2	71	74884	Iodomethane	6	D	3	2
23	75058	Acetonitrile	6	C	2	1	72	7439896	Iron	6			2
24	7429905	Aluminum	7			3	73	78831	Isobutyl alcohol	4		1	2
25	120127	Anthracene	8	D	1	3	74	7439921	Lead	9	C	3	3
26	7440360	Antimony	7		3	2	75	7439976	Mercury	9	D	3	3
27	12672296	Arochlor 1248	9			3	76	72435	Methoxychlor	9	D	2	3
28	7440382	Arsenic	7	A	3	3	77	75092	Methylene chloride	6	B	2	2
29	71432	Benzene	7	A	2	3	78	621647	N-Nitrosodi-n-propyl amine	7	B		1
30	56553	Benzo(a)anthracene	7	B		3	79	86306	N-Nitrosodiphenylamine	6	B		2
31	50328	Benzo(a)pyrene	8	B	3	3	80	91203	Naphthalene	8	B	2	3
32	205992	Benzo(b)fluoranthene	9	C		3	81	7440020	Nickel	7	C	3	3
33	191242	Benzo(g,h,i)perylene	9	D		3	82	99092	Nitroaniline, m-	6			3
34	207089	Benzo(k)fluoranthene	9	C		3	83	88744	Nitroaniline, o-	6		3	2
35	7440417	Beryllium	7	A	2	3	84	98953	Nitrobenzene	7	B	3	3
36	111911	Bis(2-chloroethoxy)methane	6		2	1	85	87865	Pentachlorophenol	8	B	2	3
37	117817	Bis(2-ethylhexyl)phthalate	7	B	2	1	86	85018	Phenanthrene	9	D		3
38	74839	Bromomethane	6	D	2	3	87	108952	Phenol	5	D	1	3
39	85687	Butyl benzyl phthalate	5	0	1	3	88	1336363	Polychlorinated biphenyls	9	B	3	3
40	7440439	Cadmium	9	A	3	3	89	129000	Pyrene	8	D	2	3
41	56235	Carbon tetrachloride	6	B	2	2	90	110861	Pyridine	6	B	2	2
42	57749	Chlordane	9	B	3	3	91	7782492	Selenium	7	D	2	3
43	75003	Chloroethane	6	B	1	1	92	127184	Tetrachloroethylene	6	B	2	2
44	67663	Chloroform	7	B	2	3	93	7440315	Tin	6			2
45	74873	Chloromethane	5	C	2	1	94	8001352	Toxaphene	9	B	3	3
46	7440473	Chromium	7	D	3	3	95	75694	Trichlorofluoromethane	6		1	2
47	218019	Chrysene	7	D		3	96	75014	Vinyl chloride	7	A	3	1
48	7440508	Copper	7		3	3	97	7440666	Zinc	7	D	1	3
49	95487	Cresol, o-	4	C	2	2							

Attachment C: PBT Scores for NHWCS “*Mixtures*” Chemical Constituents

Item	CASRN	Chemical Name	Composite	Cancer	Disease	Eco.Tox	Item	CASRN	Chemical Name	Composite	Cancer	Disease	Eco.Tox
1	71556	1,1,1-Trichloroethane	7	D	1	3	28	74873	Chloromethane	5	C	2	1
2	76131	1,1,2-Trichloro-1,2,2-trifluoroethane	6		1	2	29	7440473	Chromium	7	D	3	3
3	79005	1,1,2-Trichloroethane	6	B	2	2	30	218019	Chrysene	7	D		3
4	95501	1,2-Dichlorobenzene	7	D	1	3	31	95487	Cresol, o-	4	C	2	2
5	107062	1,2-Dichloroethane	6	B	1	2	32	57125	Cyanide	6	D	2	3
6	79469	2-Nitropropane	7	B	2	2	33	110827	Cyclohexane	7			3
7	105679	2,4-Dimethylphenol	4		2	2	34	117840	Di-n-octyl phthalate	5		2	0
8	51285	2,4-Dinitrophenol	7		2	3	35	53703	Dibenzo(a,h)anthracene	9	B		3
9	83329	Acenaphthene	8		2	3	36	84742	Dibutyl phthalate	6	D	1	3
10	67641	Acetone	4	D	1	2	37	84662	Diethyl phthalate	6	C	1	2
11	75058	Acetonitrile	6	C	2	1	38	122394	Diphenylamine	7		2	3
12	107028	Acrolein	6	C	3	3	39	86737	Fluorene	9	D	2	3
13	79061	Acrylamide	6	B	3	3	40	74908	Hydrocyanic acid	7		2	3
14	79107	Acrylic acid	7	D	3	1	41	193395	Indeno(1,2,3-cd)pyrene	9	C		3
15	62533	Aniline	7	B	3	3	42	78831	Isobutyl alcohol	4		1	2
16	120127	Anthracene	8	D	1	3	43	7439921	Lead	9	C	3	3
17	7440382	Arsenic	7	A	3	3	44	7439976	Mercury	9	D	3	3
18	71432	Benzene	7	A	2	3	45	75092	Methylene chloride	6	B	2	2
19	25376458	Benzenediamine, ar-methyl-	7			3	46	91203	Naphthalene	8	B	2	3
20	56553	Benzo(a)anthracene	7	B		3	47	7440020	Nickel	7	C	3	3
21	50328	Benzo(a)pyrene	8	B	3	3	48	98953	Nitrobenzene	7	B	3	3
22	207089	Benzo(k)fluoranthene	9	C		3	49	85018	Phenanthrene	9	D		3
23	117817	Bis(2-ethylhexyl)phthalate	7	B	2	1	50	108952	Phenol	5	D	1	3
24	85687	Butyl benzyl phthalate	5	0	1	3	51	129000	Pyrene	8	D	2	3
25	7440439	Cadmium	9	A	3	3	52	110861	Pyridine	6	B	2	2
26	56235	Carbon tetrachloride	6	B	2	2	53	127184	Tetrachloroethylene	6	B	2	2
27	67663	Chloroform	7	B	2	3	54	75694	Trichlorofluoromethane	6		1	2

Attachment D:

Data Analysis
Quality Control Techniques
Applied in this Study

Attachment D: List of Nine Data Analysis *Quality Control Techniques* Applied in this Study

- Performed redundant, random data query/sorting operations.
- Looked for unusual patterns in data query/sorting results.
- Randomly checked spreadsheet cell formulae.
- Cross-checked data query/sorting results against multiple datafields for single data items (e.g. used both CASNR & chemical names for PBT score lookup).
- Built-in data integrity assessment “checksums” at each step of sequential data query/sorting analysis, at two levels:
 - Data item total counts and sums
 - Data item sorting bin counts and sums
- Compared resultant data query subsets to database universe.
- Used electronic (computer) search features and statistical and mathematical computations, but used random manual checks.
- Observed resultant max/min and bin sorted data values for reality check (e.g. pH=0 data entries miscoded, as well as other datafields such as SRCCODE, ORIGCODE, POMC).
- Provided working drafts for internal USEPA & external (workgroup) review.