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Hazardous Waste Ranking — Assessment of Air Emissions from Hazardous Waste Treatment, Storage, And Disposal Facilities

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Hazardous Waste Ranking — Assessment of Air Emissons from Hazardous Waste Treatment, Storage, and Disposal Facilities

Prepared by

GCA/Technology Division
GCA Corporation
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Prepared for

U S ENVIRONMENTAL PROTECTION AGENCY
Office of Air Quality Planning and Standards
Emission Standards and Engineering Division
Research Triangle Park, North Carolina 27711

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SPECIAL NOTE

A Draft Final Report (December 1982) and a Revised Draft Final Report (November 1983) previously developed for this project were prepared and furnished to U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response (OSWER), Land Disposal Branch, under Contract No. 68-02-3168 (Technical Service Area 3, Assignment No. 82). Ms. Alice C. Gagnon served as EPA Projeect Officer and Dr. Seong T. Hwang of EPA/OSWER served as Task Officer for these efforts. On December 23, 1983, hazardous waste treatment, storage, and disposal facility (TSDF) area source emissions regulatory development was transferred from OSWER to the Office of Air Quality Planning and Standards (OAQPS). This Final Report was prepared under the direction of EPA/OAQPS Task Officer, Kent C. Hustvedt, in partial fulfillment of Contract No. 68-01-6871, Assignment No. 37.

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ACKNOWLEDGMENT

A number of EPA and GCA staff members contributed to this preliminary study of TSDF air emissions. Mr. Jon Perry of OSW's Land Disposal Branch served as the Task Officer during the initial stages of the program. Dr. Seong T. Hwang assumed Task Officer responsibility partway through the effort, and his guidance was especially helpful. Mr. Ed Martin and Ms. Karen Walker of OSW's Technology Branch assisted in program planning, coordination and work plan development. Their contribution in obtaining waste characterization data is gratefully acknowledged. A number of additional OSW staff members also contributed to data collection and program planning efforts. GCA staff who assisted in the large data manipulation task include Ron Bell, Tom Fitzgerald, and Michael Kravett.

SECTION 1

INTRODUCTION AND SUMMARY

INTRODUCTION

The hazardous waste prioritization presented in this report was designed to provide a first cut estimate of the inhalation health impact potential of hazardous wastes currently being disposed in the United States. The primary objective of this waste prioritization ranking was to identify a select group of hazardous wastes for subsequent analysis of air emissions under other projects.

This report provides several ranking schemes to prioritize select RCRA wastes based on potential health impacts from TSDF air emissions. The effort presented herein is an expansion of a previous effort which ranked RCRA chemicals on the basis of volatility and toxicity.[1] The revised ranking relies on a more sophisticated definition of volatility, and addresses health impacts on the basis of both inhalation toxicity and carcinogenicity. The revised prioritization presented in this report was tailored to respond to review comments received from the Land Disposal and Technology Branches of OSW, the Office of Health and Environmental Assessment (OHEA)/Washington, the Environmental Criteria Assessment Office (ECAO)/Cincinnati, and the Carcinogen Assessment Group (CAG)/Washington.

Revisions incorporated into the revised ranking in response to review comments included the following.

- Development of separate prioritization rankings for toxic and carcinogenic effects.
- Inclusion of data to permit the accounting of hazardous constituent concentration in the wastes.
- Consideration of TSDF process category by segregating processes into aqueous and nonaqueous types.
- Development of hazardous waste rankings based on: (1) waste type; and (2) chemical constituent.

The resulting waste ranking provides a numerical comparison of potential air emission hazard for a waste. It involves the computation of inhalation toxicity and carcinogenicity hazard factors for each waste evaluated. These factors are defined as the ratio of the equilibrium gas concentration for a compound (Ceq_i) to either the Threshold Limit Value (TLV) for the calculation of toxicity hazard factors or the maximum allowable concentration at the 10^{-5} Risk Level (10^{-5} RL) for carcinogenicity hazard factors. These ratios allow for the relative comparison of air hazards associated with the toxicity or carcinogenicity of a waste.

The remainder of this section provides an overview of the project methodology and the results of the hazardous waste air emissions prioritization. Each element of the study is discussed in detail in the remaining sections of the report. Hazardous waste volume determinations and characterization are discussed in Sections 2 and 3, respectively. Section 4 presents the assessment of chemical properties, toxic and carcinogenic effects. The hazard factor development and ranking results are presented in detail in Section 5.

PROJECT METHODOLOGY

A four step procedure, illustrated in Figure 1, was employed for the development of the hazardous waste prioritization. The first step involved waste volume determinations and characterization of waste types. The initial selection of candidate wastes for the prioritization ranking was to a limited extent based on the preliminary waste volume results and the availability of characterization data. Chemical and health effects properties (toxicity and carcinogenicity) were assessed for the chemical compounds identified in the second step of this ranking method. The third step involved the computation of aqueous and nonaqueous hazard factors for each waste type and chemical compound. The final step involved the weighting of hazard factors according to waste volumes for the associated waste types.

HAZARDOUS WASTE PRIORITIZATION RANKING RESULTS

The hazardous waste prioritization ranking procedure described above produced eight listings of hazardous waste types and chemical compounds. Separate listings for toxic and carcinogenic effects represents the two major categories of ranking lists provided. These two categories are addressed separately since no common basis of comparison is currently available which is acceptable to the scientific community. Subcategories within these two major groupings include: (1) separate listings for aqueous and nonaqueous TSDF types; and (2) separate listings by hazardous waste type and chemical compound type. Tables 1 through 4 summarize these results for the top ten waste types and chemical compounds in each category. Complete listings of hazard scores for all data analyzed are presented later in Section 5 of this report.

In general, the ranking scores for aqueous TSDF wastes were several orders of magnitude greater than those for nonaqueous TSDF processes due to the hydrophobic nature of many of the hazardous constituents analyzed. The low solubility (water) of many of these chemical compounds results in a high activity coefficient used in calculating the vapor phase equilibrium concentration found in the numerator of the hazardous factor expression. This general trend indicates that nonaqueous disposal processes such as landfarming or landfills would tend to pose less of a relative air emissions health impact than aqueous TSDF processes.

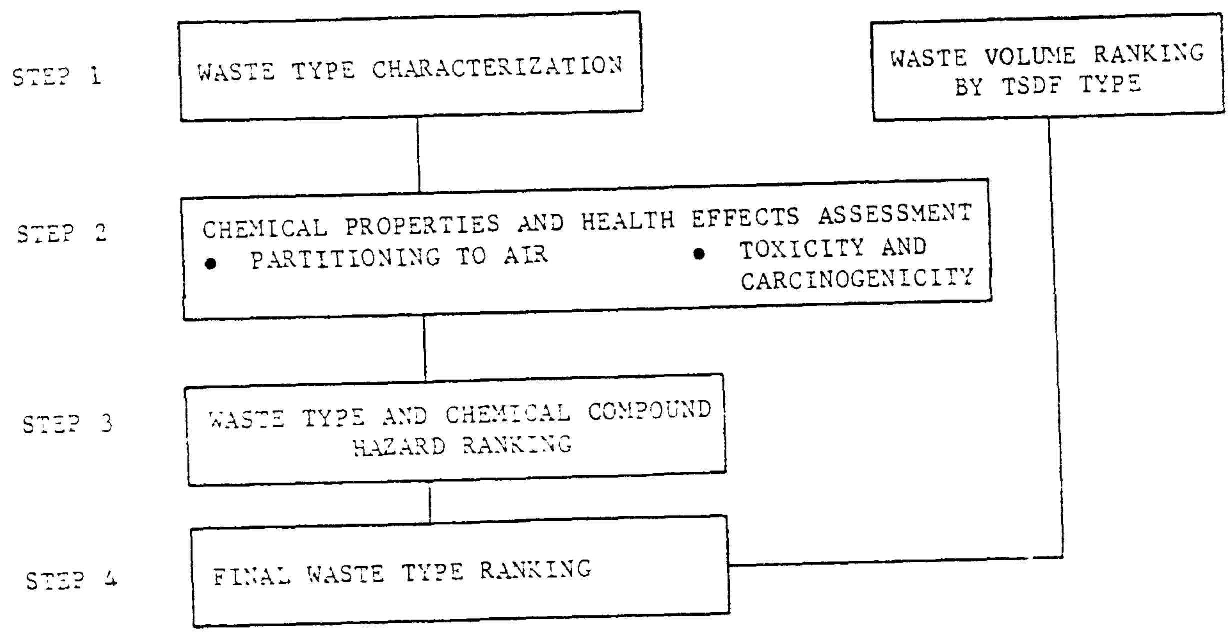

Figure 1. Hazardous waste type ranking methodology.

TABLE 1. LISTING OF TEN HIGHEST RANKED WASTE TYPES BASED ON TOXICITY CRITERIA FOR AQUEOUS AND NON-AQUEOUS TSDF CATEGORIES

Non Aqueous TSDF Categories[a]			Aqueous TSDF Categories[b]		
Waste Type Code	Brief Description	Volume Weighted Hazard Score, $V_{NA}(C_{eq})_{NA}/TLV$	Waste Type Code	Brief Description	Volume - Weighted Hazard Score, $V_{AQ}(C_{eq})_{AQ}/TLV$
U043	Vinyl chloride	6.171 E10	D001	Ignitable wastes, not otherwise listed	3.620 E14
D001	Ignitable wastes, not otherwise listed	1.606 E10	F003	Spent non halogenated solvents[d]	6.646 E13
F025	1,1,1 TCE[c] steam stripper waste	4.751 E9	D002	Corrosive wastes, not otherwise listed	5.880 E13
U001	Acetaldehyde	3.333 E9	F006	Sludges from electroplating operations	1.813 E13
U019	Benzene	2.310 E9	F002	Spent halogenated solvents[d]	1.298 E13
F002	Spent halogenated solvents[d]	2.061 E9	K016	Residues from carbon tetrachloride production	7.943 E12
U078	Vinylidene chloride	2.004 E9	F017	Paint residues or sludges	6.331 E12
F003	Spent non-halogenated solvents[d]	1.494 E9	U055	Cumene	3.322 E12
D002	Corrosive wastes, not otherwise listed	1.486 E9	F001	Spent halogenated degreasing solvents	1.081 E12
K020	Heavy ends from vinyl chloride distillation	6.667 E8	U043	Vinyl chloride	1.033 E12

[a] Non Aqueous (NA) TSDF Categories.

[b] Aqueous (AQ) TSDF Categories.

[c] 1,1,1 trichloroethane.

[d] See Appendix for specific chemical compounds.

TABLE 2. LISTING OF TEN HIGHEST RANKED CHEMICAL CONSTITUENTS BASED ON TOXICITY CRITERIA FOR AQUEOUS AND NON-AQUEOUS TSDF CATEGORIES

Non-Aqueous TSDF Categories[a]			Aqueous TSDF Categories[b]		
Chemical Constituent Code	Compound Name	Volume - Weighted Hazard Score, $V_{NA}(C_{eq})_{NA}/TTV$	Chemical Constituent Code	Compound Name	Volume - Weighted Hazard Score, $V_{AQ}(C_{eq})_{AQ}/TTV$
U043	Vinyl chloride	6.234 E10	U239	Xylene	4.473 E14
U239	Xylene	9.909 E9	U019	Benzene	2.327 E13
U019	Benzene	5.822 E9	U043	Vinyl chloride	1.800 E13
U079	1,2-dichloroethene	5.342 E9	U037	Chlorobenzene	1.381 E13
U001	Acetaldehyde	3.411 E9	C049	Ethyl benzene	1.105 E13
U122	Formaldehyde	2.729 E9	U211	Carbon tetrachloride	9.125 E12
U078	Vinylidene chloride	2.004 E9	U190	Pthalic anhydride	8.481 E12
U196	Pyridine	1.886 E9	U196	Pyridine	7.170 E12
U226	1,1,1-trichloroethane	1.828 E9	U055	Cumene	3.322 E12
U211	Carbon tetrachloride	1.596 E9	U165	Naphthalene	3.096 E12

[a]Non-Aqueous (NA) TSDF Categories.

[b]Aqueous (AQ) TSDF Categories.

TABLE 3. LISTING OF TEN HIGHEST RANKED WASTE TYPES BASED ON CARCINOGENICITY CRITERIA FOR AQUEOUS AND NON-AQUEOUS TSDF CATEGORIES

Non-Aqueous TSDF Categories[a]			Aqueous TSDF Categories[b]		
Waste Type Code	Brief Description	Volume - Weighted Hazard Score, $V_{NA}(C_{eq})_{NA}/TLV$	Waste Type Code	Brief Description	Volume - Weighted Hazard Score, $V_{AQ}(C_{eq})_{AQ}/TLV$
K016	Residues from carbon tetrachloride production	1.572 E16	K016	Residues from carbon tetrachloride production	2.391 E20
K073	Chlorinated hydrocarbon wastes	7.364 E15	D003	Reactive wastes, not otherwise listed	5.532 E18
F002	Spent halogenated solvents[c]	8.191 E14	F001	Spent halogenated degreasing solvents[c]	1.409 E18
D003	Reactive wastes, not otherwise listed	5.501 E14	D001	Ignitable wastes, not otherwise listed	1.131 E18
K020	Heavy ends from vinyl chloride distillation	4.832 E14	F002	Spent halogenated solvents[c]	3.164 E17
F001	Spent halogenated degreasing solvents[c]	3.959 E14	K073	Chlorinated hydrocarbon wastes	1.541 E17
U043	Vinyl chloride	3.913 E14	D002	Corrosive wastes, not otherwise listed	7.649 E16
U078	Vinylidene chloride	3.342 E14	U019	Benzene	7.629 E16
D001	Ignitable onsites, not otherwise listed	2.326 E14	K014	Bottoms from acrylonitrile production	6.172 E16
U019	Benzene	1.097 E14	F003	Spent non-halogenated solvents[c]	5.429 E16

[a]Non-aqueous (NA) TSDF Categories.

[b]Aqueous (AQ) TSDF Categories.

[c]See Appendix for specific chemical compounds.

TABLE 4. LISTING OF TEN HIGHEST RANKED CHEMICAL CONSTITUENTS BASED ON CARCINOGENICITY CRITERIA FOR AQUEOUS AND NON-AQUEOUS TSDF CATEGORIES

Non-Aqueous TSDF Categories[a]			Aqueous TSDF Categories[b]		
Chemical Constituent Code	Compound Name	Volume - Weighted Hazard Score, $V_{NA}(C_{eq})_{NA}/TLV$	Chemical Constituent Code	Compound Name	Volume - Weighted Hazard Score, $V_{AQ}(C_{eq})_{AQ}/TLV$
U211	Carbon tetrachloride	1.904 E16	U211	Carbon tetrachloride	2.356 E20
U044	Chloroform	4.132 E15	U019	Benzene	6.710 E18
U210	Tetrachloroethylene	1.743 E15	U210	Tetrachloroethylene	5.546 E18
U019	Benzene	8.782 E14	U043	Vinyl chloride	1.151 E17
U043	Vinyl chloride	3.985 E14	U044	Chloroform	3.778 E16
U078	Vinylidene chloride	3.342 E14	U078	Vinylidene chloride	3.187 E16
U009	Acrylonitrile	1.293 E13	U009	Acrylonitrile	5.587 E14
U122	Formaldehyde	4.416 E12	U122	Formaldehyde	1.671 E13
U041	Epichlorohydrin	3.589 E11	U188	Phenol	2.274 E12
U188	Phenol	1.903 E11	U044	Epichlorohydrin	3.344 E11

[a]Non-Aqueous (NA) TSDF Categories.

[b]Aqueous (AQ) TSDF Categories.

Note that ranking scores for the carcinogenicity hazard assessment tend to be higher than these for the toxicity assessment. This is primarily because the 10^{-5} risk level concentrations selected as the carcinogenicity indicator parameter tends to be very low concentrations, producing correspondingly high hazard factor scores. The reader is cautioned that the toxicity and carcinogenicity rankings presented in this report provide a basis for relative comparison of wastes within each ranking list and cannot be compared against each other. Simply stated, direct comparison of toxicity hazard scores to carcinogenicity hazards scores presented in this report is not advisable.

Table 1 presents the waste type toxicity ranking scores for the ten highest scored waste types from aqueous and nonaqueous TSDF categories. Note that the volume-weighted scores shown are greater for aqueous wastes in spite of larger nonaqueous waste volumes. Five waste types common to both lists presented in Table 1 include:

- D001 - Ignitable wastes, not otherwise listed;
- D002 - Corrosive wastes;
- K029 - 1,1,1-TCE steam stripper waste;
- F002 - Spent halogenated solvents; and
- U019 - Benzene, discarded off-specification wastes.

The generic D-type wastes were found in great volume (D001 also showed a very high hazard factor). In general, the remaining wastes showed both high hazard factors and large waste volumes.

Table 2 presents the results of the toxicity ranking scores for the ten highest scored chemical constituents. As expected, the chemical constituent results follow trends similar to the waste type ranking. Seven waste constituents common to both lists presented in Table 2 include:

- U122 - Formaldehyde;
- U043 - Vinyl chloride;
- U079 - 1,2-dichloroethylene;
- U019 - Benzene;
- U196 - Pyridine;
- U239 - Xylene; and
- U226 - 1,1,1-trichloroethane.

Two of these wastes, xylene and 1,2-dichloroethylene, were among the eight highest contributors to TSDF constituents identified in an earlier study[2] on national emissions estimates from TSDFs.

Table 3 presents the results of the carcinogenicity ranking scores for the ten highest scored waste types from aqueous and nonaquoues TSDF categories. Final volume-weighted scores were approximately four orders of magnitude greater for aqueous TSDFs, than for the nonaqueous category. Seven waste types found in both categories include:

- K016 - Carbon tetrachloride production heavy ends;
- K073 - Chlorinated hydrocarbon wastes from chlorine production;
- F002 - Spent halogenated solvents;
- D003 - Reactive wastes, not otherwise listed;
- F001 - Spent halogenated degreasing solvents;
- D001 - Ignitable wastes, not otherwise listed; and
- U019 - Benzene, off-specification discarded.

The top two K-type wastes (K016 and K073) are listed here primarily due to very high hazard factors. The other generic F and D type wastes appear due to substantial waste volumes.

Table 4 presents the waste type carcinogenicity ranking results by chemical constituent type for the top ten chemical compounds. Note that only ten chemical compounds were included in this analysis because characterization data were not found for many of the carcinogens identified by CAG.

The prioritization rankings presented above provide a comparative analysis for the potential health impacts associated with air emissions from hazardous waste handling. Note that the scores presented are based on waste volumes handled on a national scale. Local conditions, including waste volumes handled and disposal practices, may affect the relative impact of air emissions from one waste to another.

INPUT DATA DEVELOPMENT

The following discussion briefly summarizes the development of input data required to produce the hazardous waste prioritization ranking.

Waste Volume and Distribution

GCA used RCRA Part A permit application data to estimate waste volumes for the waste ranking analysis. Initial Part A results which predicted 4 billion tonnes of waste clearly suggested the need for statistical screening methods to eliminate erroneous data resulting from reporting errors and redundant waste accounting. GCA employed a statistical outlier screening methodology aided by information obtained from other data sources, including the Westat telephone verification survey,[3] the RIA site visit questionnaire data, and other EPA-sponsored studies.[4-7]

The outlier screening analysis rejected 768 of the original 150,000 Part A waste streams, reducing the total waste volume to 107 million tonnes. The Part A data were further screened to correct for the redundant accounting of offsite waste disposal. The redundancy correction reduced the total estimated hazardous waste annual quantity to 92 million tonnes.

Use of the statistically-cleaned Part A data was complicated by its inherent vagueness with respect to wastes processed by two or more TSDFs. Much of the Part A wastes were processed by more than one unit operation, and no volume distribution among processes was provided. Consequently, several assumptions were required to distribute waste volumes among TSDF unit processes as described in Section 2. While the assumptions may be completely inadequate in some cases, it is felt that the method of redistribution is reasonably representative of the entire waste population. Independent comparisons of corrected Part A data waste volumes to Westat verification data[3] showed agreement to within 2 percent for volumes handled by four TSDF unit processes which could be compared.

Waste Characterization

Waste characterization data and chemical property information were required for input to the hazardous waste ranking. The goal was to rank the emissions risk potential for all selected chemicals based on their presence in both the chemical-specific (U and P) waste codes, and the generic waste codes, (K, D and F). When it became clear that no comprehensive RCRA waste characterization effort had been conducted for all TSDF types and waste codes, GCA collected and compiled available data from several EPA programs. Waste characterization data were summarized for 47 generic waste codes and 54 chemical specific codes, representing almost 50 percent (30 million tonnes) of the total waste volume reported in the statistically-screened Part A data for the unit processes under study.

Data from multiple reference sources[4-6] characterizing single waste codes were averaged using a volume weighting procedure. The weighted concentration data were converted to mole fractions for use in the AERR models. These data were combined with the screened Part A volume data to produce constituent quantity data for each TSDF unit process for emission estimates.

Chemical Properties and Health Effects Data

Chemical properties of the 54 hazardous constituents selected for study were summarized for use in the waste ranking efforts. Upon examination of approximately 95 percent of the total waste volume reported, GCA determined that 100 waste types had data appropriate for the computation of a toxicity or carcinogenicity hazard factor. Many chemicals such as arsenic and chromium either had no vapor pressure data available or had vapor pressures significantly less than 1 mmHg at 25°C. Chemicals lacking published vapor pressure data or necessary health properties data are not listed in this prioritization report.

Similarly, sufficient carcinogenicity data were found for only 52 chemical compounds. The chemical, physical, and health properties data that were compiled are presented in Appendix A. Details on the chemical property data estimation techniques employed and health effects data obtained are included with a summary of these data in Section 4 of this report.

SECTION 2

ESTIMATION OF TOTAL HAZARDOUS WASTE QUANTITIES AND DISTRIBUTION

The quantity of hazardous waste handled by aqueous and nonaqueous TSDF processes was estimated by a combination of the following data sources:

- RCRA Part A permit application file (screened to remove outliers);
- Part A verification data developed for OSW by Westat;[3]
- Land application data compiled for OSW by K. W. Brown, Inc;[4]
- Limited data from the land disposal and storage RIA program;
- EPA reports;[5,6] and
- Other technical literature.

Development of waste quantity estimates for the hazardous waste ranking was a difficult task, primarily due to conflicting data bases. There was no consensus between available data sources regarding the actual volume of waste handled at RCRA TSDFs. Consequently, a detailed analysis of available information was performed to establish waste quantities, as described below.

HAZARDOUS WASTE QUANTITY DETERMINATION

Significant inconsistencies were found between hazardous waste quantities reported by TSDFs (RCRA Part A) and those reported by waste generators in all major data sources GCA consulted for this project. The most recent estimate* of hazardous waste generation in the U.S. is 41 million metric tons per year,[2] whereas the Part A data indicate a much larger value. An accurate interpretation of these data is difficult due to the following observations:

- Hazardous waste facility operators did not consistently report values for waste volume which reflect the actual quantity of hazardous species in the waste stream. RCRA regulations require an

*EPA updated this estimate to 150 million tonnes, 30 August 1983.

entire waste stream to be reported as hazardous regardless of the quantity of hazardous material in that stream. Consequently, facilities which combined nonhazardous streams with hazardous streams prior to treatment, storage, or disposal would frequently report the combined volume as hazardous. For cases where hazardous wastes are shipped to offsite facilities, the quantity of hazardous waste is well defined; i.e. the quantity shipped or received. It is also representative of the actual hazardous stream quantity since transportation costs would preclude the unnecessary shipping of nonhazardous material. However, since the majority of hazardous waste is handled in onsite facilities, it is likely that significant quantities of nonhazardous material are being reported as hazardous in the form of combined process waste streams.

- Due to ambiguity in Part A application instructions regarding waste quantity reporting, it is likely certain wastes were reported under multiple RCRA hazardous waste codes. Specifically, the instructions dictate reporting wastes by all waste codes that could be used to define that particular waste stream. Thus, for waste streams comprised of multiple codes, the entire waste volume may be reported under each code. In addition, chemical constituents of waste streams denoted by U and P waste codes may also be reported under their generic counterparts (D, F and K waste codes).

- Erroneous data are reported which have not been verified. For instance, Part A data contained eight single waste streams at specific facilities with annual quantities exceeding 10 million metric tons. This is clearly an unrealistic quantity because total U.S. hazardous waste generation is estimated as 41 million metric tons, original EPA estimate; and 150 million tons, recent estimate.

- Statistical elimination of erroneously reported data is hindered by the fact that some large volume waste streams do, in fact, exist. Thus, eliminating apparently erroneous data can result in a substantially incorrect quantity, for a waste code or process, and in turn, an incorrect emissions estimate.

The following discussion reviews the procedures GCA employed to estimate hazardous waste volumes for use in the weighted waste ranking methodology. As discussed earlier, information pertaining to hazardous constituent characterization is equally important.

Waste Stream Quantities

The Part A data tape received from EPA was found to contain data for 9,117 hazardous waste sites throughout the U.S. Each site listed waste volumes for up to 495 separate waste codes. A total of 147,177 individual waste streams were reported on the Part A tape, averaging 16 waste types per site. Preliminary analysis of these waste streams indicated that the volumes reported were often subject to reporting, coding, and/or programming errors.

The total annual U.S. waste volume as reported on the Part A tape was almost 4 billion metric tons, a figure considerably at odds with independent estimates of 41 and 150 million metric tons. Examination of the largest reported volumes indicated that gross errors for a relatively small number of waste streams accounted for the majority of the errors in the data set. For example, one waste volume for a site was reported at 1.8 billion metric tons handled annually. Volume data for other sites also appeared to be many orders of magnitude greater than could reasonably be expected even for a very large TSDF. It was clear from this analysis that certain outlying, erroneous data points accounted for the gross inaccuracy of the total annual volume reported in the Part A data.

In order to modify the original Part A data base so waste volume data could be obtained for the hazardous waste ranking, the following procedure was developed to eliminate outliers from the data:

- All unit waste volumes over 10 million metric tons were assumed to be errors and the volumes for these waste streams were changed to "missing". Eight waste volumes were affected by this step, reducing the total volume reported from 4 billion to 541 million metric tons.

- Waste codes which did not report waste volumes and codes with volumes reported as zero were excluded from the data set. These codes accounted for 47.8 percent of the codes reported on the Part A tape. Descriptive statistics, including estimation of the mean, standard deviation, and sample size, were developed for the remaining 76,847 waste streams by waste code.

- Identification of outliers was performed by use of the one-tailed student's t-distribution at the X = 0.01 significance level. Similar to the descriptive statistics developed previously, this was also performed on an individual waste code basis to control for differences in average waste stream volumes which exists between different codes. The criteria for the acceptance/rejection decision for each reported waste volume was:

  If $t_{iw} \geq t(N_w, 0.01)$,

  then reject that volume;

  for

  $$t_{iw} = \frac{QNT_{iw} - \overline{QNT}_w}{S_w \sqrt{N_w}}$$

  where,

  t_{iw} = t statistic for observation "i" of waste "w",

  QNT_{iw} = volume reported for observation "i" of waste "w",

$\overline{QNT}_w$ = mean volume for waste "w",

S_w = standard deviation of volume reported for waste "w", and

N_w = sample size of volume reported for waste "w".

A total of 3,274 of the original 76,847 waste volume entries were rejected by this procedure (4.2 percent of total waste streams reported). An examination of the rejected outliers indicated that a small number of facilities had listed identical volumes for 40 to 100 different waste types. Analysis of these rejected volumes found them in excess of the mean volume for all reported wastes of that code by several orders of magnitude. In many cases, the rejected data were several hundred standard deviations above the mean levels reported for all wastes in that respective code. These observations confirm the suspicions of reporting errors developed during the preliminary analysis. After the volume determined to be outliers were removed from the data base, the total waste volume was reduced to 22.2 million metric tons reported in 73,573 waste streams.

Further refinement of the outlier analysis was conducted later when data from the waste characterization study and the land disposal RIA site visit questionnaires became available. GCA found that an excessive number of waste streams reported in these sources would have been excluded in the outlier analysis. Subsequent evaluation led to the selection of a much higher cutoff point for outlier data on the Part A tape, corresponding to a confidence level greater than 99.95 percent (type 1 error less than .05 percent).

GCA felt that the above refinement to the outlier analysis was necessary due to the tremendous impact these outlier volumes had on the total waste volume determination. The selection of a higher outlier cutoff point added an additional 2,506 waste steams previously excluded from the data set. Thus, refined outlier analysis eliminated 768 or 1.0 percent of the 76,847 total data entries in the original Part A data base. The final analysis resulted in a total annual hazardous waste quantity estimate of 106.7 million metric tons reported by all TSDFs that filed Part A permit applications. This figure does not account for redundant waste quantities.

Redundant Waste Quantity Correction

The next step in the waste volume determination involved making allowances for wastes that were disposed offsite and thus counted more than once under the Part A reporting requirements. Under this corrective scheme, all wastes that reported storage in tanks or containers only were assumed to be 100 percent reported elsewhere as well. Waste stored only in surface impoundments and waste piles were assumed to be 50 percent reported elsewhere (i.e., some degree of waste reduction through evaporation etc. was assumed to occur). Making allowances for redundant quantities in this manner resulted in an annual estimate of 91.7 million metric tons of hazardous waste. This approach suggests that 14 percent of hazardous wastes are disposed offsite nationally, which agrees well with data reported by the California Air Resources Board (15 percent).7

DISTRIBUTION OF WASTE BETWEEN TSDF UNIT PROCESSES

The next step in determining annual hazardous waste quantities involved waste allocation among the TSDF processes. Unfortunately, this task was complicated because the Part A applications were extremely vague in this area. The main complication arises when a facility reported more than one TSDF unit process for a given waste stream. Facilities were permitted to report as many as six TSDF processes for each waste code. The following discussion presents methods developed to handle these Part A reporting problems.

GCA initially determined that estimating waste distribution between processes would be best accomplished by extrapolating from waste streams handled by a single unit process. These single process streams accounted for approximately 40 percent of the total waste streams reported, by frequency. However, based on further analysis of other distribution schemes, GCA concluded that the single process apportionment scheme did not adequately describe the distribution of wastes among TSDF processes.

The following methodology was then developed for allocating waste quantities between processes:

- Waste streams reportedly handled by a single process would remain allocated to that process;
- Waste streams reportedly handled only by storage processes would be equally distributed among storage processes listed;
- Waste streams reportedly handled only by treatment/disposal processes would be evenly allocated among those treatment/disposal processes; and
- Waste streams reportedly handled by storage and treatment/disposal processes would first be evenly allocated among the storage processes; i.e. GCA assumed all of the waste was stored in some fashion. Secondly, all of the waste handled in storage containers and tanks and 50 percent of the waste handled in storage impoundments and waste piles was assumed to then be evenly distributed among the reported treatment/disposal processes. This assumption is similar to that used in the redundant waste quantity correction. It attempts to account for the degree of waste volume reduction which takes place when wastes are stored in open air processes.

A major limitation of the distribution scheme selected for hazardous waste ranking is that wastes are assumed to exhibit an equal distribution between reported processes. It is highly likely that when site owners reported multiple processes, there are several combinations which generally have a disproportionate amount of waste going to one of the processes. For example, when a disposal process (e.g., landfill) is listed in combination with a treatment process (e.g., treatment tank), it is likely that more than 50 percent of the waste is handled in the treatment process. This follows from the fact that wastes will likely be treated and then disposed rather than the reverse. Another limitation of this distribution scheme is that wastes are not distributed among processes in the same proportion in the Part A data. Streams which contain a high liquid content will not be landfilled, incinerated, or stored in a waste pile, to a significant extent.

RESULTS

The results of the Part A analysis with the corrected waste volumes are presented in Table 5 wherein waste types or codes (as described in the Federal Register[8]) are listed in order of decreasing disposal volume. Chemical specific waste codes (U and P codes) and generic waste stream specific codes (D, F and K codes) are defined in Appendix A, Tables A-1 and A-2, respectively. The data in Table 5 indicate the total waste volume for each code in metric tons, the percent of total U.S. volume and the cumulative percent accounted for by the listed waste codes. The total U.S. volume, after data corrections described previously, is 91.6 million metric tons. The highest volume waste type is D002--nonlisted corrosive wastes--with an annual disposal volume of about 25.6 million metric tonnes (MT) or 27.9 percent of the total corected Part A volume. Other high volume wastes include D007 (chromium waste), D000 (any combination of arsenic, barium, cadmium, and chromium waste), K062 (waste pickle liquor), and D003 (nonlisted reactive wastes).

Tables 6 and 7 present similar data for aqueous and nonaqueous processes, respectively. As part of the revised ranking approach presented in this report, GCA took into consideration influence of the TSDF process subcategory. TSDF processes were divided into aqueous and nonaqueous categories as follows:

- Aqueous Processes
  - S04 - Storage Surface Impoundment
  - T01 - Treatment Tank
  - T02 - Treatment Surface Impoundment
  - D83 - Disposal Surface Impoundment
- Nonaqueous Processes
  - S03 - Waste Piles
  - D80 - Landfill
  - D81 - Land Application

Note that storage tanks (S02) were originally included in the ranking. However, the impact of storage tank emissions was found to be very low compared to other TSDF processes.[2] Thus, storage tanks (S02) were removed from the TSDF population for this study.

TABLE 5. PRELIMINARY SCREENING OF WASTE VOLUME BY WASTE TYPES

(CORRECTED VOLUMES)

OBS	WASTE TYPE[a]	WASTE VOLUME[b]	PERCENT	CUMULATIVE PERCENT
1	TOTAL	91,599,934.65	100.0000	.
2	D002	25,584,063.87	27.9302	27.9302
3	D007	10,959,133.23	11.9641	39.8943
4	D000	6,880,247.63	7.5112	47.4055
5	K062	2,741,369.72	2.9928	50.3983
6	D003	2,627,759.20	2.8687	53.2670
7	F007	2,596,874.67	2.8350	56.1021
8	D001	2,143,618.35	2.3402	58.4423
9	K011	1,698,264.10	1.8540	60.2963
10	F006	1,507,940.60	1.6462	61.9425
11	F014	1,172,405.61	1.2799	63.2224
12	K027	1,106,976.17	1.2085	64.4309
13	D004	1,089,792.69	1.1897	65.6206
14	K016	1,005,953.93	1.0982	66.7188
15	D008	998,701.44	1.0903	67.8091
16	K010	963,099.01	1.0514	68.8605
17	K048	958,726.16	1.0466	69.9072
18	K047	847,802.51	0.9255	70.8327
19	K013	786,734.37	0.8589	71.6917
20	D009	772,232.35	0.8430	72.5347
21	F009	765,700.34	0.8359	73.3706
22	F001	745,368.22	0.8137	74.1844
23	K051	674,184.16	0.7360	74.9204
24	K049	644,348.89	0.7034	75.6238
25	K002	596,079.02	0.6507	76.2745
26	K061	591,455.75	0.6457	76.9202
27	D006	562,207.01	0.6138	77.5340
28	K071	513,399.96	0.5605	78.0945
29	U001	413,190.43	0.4511	78.5456
30	K044	390,097.84	0.4259	78.9714
31	F005	357,485.02	0.3903	79.3617
32	D005	318,206.31	0.3474	79.7091
33	F003	290,244.74	0.3169	80.0260
34	D010	227,742.44	0.2486	80.2746
35	F012	227,648.35	0.2485	80.5231
36	F002	222,661.57	0.2431	80.7662
37	K087	193,235.99	0.2110	80.9771
38	K030	180,460.38	0.1970	81.1742
39	F008	174,504.25	0.1905	81.3647
40	D011	172,754.91	0.1886	81.5533
41	U055	171,371.44	0.1871	81.7403
42	P030	167,017.60	0.1823	81.9227
43	U113	166,260.10	0.1815	82.1042
44	K019	159,920.38	0.1746	82.2788
45	K050	159,012.47	0.1736	82.4524
46	K081	154,851.81	0.1691	82.6214
47	U077	154,410.61	0.1686	82.7900
48	K052	150,099.99	0.1639	82.9539
49	K069	147,961.64	0.1615	83.1154
50	F015	144,955.05	0.1582	83.2736
51	K031	143,383.98	0.1565	83.4302
52	F018	140,346.28	0.1532	83.5834
53	K079	137,944.82	0.1506	83.7340
54	K082	135,050.29	0.1474	83.8814

TABLE 5 (continued)

(CORRECTED VOLUMES)

OBS	WASTE TYPE[a]	WASTE VOLUME[b]	PERCENT	CUMULATIVE PERCENT
55	F010	132,238.38	0.1444	84.0259
56	K046	126,050.38	0.1376	84.1634
57	U043	126,005.23	0.1376	84.3009
58	U238	124,348.58	0.1358	84.4367
59	F017	117,601.47	0.1284	84.5651
60	K022	114,495.85	0.1250	84.6901
61	U012	112,781.23	0.1231	84.8132
62	U051	111,191.23	0.1214	84.9346
63	U234	110,475.43	0.1206	85.0552
64	U237	108,537.64	0.1185	85.1737
65	K058	107,748.14	0.1176	85.2913
66	D012	106,359.06	0.1161	85.4074
67	P010	106,176.27	0.1159	85.5233
68	K035	105,632.77	0.1153	85.6387
69	K018	104,043.81	0.1136	85.7522
70	U016	102,625.59	0.1120	85.8643
71	K059	97,262.66	0.1062	85.9705
72	K057	96,621.72	0.1055	86.0759
73	K020	91,457.39	0.0998	86.1758
74	F106	91,399.20	0.0998	86.2756
75	K044	90,417.36	0.0987	86.3743
76	F004	90,260.21	0.0985	86.4728
77	P054	89,027.59	0.0972	86.5700
78	U064	85,334.72	0.0932	86.6632
79	U052	83,983.56	0.0917	86.7549
80	K014	82,364.45	0.0899	86.8448
81	P048	82,182.53	0.0897	86.9345
82	K033	81,121.03	0.0886	87.0231
83	K043	78,821.28	0.0860	87.1091
84	K015	78,384.42	0.0856	87.1947
85	U230	76,836.70	0.0839	87.2786
86	U020	76,319.38	0.0833	87.3619
87	U154	74,741.66	0.0816	87.4435
88	U080	74,646.07	0.0815	87.5250
89	K042	74,493.03	0.0813	87.6067
90	K038	70,463.70	0.0769	87.6833
91	K005	67,794.57	0.0740	87.7573
92	K006	67,246.78	0.0734	87.8307
93	P082	66,364.84	0.0721	87.9028
94	K003	66,032.99	0.0721	87.9749
95	U220	65,853.59	0.0719	88.0468
96	U178	65,746.64	0.0718	88.1186
97	K040	65,522.19	0.0715	88.1901
98	D017	64,988.32	0.0709	88.2611
99	K004	64,712.33	0.0706	88.3317
100	U188	64,297.15	0.0702	88.4019
101	K007	64,144.07	0.0700	88.4719
102	F011	63,986.40	0.0699	88.5418
103	U002	63,011.13	0.0688	88.6106
104	K060	62,000.81	0.0677	88.6782
105	K036	61,882.13	0.0676	88.7458
106	K037	61,338.73	0.0670	88.8128
107	K024	59,988.14	0.0655	88.8783
108	U019	59,925.77	0.0654	88.9437

TABLE 5 (continued)

(CORRECTED VOLUMES)

OBS	WASTE TYPE [a]	WASTE VOLUME [b]	PERCENT	CUMULATIVE PERCENT
109	K023	59,191.01	0.0646	89.0093
110	U134	58,462.94	0.0638	89.0721
111	D013	58,276.65	0.0636	89.1357
112	U111	58,270.31	0.0636	89.1994
113	K041	58,076.80	0.0634	89.2628
114	P006	57,837.73	0.0631	89.3259
115	K039	57,636.45	0.0629	89.3888
116	K009	57,209.02	0.0625	89.4513
117	P070	56,878.85	0.0621	89.5134
118	K066	55,910.02	0.0610	89.5744
119	D014	55,556.91	0.0607	89.6351
120	D015	54,822.64	0.0599	89.6949
121	K089	53,881.08	0.0588	89.7537
122	K063	52,144.22	0.0569	89.8107
123	P101	52,029.55	0.0568	89.8675
124	U123	51,546.33	0.0563	89.9237
125	K025	51,434.15	0.0562	89.9799
126	P029	51,384.32	0.0561	90.0360
127	K025	51,274.79	0.0560	90.0920
128	U112	50,939.94	0.0556	90.1476
129	P036	50,799.13	0.0554	90.2030
130	U044	50,762.54	0.0554	90.2584
131	U078	49,197.30	0.0537	90.3122
132	U076	49,162.25	0.0537	90.3658
133	P121	48,074.31	0.0525	90.4183
134	U122	47,549.39	0.0519	90.4702
135	U008	47,037.17	0.0514	90.5216
136	P020	46,050.31	0.0503	90.5719
137	P074	45,527.86	0.0497	90.6215
138	U004	45,511.04	0.0497	90.6712
139	D016	45,478.30	0.0496	90.7209
140	K008	45,416.83	0.0496	90.7705
141	P098	45,365.23	0.0495	90.8200
142	U009	45,355.73	0.0495	90.8695
143	U056	45,338.82	0.0495	90.9190
144	P078	45,247.38	0.0494	90.9684
145	P110	45,214.07	0.0494	91.0179
146	U070	45,205.91	0.0494	91.0671
147	U091	45,065.83	0.0492	91.1163
148	U072	44,833.34	0.0489	91.1652
149	U057	44,788.75	0.0489	91.2141
150	U092	44,720.75	0.0488	91.2630
151	U071	44,613.60	0.0487	91.3117
152	P111	44,573.78	0.0487	91.3603
153	U079	44,570.89	0.0487	91.4090
154	U089	44,212.38	0.0483	91.4573
155	P072	44,202.40	0.0483	91.5055
156	U095	44,202.26	0.0483	91.5538
157	U094	44,201.73	0.0483	91.6020
158	U243	43,780.65	0.0478	91.6499
159	U240	43,508.44	0.0475	91.6973
160	K032	43,408.83	0.0474	91.7447
161	U244	43,379.03	0.0474	91.7921
162	U245	43,290.45	0.0473	91.8393

TABLE 5 (continued)

(CORRECTED VOLUMES)

OBS	WASTE TYPE [a]	WASTE VOLUME [b]	PERCENT	CUMULATIVE PERCENT
163	P104	43,190.57	0.0472	91.8865
164	P094	42,625.82	0.0465	91.9330
165	U237	42,267.35	0.0461	91.9792
166	K086	42,148.69	0.0460	92.0252
167	P076	42,098.40	0.0459	92.0711
168	K028	41,919.10	0.0458	92.1169
169	K091	41,762.75	0.0456	92.1625
170	U007	41,741.85	0.0456	92.2081
171	U119	41,398.25	0.0452	92.2533
172	U239	41,337.01	0.0451	92.2984
173	U032	41,185.88	0.0450	92.3433
174	U053	40,959.67	0.0447	92.3881
175	P021	40,725.89	0.0445	92.4325
176	P068	40,647.33	0.0444	92.4769
177	U069	40,604.40	0.0443	92.5212
178	F039	40,507.87	0.0442	92.5655
179	P066	40,437.75	0.0441	92.6096
180	U060	40,426.36	0.0441	92.6537
181	K100	40,408.61	0.0441	92.6978
182	U108	40,320.78	0.0440	92.7419
183	U107	40,198.10	0.0439	92.7857
184	U024	40,193.43	0.0439	92.8296
185	U088	40,143.89	0.0439	92.8735
186	P040	40,082.40	0.0438	92.9172
187	U005	40,077.04	0.0438	92.9610
188	U006	40,076.19	0.0438	93.0047
189	U046	40,075.77	0.0438	93.0485
190	U042	40,074.59	0.0437	93.0922
191	U027	40,073.60	0.0437	93.1360
192	P041	40,067.94	0.0437	93.1797
193	U023	40,065.80	0.0437	93.2234
194	U038	40,041.48	0.0437	93.2672
195	U093	40,037.15	0.0437	93.3109
196	U021	40,033.46	0.0437	93.3546
197	P097	40,031.92	0.0437	93.3983
198	P113	40,031.52	0.0437	93.4420
199	U014	40,030.46	0.0437	93.4857
200	P057	40,029.79	0.0437	93.5294
201	P118	40,029.74	0.0437	93.5731
202	U035	40,029.61	0.0437	93.6168
203	U009	40,028.62	0.0437	93.6605
204	P027	40,028.48	0.0437	93.7042
205	P085	40,028.45	0.0437	93.7479
206	U085	40,028.39	0.0437	93.7916
207	P046	40,028.37	0.0437	93.8353
208	U022	40,028.24	0.0437	93.8790
209	U026	40,028.15	0.0437	93.9227
210	U059	40,028.12	0.0437	93.9664
211	P026	40,027.92	0.0437	94.0101
212	P045	40,027.92	0.0437	94.0538
213	U086	40,027.89	0.0437	94.0975
214	P093	40,027.87	0.0437	94.1412
215	U087	40,027.83	0.0437	94.1849
216	U015	40,027.83	0.0437	94.2286

TABLE 5 (continued)

(CORRECTED VOLUMES)

OBS	WASTE TYPE[a]	WASTE VOLUME[b]	PERCENT	CUMULATIVE PERCENT
217	U062	40,027.73	0.0437	94.2723
218	U049	40,027.71	0.0437	94.3160
219	P067	40,027.69	0.0437	94.3597
220	P042	40,027.64	0.0437	94.4034
221	U059	40,027.62	0.0437	94.4471
222	U030	40,027.47	0.0437	94.4908
223	P043	40,027.42	0.0437	94.5345
224	P084	40,027.42	0.0437	94.5782
225	U010	40,018.81	0.0437	94.6218
226	U090	40,017.63	0.0437	94.6655
227	P034	39,992.97	0.0437	94.7092
228	U096	39,947.21	0.0436	94.7528
229	P075	39,946.42	0.0436	94.7964
230	K078	39,691.12	0.0433	94.8397
231	P109	39,256.39	0.0429	94.8826
232	P031	39,180.27	0.0428	94.9254
233	P011	39,133.96	0.0427	94.9681
234	U033	39,073.73	0.0427	95.0107
235	P065	38,894.77	0.0425	95.0532
236	P107	38,892.55	0.0425	95.0957
237	K090	38,701.86	0.0423	95.1379
238	U159	38,557.49	0.0421	95.1800
239	P099	38,111.47	0.0416	95.2216
240	U226	38,080.54	0.0416	95.2632
241	P012	38,078.97	0.0416	95.3048
242	P062	38,033.39	0.0415	95.3463
243	P038	38,032.58	0.0415	95.3878
244	P114	38,031.80	0.0415	95.4293
245	P103	37,995.43	0.0415	95.4708
246	P081	37,917.57	0.0414	95.5122
247	P112	37,126.20	0.0405	95.5527
248	U228	37,069.24	0.0405	95.5932
249	K029	36,996.21	0.0404	95.6336
250	U210	36,665.26	0.0400	95.6736
251	P002	36,073.82	0.0394	95.7130
252	K034	36,043.73	0.0393	95.7523
253	P016	35,961.00	0.0393	95.7916
254	P007	35,952.32	0.0392	95.8309
255	P017	35,036.34	0.0383	95.8691
256	P060	34,586.94	0.0378	95.9069
257	K017	33,889.13	0.0370	95.9439
258	K045	33,799.27	0.0369	95.9808
259	U243	32,395.00	0.0354	96.0161
260	U237	31,516.33	0.0344	96.0505
261	U223	30,840.32	0.0337	96.0842
262	U003	30,577.94	0.0334	96.1176
263	U231	30,405.21	0.0332	96.1508
264	U211	29,708.96	0.0324	96.1832
265	U139	29,193.70	0.0319	96.2151
266	U063	29,142.85	0.0318	96.2469
267	U140	28,772.81	0.0314	96.2783
268	U142	28,645.37	0.0313	96.3096
269	U081	28,274.35	0.0309	96.3404
270	K021	27,875.93	0.0304	96.3709

TABLE 5 (continued)

(CORRECTED VOLUMES)

OBS	WASTE TYPE[a]	WASTE VOLUME[b]	PERCENT	CUMULATIVE PERCENT
271	U165	27,683.57	0.0302	96.4011
272	U115	27,427.73	0.0299	96.4310
273	U161	27,176.20	0.0297	96.4607
274	K083	27,023.71	0.0295	96.4902
275	U135	26,405.17	0.0288	96.5190
276	U031	26,239.61	0.0286	96.5477
277	P005	26,181.52	0.0286	96.5763
278	U236	25,923.61	0.0283	96.6046
279	P106	25,880.78	0.0283	96.6328
280	U235	25,826.32	0.0282	96.6610
281	U196	25,423.26	0.0278	96.6888
282	U149	25,288.20	0.0276	96.7164
283	U103	25,136.84	0.0274	96.7438
284	U191	25,005.90	0.0273	96.7711
285	U209	24,995.09	0.0273	96.7984
286	U208	24,989.25	0.0273	96.8257
287	P122	24,705.51	0.0270	96.8527
288	K064	24,613.29	0.0269	96.8795
289	U101	24,609.86	0.0269	96.9064
290	U034	24,609.19	0.0269	96.9333
291	U203	24,606.66	0.0269	96.9601
292	U018	24,606.53	0.0269	96.9870
293	U050	24,606.24	0.0269	97.0139
294	K001	24,563.59	0.0268	97.0407
295	K095	23,587.48	0.0258	97.0664
296	K067	23,473.39	0.0256	97.0920
297	K066	23,064.68	0.0252	97.1172
298	P051	22,907.09	0.0250	97.1422
299	P037	22,303.28	0.0243	97.1666
300	K085	22,026.96	0.0240	97.1906
301	U155	21,800.03	0.0238	97.2144
302	P066	21,551.32	0.0235	97.2380
303	U082	21,458.73	0.0234	97.2614
304	U017	21,342.47	0.0233	97.2847
305	U084	21,340.58	0.0233	97.3080
306	U099	21,339.72	0.0233	97.3313
307	U172	21,339.21	0.0233	97.3546
308	U117	21,187.21	0.0231	97.3777
309	U169	20,976.18	0.0229	97.4006
310	U213	20,947.22	0.0229	97.4235
311	U026	20,904.08	0.0228	97.4463
312	U106	20,831.52	0.0227	97.4690
313	P064	20,772.72	0.0227	97.4917
314	P033	20,719.91	0.0226	97.5143
315	P050	20,700.06	0.0226	97.5369
316	P047	20,693.00	0.0226	97.5595
317	P044	20,667.98	0.0226	97.5821
318	P102	20,609.08	0.0225	97.6046
319	U067	20,576.98	0.0225	97.6270
320	U074	20,574.53	0.0225	97.6495
321	U060	20,565.66	0.0225	97.6720
322	U039	20,526.62	0.0224	97.6944
323	P008	20,526.16	0.0224	97.7168
324	P018	20,525.21	0.0224	97.7392

TABLE 5 (continued)

(CORRECTED VOLUMES)

OBS	WASTE TYPE[a]	WASTE VOLUME[b]	PERCENT	CUMULATIVE PERCENT
325	U073	20,487.68	0.0224	97.7616
326	U041	20,484.07	0.0224	97.7839
327	U114	20,481.55	0.0224	97.8063
328	U047	20,478.02	0.0224	97.8286
329	P087	20,446.49	0.0223	97.8510
330	P023	20,445.06	0.0223	97.8733
331	U157	20,443.64	0.0223	97.8956
332	P028	20,443.60	0.0223	97.9179
333	U173	20,442.89	0.0223	97.9402
334	U011	20,441.50	0.0223	97.9625
335	U164	20,436.49	0.0223	97.9849
336	U192	20,435.99	0.0223	98.0072
337	U137	20,435.39	0.0223	98.0295
338	U066	20,435.30	0.0223	98.0518
339	U184	20,434.39	0.0223	98.0741
340	U098	20,434.22	0.0223	98.0964
341	U212	20,434.01	0.0223	98.1187
342	U141	20,433.94	0.0223	98.1410
343	F049	20,433.86	0.0223	98.1633
344	U139	20,433.82	0.0223	98.1856
345	U193	20,433.76	0.0223	98.2079
346	U214	20,433.73	0.0223	98.2302
347	P116	20,433.44	0.0223	98.2526
348	U215	20,433.22	0.0223	98.2749
349	P115	20,433.05	0.0223	98.2972
350	U116	20,432.67	0.0223	98.3195
351	U109	20,432.55	0.0223	98.3418
352	U181	20,432.46	0.0223	98.3641
353	U209	20,432.45	0.0223	98.3864
354	U097	20,432.44	0.0223	98.4087
355	U206	20,432.35	0.0223	98.4310
356	U150	20,432.26	0.0223	98.4533
357	P069	20,432.16	0.0223	98.4756
358	U174	20,432.05	0.0223	98.4979
359	U177	20,432.01	0.0223	98.5202
360	U176	20,432.00	0.0223	98.5425
361	U179	20,432.00	0.0223	98.5648
362	U180	20,432.00	0.0223	98.5871
363	U143	20,431.89	0.0223	98.6094
364	U163	20,389.32	0.0223	98.6317
365	P119	20,327.80	0.0222	98.6539
366	P063	20,253.59	0.0221	98.6760
367	K073	20,159.41	0.0220	98.6980
368	U127	19,667.26	0.0215	98.7195
369	U129	19,613.25	0.0214	98.7409
370	U029	19,611.06	0.0214	98.7623
371	U131	19,548.50	0.0213	98.7837
372	U128	19,526.80	0.0213	98.8050
373	P105	19,520.29	0.0213	98.8263
374	K094	19,089.59	0.0208	98.8471
375	U204	18,937.34	0.0207	98.8678
376	P095	18,564.23	0.0203	98.8881
377	P092	18,505.15	0.0202	98.9083
378	U205	18,437.67	0.0201	98.9284

TABLE 5 (continued)

(CORRECTED VOLUMES)

OBS	WASTE TYPE[a]	WASTE VOLUME[b]	PERCENT	CUMULATIVE PERCENT
379	U136	18,389.34	0.0201	98.9485
380	U189	17,823.71	0.0195	98.9679
381	F056	17,578.57	0.0192	98.9871
382	P073	17,529.14	0.0191	99.0063
383	P096	17,478.73	0.0191	99.0253
384	P004	16,710.40	0.0182	99.0435
385	P014	16,373.67	0.0179	99.0615
386	U083	16,351.66	0.0179	99.0793
387	U121	16,282.94	0.0178	99.0971
388	U120	15,669.60	0.0171	99.1142
389	P059	15,247.73	0.0166	99.1308
390	P013	15,137.69	0.0165	99.1474
391	P058	15,001.22	0.0164	99.1637
392	U126	14,989.61	0.0164	99.1801
393	K099	14,969.08	0.0163	99.1964
394	U125	14,674.29	0.0160	99.2125
395	K098	14,515.48	0.0158	99.2283
396	U167	13,767.72	0.0150	99.2433
397	P024	13,736.02	0.0150	99.2583
398	U102	13,728.63	0.0150	99.2733
399	U118	13,725.71	0.0150	99.2883
400	U202	13,724.50	0.0150	99.3033
401	U166	13,722.26	0.0150	99.3183
402	U168	13,720.20	0.0150	99.3332
403	P009	13,490.30	0.0147	99.3480
404	F003	12,343.36	0.0135	99.3614
405	P123	11,987.29	0.0131	99.3745
406	P015	11,299.39	0.0123	99.3869
407	P120	11,283.66	0.0123	99.3992
408	U240	11,066.27	0.0121	99.4113
409	U036	10,999.75	0.0120	99.4233
410	P089	10,854.33	0.0118	99.4351
411	U105	10,837.50	0.0118	99.4470
412	U061	10,807.56	0.0118	99.4588
413	U232	10,736.02	0.0117	99.4705
414	P071	10,462.89	0.0114	99.4819
415	K053	10,427.57	0.0114	99.4933
416	U170	10,347.95	0.0113	99.5046
417	P001	10,274.02	0.0112	99.5158
418	U156	10,144.81	0.0111	99.5269
419	U152	9,855.10	0.0108	99.5376
420	U185	9,663.21	0.0105	99.5482
421	U182	9,653.03	0.0105	99.5587
422	U145	9,601.31	0.0105	99.5692
423	U153	9,598.54	0.0105	99.5797
424	U110	9,593.21	0.0105	99.5902
425	U207	9,583.73	0.0105	99.6006
426	P077	9,576.67	0.0105	99.6111
427	U163	9,573.31	0.0105	99.6215
428	U048	9,570.04	0.0104	99.6320
429	U196	9,563.45	0.0104	99.6424
430	U149	9,555.11	0.0104	99.6528
431	U194	9,552.77	0.0104	99.6633
432	U233	9,546.66	0.0104	99.6737

TABLE 5 (continued)

(CORRECTED VOLUMES)

OBS	WASTE TYPE[a]	WASTE VOLUME[b]	PERCENT	CUMULATIVE PERCENT
433	U222	9,547.70	0.0104	99.6841
434	U187	9,547.36	0.0104	99.6945
435	U146	9,547.14	0.0104	99.7050
436	U217	9,546.82	0.0104	99.7154
437	U216	9,546.82	0.0104	99.7258
438	U138	9,546.41	0.0104	99.7362
439	U158	9,546.38	0.0104	99.7467
440	U218	9,546.12	0.0104	99.7571
441	U225	9,545.74	0.0104	99.7675
442	U171	9,520.75	0.0104	99.7779
443	U045	9,185.98	0.0100	99.7879
444	K096	9,072.01	0.0099	99.7978
445	U013	8,846.50	0.0097	99.8075
446	U147	8,721.26	0.0095	99.8170
447	U075	8,663.33	0.0095	99.8265
448	U197	8,295.16	0.0091	99.8355
449	U224	7,654.22	0.0084	99.8439
450	U142	7,600.63	0.0083	99.8522
451	U190	6,635.30	0.0072	99.8594
452	U133	6,216.26	0.0068	99.8662
453	U160	5,973.10	0.0065	99.8727
454	K064	5,507.74	0.0060	99.8787
455	F019	5,399.84	0.0059	99.8846
456	U221	5,343.52	0.0058	99.8905
457	U219	4,666.23	0.0051	99.8956
458	K093	4,536.28	0.0050	99.9005
459	U124	4,408.12	0.0048	99.9053
460	U144	4,338.55	0.0047	99.9101
461	P002	4,313.35	0.0047	99.9148
462	U201	4,208.98	0.0046	99.9194
463	U132	4,093.87	0.0045	99.9239
464	K056	3,740.42	0.0041	99.9279
465	P035	3,130.64	0.0034	99.9313
466	K054	2,719.63	0.0030	99.9343
467	U151	2,620.26	0.0029	99.9372
468	P098	2,449.67	0.0027	99.9398
469	K063	2,449.44	0.0027	99.9425
470	P055	2,449.44	0.0027	99.9452
471	K055	2,219.40	0.0024	99.9476
472	K106	2,033.32	0.0022	99.9498
473	P080	1,997.20	0.0022	99.9520
474	P053	1,996.14	0.0022	99.9542
475	U054	1,996.14	0.0022	99.9564
476	K012	1,996.14	0.0022	99.9585
477	U065	1,996.14	0.0022	99.9607
478	U104	1,996.14	0.0022	99.9629
479	P025	1,995.84	0.0022	99.9651
480	P052	1,995.84	0.0022	99.9673
481	P051	1,995.84	0.0022	99.9694
482	F079	1,995.84	0.0022	99.9716
483	P083	1,995.84	0.0022	99.9738
484	P086	1,995.84	0.0022	99.9760
485	P100	1,995.84	0.0022	99.9782
486	P117	1,995.84	0.0022	99.9803

TABLE 5 (continued)

(CORRECTED VOLUMES)

OBS	WASTE TYPE[a]	WASTE VOLUME[b]	PERCENT	CUMULATIVE PERCENT
487	U040	1,995.84	0.0022	99.9825
488	U190	1,995.84	0.0022	99.9847
489	U175	1,995.84	0.0022	99.9869
490	P019	1,995.84	0.0022	99.9890
491	F032	1,995.84	0.0022	99.9912
492	U229	1,995.84	0.0022	99.9934
493	K104	913.95	0.0010	99.9944
494	K103	911.80	0.0010	99.9954
495	K097	907.48	0.0010	99.9964
496	K101	907.48	0.0010	99.9974
497	K105	907.48	0.0010	99.9984
498	K102	907.48	0.0010	99.9994
499	K074	563.62	0.0006	100.0000
500	ALL2	2.27	0.0000	100.0000
501	U247	0.27	0.0000	100.0000

[a]See Appendix A, Tables A-1 and A-2 for definition.

[b]Metric tons per year based on corrected Part A data.

TABLE 6. PRELIMINARY SCREENING OF WASTE VOLUME IN AQUEOUS PROCESSES BY WASTE TYPE

(S04, T01, T02, D83)

OBS	WASTE TYPE[a]	WASTE VOLUME[b]	PERCENT	CUMULATIVE PERCENT
1	TOTAL	54,837,564.93	100.0000	.
2	D002	21,770,397.75	39.6998	39.6998
3	D007	8,105,894.89	14.7816	54.4814
4	D000	6,303,698.95	11.4952	65.9767
5	K062	1,939,330.85	3.5365	69.5132
6	D003	1,814,165.02	3.3083	72.8214
7	F007	1,780,570.53	3.2470	76.0684
8	K016	1,162,479.20	2.1199	79.1883
9	D001	1,001,215.71	1.8258	80.0140
10	F006	998,309.74	1.8205	81.8345
11	D004	801,839.24	1.4623	83.2968
12	K002	686,906.69	1.2526	84.5494
13	K011	674,369.54	1.2298	85.7792
14	D009	514,364.84	0.9380	86.7172
15	F009	494,653.68	0.9020	87.6192
16	K047	472,998.54	0.8625	88.4818
17	K049	382,099.16	0.6968	89.1785
18	F001	381,062.05	0.6949	89.8735
19	D008	373,043.48	0.6803	90.5537
20	K071	370,367.68	0.6754	91.2291
21	K048	318,637.66	0.5811	91.8102
22	K051	310,550.93	0.5663	92.3765
23	K013	282,436.46	0.5150	92.8915
24	D006	251,585.12	0.4588	93.3503
25	F014	232,763.91	0.4245	93.7748
26	U001	190,540.22	0.3475	94.1223
27	K083	165,727.64	0.3022	94.4244
28	F005	137,630.30	0.2510	94.6754
29	D005	134,391.56	0.2451	94.9205
30	K079	125,013.71	0.2280	95.1485
31	K050	124,268.52	0.2266	95.3751
32	K087	114,509.58	0.2088	95.5839
33	U077	113,921.29	0.2077	95.7916
34	F003	113,675.36	0.2073	95.9989
35	K052	102,286.45	0.1865	96.1854
36	K046	86,013.71	0.1569	96.3423
37	D011	76,045.97	0.1387	96.4810
38	P010	73,586.53	0.1342	96.6152
39	K030	68,583.99	0.1251	96.7402
40	F008	66,236.01	0.1208	96.8610
41	K018	66,172.08	0.1207	96.9817
42	D010	64,522.77	0.1177	97.0993
43	F002	62,577.19	0.1141	97.2135
44	F010	59,054.65	0.1077	97.3212
45	K061	54,672.35	0.0997	97.4209
46	P030	52,761.50	0.0963	97.5172
47	P106	51,706.04	0.0943	97.6114
48	K044	46,259.21	0.0844	97.6958
49	P054	42,451.65	0.0774	97.7732
50	F012	39,143.14	0.0714	97.8446
51	F015	38,155.43	0.0696	97.9142
52	U020	36,312.72	0.0662	97.9804
53	F017	34,414.98	0.0628	98.0432
54	F019	32,805.17	0.0598	98.1030

TABLE 6 (continued)

(S04,T01,T02,D83)

OBS	WASTE TYPE[a]	WASTE VOLUME[b]	PERCENT	CUMULATIVE PERCENT
55	K069	30,353.78	0.0554	98.1563
56	U230	29,258.35	0.0534	98.2117
57	K043	22,720.37	0.0414	98.2531
58	U064	22,680.94	0.0414	98.2945
59	U178	22,680.91	0.0414	98.3358
60	U188	21,579.31	0.0394	98.3752
61	K038	21,466.02	0.0391	98.4143
62	U043	20,836.11	0.0380	98.4523
63	K014	20,541.28	0.0375	98.4898
64	F004	20,507.87	0.0374	98.5272
65	U134	19,154.01	0.0349	98.5621
66	K081	18,149.16	0.0331	98.5952
67	F011	18,042.30	0.0329	98.6281
68	K001	16,635.31	0.0303	98.6584
69	D012	16,592.84	0.0303	98.6887
70	K085	15,666.85	0.0286	98.7173
71	K079	15,509.42	0.0283	98.7456
72	U154	14,865.42	0.0271	98.7727
73	K060	13,597.16	0.0248	98.7975
74	U220	13,516.01	0.0246	98.8221
75	K069	13,339.76	0.0243	98.8465
76	U210	12,953.34	0.0236	98.8701
77	U019	12,598.43	0.0230	98.8931
78	U044	12,225.18	0.0223	98.9154
79	U002	11,974.67	0.0218	98.9372
80	D017	11,645.78	0.0212	98.9584
81	U159	11,571.21	0.0211	98.9795
82	K017	11,219.44	0.0205	99.0000
83	U238	10,972.38	0.0200	99.0200
84	U122	10,806.50	0.0197	99.0397
85	K066	10,747.07	0.0196	99.0593
86	U226	10,678.99	0.0195	99.0788
87	U052	10,441.36	0.0190	99.0978
88	U228	10,408.46	0.0190	99.1168
89	U239	10,069.77	0.0184	99.1352
90	U012	9,597.80	0.0175	99.1527
91	K100	9,544.56	0.0174	99.1701
92	U223	9,335.90	0.0170	99.1871
93	U112	9,051.68	0.0165	99.2036
94	U055	8,921.33	0.0163	99.2199
95	U211	8,919.07	0.0163	99.2361
96	U078	8,870.68	0.0162	99.2523
97	U076	8,869.01	0.0162	99.2685
98	K082	7,845.61	0.0143	99.2828
99	P074	7,276.09	0.0133	99.2961
100	K024	7,267.58	0.0133	99.3093
101	U063	7,158.32	0.0131	99.3224
102	U140	7,153.19	0.0130	99.3354
103	P029	7,150.75	0.0130	99.3484
104	P098	7,085.02	0.0129	99.3614
105	P104	6,994.57	0.0127	99.3741
106	U123	6,913.96	0.0126	99.3867
107	P121	6,909.79	0.0126	99.3993
108	P048	6,897.14	0.0126	99.4119

TABLE 6 (continued)

(S04,T01,T02,D83)

OBS	WASTE TYPE[a]	WASTE VOLUME[b]	PERCENT	CUMULATIVE PERCENT
109	K022	6,890.50	0.0126	99.4245
110	U227	6,859.22	0.0125	99.4370
111	U113	6,856.89	0.0125	99.4495
112	P011	6,856.31	0.0125	99.4620
113	U135	6,798.01	0.0124	99.4744
114	P012	6,794.96	0.0124	99.4868
115	U161	6,766.35	0.0123	99.4991
116	U092	6,677.02	0.0122	99.5113
117	U127	6,671.12	0.0122	99.5234
118	U070	6,653.98	0.0121	99.5356
119	U072	6,627.03	0.0121	99.5477
120	U071	6,624.65	0.0121	99.5597
121	P110	6,620.01	0.0121	99.5718
122	U209	6,608.61	0.0121	99.5839
123	U208	6,608.30	0.0121	99.5959
124	U131	6,603.40	0.0120	99.6080
125	U129	6,601.71	0.0120	99.6200
126	U128	6,601.60	0.0120	99.6320
127	U079	6,600.86	0.0120	99.6441
128	U130	6,600.81	0.0120	99.6561
129	U231	6,600.79	0.0120	99.6681
130	K035	6,201.05	0.0113	99.6795
131	K040	5,611.18	0.0102	99.6897
132	K090	5,056.13	0.0092	99.6989
133	K015	5,038.32	0.0092	99.7081
134	K026	4,890.94	0.0089	99.7170
135	K003	4,840.93	0.0088	99.7258
136	U008	4,662.51	0.0085	99.7343
137	K023	4,562.61	0.0083	99.7427
138	K004	4,447.47	0.0081	99.7508
139	K032	4,390.09	0.0080	99.7588
140	U115	4,256.40	0.0078	99.7665
141	P122	4,164.04	0.0076	99.7741
142	K007	4,029.16	0.0073	99.7815
143	U165	3,996.62	0.0073	99.7888
144	K053	3,991.17	0.0073	99.7960
145	K091	3,891.89	0.0071	99.8031
146	K064	3,890.91	0.0071	99.8102
147	U051	3,490.74	0.0064	99.8166
148	P073	3,394.76	0.0062	99.8228
149	F019	3,047.09	0.0056	99.8284
150	K033	2,981.66	0.0054	99.8338
151	K065	2,877.11	0.0052	99.8390
152	U125	2,759.63	0.0050	99.8441
153	U056	2,712.25	0.0049	99.8490
154	K067	2,546.74	0.0046	99.8537
155	K068	2,544.11	0.0046	99.8583
156	U031	2,501.89	0.0046	99.8629
157	U009	2,474.01	0.0045	99.8674
158	U003	2,448.58	0.0045	99.8718
159	P005	2,406.79	0.0044	99.8762
160	K029	2,396.16	0.0044	99.8806
161	U196	2,376.82	0.0043	99.8849
162	U057	2,320.35	0.0042	99.8892

TABLE 6 (continued)

(S04,T01,T02,C83)

OBS	WASTE TYPE[a]	WASTE VOLUME[b]	PERCENT	CUMULATIVE PERCENT
163	U103	2,318.21	0.0042	99.8934
164	U162	2,307.29	0.0042	99.8976
165	U034	2,294.46	0.0042	99.9018
166	P111	2,292.52	0.0042	99.9060
167	U191	2,292.05	0.0042	99.9101
168	K028	2,159.79	0.0039	99.9141
169	U133	2,074.01	0.0038	99.9179
170	K031	2,070.23	0.0038	99.9216
171	K027	1,978.75	0.0036	99.9252
172	U224	1,818.15	0.0033	99.9286
173	K034	1,756.34	0.0032	99.9318
174	K008	1,668.34	0.0030	99.9348
175	K036	1,636.23	0.0030	99.9378
176	U242	1,573.59	0.0029	99.9407
177	K056	1,390.39	0.0025	99.9432
178	K039	1,202.95	0.0022	99.9454
179	P066	1,057.28	0.0019	99.9473
180	K041	984.77	0.0018	99.9491
181	P095	956.82	0.0017	99.9509
182	K017	899.64	0.0016	99.9525
183	K073	766.60	0.0014	99.9539
184	K020	685.84	0.0013	99.9551
185	K037	671.93	0.0012	99.9564
186	K019	664.07	0.0012	99.9576
187	P069	633.41	0.0012	99.9587
188	U219	561.84	0.0010	99.9598
189	D014	554.74	0.0010	99.9608
190	U204	545.29	0.0010	99.9618
191	K045	544.32	0.0010	99.9628
192	D013	538.91	0.0010	99.9637
193	K106	523.23	0.0010	99.9647
194	K025	520.26	0.0009	99.9656
195	U028	491.36	0.0009	99.9665
196	K015	480.21	0.0009	99.9674
197	K074	476.28	0.0009	99.9683
198	K084	470.38	0.0009	99.9691
199	P021	465.57	0.0008	99.9700
200	U013	454.45	0.0008	99.9708
201	K063	453.60	0.0008	99.9717
202	P055	453.60	0.0008	99.9725
203	P090	433.60	0.0008	99.9733
204	D015	445.61	0.0008	99.9741
205	P071	433.10	0.0008	99.9749
206	P068	432.45	0.0008	99.9757
207	K042	422.90	0.0008	99.9765
208	K054	413.89	0.0008	99.9772
209	D014	398.67	0.0007	99.9779
210	K083	361.37	0.0007	99.9786
211	K009	359.26	0.0007	99.9793
212	U160	344.66	0.0006	99.9799
213	K026	331.58	0.0006	99.9805
214	U037	329.66	0.0006	99.9811
215	K085	309.96	0.0006	99.9817
216	U170	307.75	0.0006	99.9822

TABLE 6 (continued)

(S04,T01,T02,C83)

OBS	WASTE TYPE [a]	WASTE VOLUME [b]	PERCENT	CUMULATIVE PERCENT
217	P022	302.87	0.0006	99.9828
218	K058	282.81	0.0005	99.9833
219	U246	272.38	0.0005	99.9838
220	U105	270.98	0.0005	99.9843
221	U169	258.76	0.0005	99.9848
222	U156	250.51	0.0005	99.9852
223	U149	244.82	0.0004	99.9857
224	U045	241.34	0.0004	99.9861
225	P088	227.98	0.0004	99.9865
226	K059	227.10	0.0004	99.9869
227	P064	173.61	0.0003	99.9872
228	P002	172.75	0.0003	99.9876
229	P004	151.28	0.0003	99.9879
230	U121	144.97	0.0003	99.9881
231	U213	144.48	0.0003	99.9884
232	K021	142.28	0.0003	99.9886
233	P063	137.06	0.0002	99.9889
234	P033	131.92	0.0002	99.9891
235	P044	119.37	0.0002	99.9893
236	P120	111.49	0.0002	99.9895
237	U152	108.46	0.0002	99.9897
238	P003	108.03	0.0002	99.9899
239	P100	106.92	0.0002	99.9901
240	U151	104.05	0.0002	99.9903
241	U036	103.23	0.0002	99.9905
242	P109	91.66	0.0002	99.9907
243	P020	89.55	0.0002	99.9908
244	U189	84.07	0.0002	99.9910
245	P094	84.04	0.0002	99.9911
246	P051	81.04	0.0001	99.9913
247	P050	71.13	0.0001	99.9914
248	P006	70.82	0.0001	99.9915
249	U060	62.20	0.0001	99.9917
250	P059	61.92	0.0001	99.9918
251	U136	60.18	0.0001	99.9919
252	U182	58.51	0.0001	99.9920
253	P099	57.16	0.0001	99.9921
254	U144	56.37	0.0001	99.9922
255	U061	56.15	0.0001	99.9923
256	U039	54.58	0.0001	99.9924
257	U007	51.08	0.0001	99.9925
258	U153	50.63	0.0001	99.9926
259	P040	50.47	0.0001	99.9927
260	U114	48.89	0.0001	99.9928
261	P041	48.63	0.0001	99.9929
262	U006	48.11	0.0001	99.9929
263	P065	46.88	0.0001	99.9930
264	P082	46.33	0.0001	99.9931
265	U029	46.33	0.0001	99.9932
266	U111	46.33	0.0001	99.9933
267	U053	46.29	0.0001	99.9934
268	U032	45.13	0.0001	99.9934
269	U147	44.51	0.0001	99.9935
270	U177	44.11	0.0001	99.9936

TABLE 6 (continued)

(S04,T01,T02,D83)

OBS	WASTE TYPE[a]	WASTE VOLUME[b]	PERCENT	CUMULATIVE PERCENT
271	U117	43.95	0.0001	99.9937
272	U069	42.87	0.0001	99.9938
273	U041	41.96	0.0001	99.9938
274	U038	38.79	0.0001	99.9939
275	U244	38.65	0.0001	99.9940
276	U048	35.57	0.0001	99.9940
277	U061	35.17	0.0001	99.9941
278	K057	33.11	0.0001	99.9942
279	U207	32.81	0.0001	99.9942
280	U086	31.58	0.0001	99.9943
281	U108	29.99	0.0001	99.9943
282	U102	29.76	0.0001	99.9944
283	P036	29.03	0.0001	99.9945
284	U074	28.34	0.0001	99.9945
285	U124	28.05	0.0001	99.9945
286	P097	27.47	0.0001	99.9946
287	U025	26.86	0.0000	99.9946
288	P047	26.65	0.0000	99.9947
289	U021	26.64	0.0000	99.9947
290	U194	26.41	0.0000	99.9947
291	F007	26.01	0.0000	99.9948
292	U017	25.62	0.0000	99.9948
293	U034	25.50	0.0000	99.9949
294	U118	25.48	0.0000	99.9949
295	U068	25.34	0.0000	99.9950
296	U014	25.27	0.0000	99.9950
297	P023	25.25	0.0000	99.9951
298	P024	25.17	0.0000	99.9951
299	U164	25.10	0.0000	99.9952
300	U119	25.10	0.0000	99.9952
301	U023	25.04	0.0000	99.9953
302	U098	25.01	0.0000	99.9953
303	U082	24.95	0.0000	99.9954
304	P028	24.88	0.0000	99.9954
305	U155	24.85	0.0000	99.9954
306	U210	24.82	0.0000	99.9955
307	U101	24.81	0.0000	99.9955
308	U024	24.63	0.0000	99.9956
309	P105	24.63	0.0000	99.9956
310	U235	24.62	0.0000	99.9957
311	U186	24.58	0.0000	99.9957
312	P118	24.50	0.0000	99.9958
313	U139	24.49	0.0000	99.9958
314	P119	24.42	0.0000	99.9958
315	P116	24.25	0.0000	99.9959
316	U192	24.20	0.0000	99.9959
317	P034	24.19	0.0000	99.9960
318	U042	24.19	0.0000	99.9960
319	U193	24.19	0.0000	99.9961
320	P038	24.16	0.0000	99.9961
321	U141	23.93	0.0000	99.9962
322	U083	23.93	0.0000	99.9962
323	P092	23.92	0.0000	99.9962
324	U185	23.91	0.0000	99.9963

TABLE 6 (continued)

(S04,T01,T02,D03)

OBS	WASTE TYPE[a]	WASTE VOLUME[b]	PERCENT	CUMULATIVE PERCENT
325	U222	23.90	0.0000	99.9964
326	U084	23.84	0.0000	99.9964
327	U005	23.84	0.0000	99.9965
328	U138	23.83	0.0000	99.9965
329	U046	23.83	0.0000	99.9965
330	U137	23.83	0.0000	99.9966
331	U110	23.82	0.0000	99.9966
332	U203	23.82	0.0000	99.9967
333	U097	23.78	0.0000	99.9967
334	P085	23.77	0.0000	99.9968
335	U067	23.75	0.0000	99.9968
336	U085	23.75	0.0000	99.9969
337	P017	23.74	0.0000	99.9969
338	P027	23.74	0.0000	99.9969
339	P093	23.74	0.0000	99.9970
340	U205	23.74	0.0000	99.9970
341	U126	23.74	0.0000	99.9971
342	U066	23.73	0.0000	99.9971
343	U010	23.72	0.0000	99.9972
344	U087	23.72	0.0000	99.9972
345	U158	23.72	0.0000	99.9972
346	U015	23.71	0.0000	99.9973
347	U016	23.71	0.0000	99.9973
348	U027	23.71	0.0000	99.9974
349	U086	23.71	0.0000	99.9974
350	U150	23.71	0.0000	99.9975
351	U157	23.71	0.0000	99.9975
352	U099	23.70	0.0000	99.9975
353	P016	23.69	0.0000	99.9976
354	U049	23.69	0.0000	99.9976
355	P069	23.69	0.0000	99.9977
356	U062	23.68	0.0000	99.9977
357	U089	23.68	0.0000	99.9978
358	U183	23.66	0.0000	99.9978
359	U047	23.66	0.0000	99.9978
360	U058	23.65	0.0000	99.9979
361	U059	23.65	0.0000	99.9979
362	U225	23.65	0.0000	99.9980
363	U050	23.65	0.0000	99.9980
364	P075	23.65	0.0000	99.9981
365	P115	23.65	0.0000	99.9981
366	U202	23.63	0.0000	99.9981
367	U109	23.63	0.0000	99.9982
368	P108	23.63	0.0000	99.9982
369	U218	23.62	0.0000	99.9983
370	U184	23.62	0.0000	99.9983
371	P103	23.62	0.0000	99.9984
372	U132	23.61	0.0000	99.9984
373	U174	23.61	0.0000	99.9985
374	U177	23.59	0.0000	99.9985
375	U018	23.59	0.0000	99.9985
376	P046	23.59	0.0000	99.9986
377	P073	23.59	0.0000	99.9986
378	U063	23.59	0.0000	99.9987

TABLE 6 (continued)

(S04,T01,T02,D83)

CBS	WASTE TYPE[a]	WASTE VOLUME[b]	PERCENT	CUMULATIVE PERCENT
379	P042	23.59	0.0000	99.9987
380	P043	23.59	0.0000	99.9988
381	P045	23.59	0.0000	99.9988
382	P049	23.59	0.0000	99.9988
383	P084	23.59	0.0000	99.9989
384	P110	23.59	0.0000	99.9989
385	U030	23.59	0.0000	99.9990
386	U143	23.59	0.0000	99.9990
387	U172	23.59	0.0000	99.9991
388	U173	23.59	0.0000	99.9991
389	U176	23.59	0.0000	99.9991
390	U179	23.59	0.0000	99.9992
391	U180	23.59	0.0000	99.9992
392	U181	23.59	0.0000	99.9993
393	U206	23.59	0.0000	99.9993
394	U233	23.59	0.0000	99.9994
395	U011	23.29	0.0000	99.9994
396	U090	23.20	0.0000	99.9994
397	P001	23.14	0.0000	99.9995
398	U116	22.75	0.0000	99.9995
399	U243	22.66	0.0000	99.9996
400	U245	22.66	0.0000	99.9996
401	P037	21.00	0.0000	99.9996
402	P081	19.96	0.0000	99.9997
403	U171	19.09	0.0000	99.9997
404	K055	19.05	0.0000	99.9997
405	U075	15.27	0.0000	99.9998
406	U190	13.37	0.0000	99.9998
407	U096	12.85	0.0000	99.9998
408	P039	10.36	0.0000	99.9998
409	P014	9.70	0.0000	99.9999
410	P101	9.43	0.0000	99.9999
411	U073	9.15	0.0000	99.9999
412	U221	8.17	0.0000	99.9999
413	P077	7.98	0.0000	99.9999
414	P076	4.80	0.0000	99.9999
415	P013	4.56	0.0000	99.9999
416	U201	3.47	0.0000	100.0000
417	P078	3.45	0.0000	100.0000
418	U240	2.99	0.0000	100.0000
419	U091	2.40	0.0000	100.0000
420	P056	2.19	0.0000	100.0000
421	U197	1.83	0.0000	100.0000
422	P080	1.70	0.0000	100.0000
423	U163	1.52	0.0000	100.0000
424	P031	1.10	0.0000	100.0000
425	U120	1.03	0.0000	100.0000
426	K034	0.91	0.0000	100.0000
427	P035	0.88	0.0000	100.0000
428	P058	0.66	0.0000	100.0000
429	P015	0.61	0.0000	100.0000
430	U166	0.61	0.0000	100.0000
431	K010	0.60	0.0000	100.0000
432	P050	0.60	0.0000	100.0000

TABLE 6 (continued)

(S04,T01,T02,C83)

OBS	WASTE TYPE[a]	WASTE VOLUME[b]	PERCENT	CUMULATIVE PERCENT
433	U054	0.60	0.0000	100.0000
434	U065	0.60	0.0000	100.0000
435	U104	0.60	0.0000	100.0000
436	U148	0.38	0.0000	100.0000
437	U167	0.28	0.0000	100.0000
438	U145	0.27	0.0000	100.0000
439	U146	0.25	0.0000	100.0000
440	U026	0.24	0.0000	100.0000
441	U095	0.24	0.0000	100.0000
442	U214	0.21	0.0000	100.0000
443	P094	0.21	0.0000	100.0000
444	P107	0.15	0.0000	100.0000
445	P060	0.15	0.0000	100.0000
446	P072	0.15	0.0000	100.0000
447	U022	0.15	0.0000	100.0000
448	P009	0.14	0.0000	100.0000
449	U035	0.12	0.0000	100.0000
450	U033	0.08	0.0000	100.0000
451	U093	0.06	0.0000	100.0000
452	U094	0.06	0.0000	100.0000
453	U217	0.06	0.0000	100.0000
454	U215	0.06	0.0000	100.0000
455	P113	0.06	0.0000	100.0000
456	P114	0.06	0.0000	100.0000
457	U216	0.06	0.0000	100.0000
458	P018	0.05	0.0000	100.0000
459	U142	0.04	0.0000	100.0000
460	U168	0.01	0.0000	100.0000
461	P123	0.01	0.0000	100.0000
462	P028	0.00	0.0000	100.0000
463	U232	0.00	0.0000	100.0000
464	P057	0.00	0.0000	100.0000
465	U187	0.00	0.0000	100.0000
466	U236	0.00	0.0000	100.0000
467	P087	0.00	0.0000	100.0000
468	P067	0.00	0.0000	100.0000
469	U200	0.00	0.0000	100.0000
470	ALL0	0.00	0.0000	100.0000
471	K093	0.00	0.0000	100.0000
472	K095	0.00	0.0000	100.0000
473	K096	0.00	0.0000	100.0000
474	K097	0.00	0.0000	100.0000
475	K098	0.00	0.0000	100.0000
476	K099	0.00	0.0000	100.0000
477	K101	0.00	0.0000	100.0000
478	K102	0.00	0.0000	100.0000
479	K103	0.00	0.0000	100.0000
480	K104	0.00	0.0000	100.0000
481	K105	0.00	0.0000	100.0000
482	P019	0.00	0.0000	100.0000
483	P025	0.00	0.0000	100.0000
484	P026	0.00	0.0000	100.0000
485	P030	0.00	0.0000	100.0000
486	P052	0.00	0.0000	100.0000

TABLE 6 (continued)

(S04,T01,T02,D83)

OBS	WASTE TYPE[a]	WASTE VOLUME[b]	PERCENT	CUMULATIVE PERCENT
487	P061	0.00	0.0000	100.0000
488	P062	0.00	0.0000	100.0000
489	P079	0.00	0.0000	100.0000
490	P083	0.00	0.0000	100.0000
491	P086	0.00	0.0000	100.0000
492	P100	0.00	0.0000	100.0000
493	P117	0.00	0.0000	100.0000
494	U040	0.00	0.0000	100.0000
495	U100	0.00	0.0000	100.0000
496	U136	0.00	0.0000	100.0000
497	U175	0.00	0.0000	100.0000
498	U229	0.00	0.0000	100.0000
499	U234	0.00	0.0000	100.0000
500	U237	0.00	0.0000	100.0000
501	U247	0.00	0.0000	100.0000

[a]See Appendix A, Tables A-1 and A-2 for definition.

[b]Metric tons per year based on corrected Part A data.

TABLE 7. PRELIMINARY SCREENING OF NON-AQUEOUS PROCESSES BY WASTE TYPE

(303,080,061)

OBS	WASTE TYPE[a]	WASTE VOLUME[b]	PERCENT	CUMULATIVE PERCENT
1	TOTAL	23,599,995.63	100.0000	.
2	K007	2,103,335.90	8.9124	8.9124
3	U007	1,218,066.45	5.1613	14.0737
4	D002	781,397.46	3.3110	17.3847
5	D00[illegible]	747,150.01	3.1659	20.5506
6	F01[illegible]	704,576.77	2.9855	23.5361
7	D006	683,084.44	2.8944	26.4306
8	K061	558,597.48	2.3646	28.7954
9	K062	452,371.56	1.9168	30.7122
10	F006	415,667.01	1.7613	32.4735
11	K0[illegible]	410,917.45	1.7412	34.2147
12	K013	392,577.19	1.6635	35.8782
13	K048	381,027.50	1.6145	37.4927
14	D003	377,780.34	1.6008	39.0934
15	D001	344,961.20	1.4616	40.5552
16	D004	313,230.65	1.3273	41.8825
17	K051	310,542.31	1.3159	43.1984
18	K049	302,665.88	1.2825	44.4808
19	F007	265,915.65	1.1268	45.6076
20	D009	229,357.16	0.9720	46.5796
21	D00[illegible]	[illegible]	0.8038	47.3834
22	K0[illegible]	128,105.74	0.5428	47.9262
23	U0[illegible]	126,901.04	0.5377	48.4660
24	K087	125,763.17	0.5329	48.9989
25	U00[illegible]	124,233.58	0.5264	49.5253
26	K0[illegible]	109,485.23	0.4639	49.9892
27	K0[illegible]	98,358.11	0.4169	50.4061
28	K0[illegible]	96,501.10	0.4089	50.8150
29	K071	93,845.40	0.3977	51.2127
30	K0[illegible]	86,537.96	0.3667	51.5793
31	K00[illegible]	85,614.13	0.3628	51.9421
32	U04[illegible]	80,752.81	0.3422	52.2843
33	F[illegible]	78,894.95	0.3343	52.6186
34	[illegible]	75,967.76	0.3219	52.9405
35	U05[illegible]	75,946.52	0.3218	53.2623
36	F01[illegible]	75,041.60	0.3180	53.5803
37	K0[illegible]	74,379.73	0.3152	53.8954
38	F00[illegible]	74,183.47	0.3143	54.2098
39	U0[illegible]	73,253.42	0.3104	54.5202
40	K052	71,910.60	0.3047	54.8249
41	K04[illegible]	70,588.12	0.2991	55.1240
42	D010	69,149.27	0.2930	55.4170
43	F01[illegible]	67,544.67	0.2862	55.7032
44	U00[illegible]	66,570.03	0.2821	55.9853
45	F01[illegible]	63,723.26	0.2700	56.2553
46	U08[illegible]	63,576.01	0.2694	56.5247
47	K01[illegible]	63,285.36	0.2682	56.7931
48	K00[illegible]	62,445.50	0.2646	57.0578
49	F00[illegible]	61,832.19	0.2620	57.3197
50	K04[illegible]	60,917.10	0.2581	57.5778
51	K05[illegible]	60,720.71	0.2573	57.8351
52	K01[illegible]	60,280.77	0.2554	58.0905
53	D01[illegible]	59,561.56	0.2524	58.3429
54	U0[illegible]	58,053.55	0.2460	58.5889

TABLE 7 (continued)

(5[illegible]3,L80,0[illegible]1)

OBS	WASTE TYPE[a]	WASTE VOLUME[b]	PERCENT	CUMULATIVE PERCENT
55	K006	57,919.94	0.2454	58.8342
56	K035	57,700.29	0.2445	59.0786
57	K023	57,380.20	0.2431	59.3217
58	K004	56,375.40	0.2399	59.5606
59	K007	56,300.04	0.2376	59.7994
60	D017	55,015.90	0.2331	60.0315
61	K040	54,964.96	0.2329	60.2644
62	K037	54,593.48	0.2313	60.4957
63	D010	53,030.48	0.2247	60.7205
64	D012	52,931.67	0.2243	60.9447
65	D014	52,911.55	0.2242	61.1689
66	K042	51,600.83	0.2189	61.3878
67	U111	51,444.55	0.2180	61.6058
68	F018	50,599.46	0.2157	61.8215
69	K019	50,550.21	0.2142	62.0357
70	K041	50,104.44	0.2124	62.2481
71	K011	49,[illegible].04	0.2104	62.4585
72	K051	48,951.60	0.2074	62.6659
73	F017	48,113.40	0.2039	62.8698
74	F019	47,441.06	0.2010	63.0708
75	K030	46,994.71	0.1991	63.2700
76	K054	46,661.79	0.1977	63.4677
77	P036	46,573.40	0.1973	63.6651
78	K038	46,49[illegible].7[illegible]	0.1970	63.86[illegible]
79	F001	45,874.07	0.1969	64.0590
80	F101	45,830.74	0.1943	64.2533
81	K009	44,958.59	0.1908	64.4441
82	U041	44,14[illegible].49	0.1871	64.6312
83	U0[illegible]	43,[illegible]03.97	0.1860	64.8172
84	D015	42,45[illegible].36	0.1799	64.9971
85	F027	42,[illegible].55	0.1786	65.1757
86	K066	41,77[illegible].[illegible]	0.1767	65.35[illegible]4
87	K063	41,[illegible].32	0.1763	65.5[illegible]7
88	K033	41,634.4[illegible]	0.1760	65.7[illegible]27
89	K035	41,4[illegible].[illegible]5	0.1756	65.87[illegible]3
90	K005	41,431.[illegible]	0.1750	66.0533
91	K044	40,[illegible]5.73	0.1732	66.22[illegible]6
92	U041	40,220.[illegible]	0.1704	66.397[illegible]
93	K048	40,220.18	0.1704	66.5674
94	U044	40,133.13	0.1701	66.7375
95	U04[illegible]	40,069.17	0.1699	66.9074
96	K005	39,571.37	0.1677	67.0751
97	U051	39,139.03	0.1658	67.2409
98	F020	38,537.41	0.1633	67.4042
99	U17[illegible]	38,458.02	0.1630	67.5671
100	U002	38,062.32	0.1613	67.7284
101	U019	37,927.90	0.1607	67.8891
102	F002	37,842.21	0.1603	68.049[illegible]
103	P075	37,762.15	0.1601	68.2096
104	F024	37,726.73	0.1599	68.3694
105	U221	37,561.61	0.1592	68.5286
106	F102	37,04[illegible].44	0.1570	68.6856
107	K047	36,891.31	0.1563	68.8419
108	U03[illegible]	36,615.9[illegible]	0.1552	68.9971

TABLE 7 (continued)

(553,060,381)

OBS	WASTE TYPE[a]	WASTE VOLUME[b]	PERCENT	CUMULATIVE PERCENT
109	U119	36,147.43	0.1532	69.1521
110	U037	36,128.57	0.1531	69.3052
111	P107	36,121.23	0.1531	69.4582
112	U112	36,111.39	0.1530	69.6112
113	U079	36,078.67	0.1529	69.7641
114	P110	36,075.08	0.1529	69.9170
115	K025	36,040.45	0.1527	70.0697
116	P098	35,989.43	0.1524	70.2221
117	P029	35,959.09	0.1524	70.3745
118	P121	35,947.42	0.1523	70.5268
119	P074	35,927.13	0.1523	70.6791
120	P039	35,889.71	0.1521	70.8311
121	U169	35,863.11	0.1520	70.9831
122	U034	35,861.46	0.1520	71.1351
123	U053	35,857.21	0.1519	71.2870
124	U007	35,852.52	0.1519	71.4389
125	U008	35,840.29	0.1519	71.5908
126	P104	35,834.40	0.1518	71.7426
127	U044	35,805.44	0.1517	71.8944
128	U070	35,740.43	0.1515	72.0458
129	P001	35,662.00	0.1511	72.1969
130	P088	35,601.70	0.1509	72.3477
131	U036	35,599.47	0.1508	72.4985
132	U077	35,576.06	0.1507	72.6493
133	U040	35,574.31	0.1507	72.8000
134	U075	35,561.64	0.1507	72.9506
135	U011	35,543.70	0.1506	73.1014
136	U071	35,533.09	0.1506	73.2519
137	U078	35,529.87	0.1506	73.4025
138	U073	35,514.17	0.1505	73.5530
139	P075	35,477.93	0.1503	73.7033
140	U014	35,469.79	0.1503	73.8536
141	P111	35,464.67	0.1503	74.0039
142	U184	35,455.13	0.1502	74.1541
143	U157	35,449.39	0.1502	74.3043
144	U004	35,426.05	0.1502	74.4545
145	U137	35,424.16	0.1501	74.6046
146	P003	35,421.57	0.1501	74.7547
147	P040	35,421.55	0.1501	74.9048
148	U030	35,421.03	0.1501	75.0549
149	U088	35,421.09	0.1501	75.2050
150	U000	35,420.30	0.1501	75.3551
151	P072	35,419.96	0.1501	75.5051
152	U093	35,419.82	0.1501	75.6552
153	U095	35,419.82	0.1501	75.8053
154	U094	35,419.81	0.1501	75.9554
155	U096	35,419.81	0.1501	76.1055
156	P026	35,419.81	0.1501	76.2556
157	P067	35,419.81	0.1501	76.4056
158	U026	35,419.81	0.1501	76.5557
159	U006	35,419.26	0.1501	76.7058
160	U174	35,406.38	0.1500	76.8558
161	P054	35,401.09	0.1500	77.0058
162	U001	35,396.14	0.1500	77.1558

TABLE 7 (continued)

(S33,080,D81)

OBS	WASTE TYPE[a]	WASTE VOLUME[b]	PERCENT	CUMULATIVE PERCENT
163	U043	35,396.04	0.1500	77.3058
164	U020	35,397.75	0.1500	77.4558
165	U059	35,397.39	0.1500	77.6058
166	U035	35,397.22	0.1500	77.7558
167	U025	35,397.21	0.1500	77.9058
168	P111	35,397.16	0.1500	78.0558
169	P118	35,397.13	0.1500	78.2057
170	P099	35,396.91	0.1500	78.3557
171	U014	35,396.68	0.1500	78.5057
172	P046	35,396.66	0.1500	78.6557
173	P027	35,396.37	0.1500	78.8057
174	P093	35,396.37	0.1500	78.9557
175	P065	35,396.34	0.1500	79.1057
176	U016	35,396.32	0.1500	79.2556
177	P075	35,396.29	0.1500	79.4056
178	U113	35,396.27	0.1500	79.5556
179	U030	35,396.27	0.1500	79.7056
180	U085	35,396.26	0.1500	79.8556
181	U003	35,394.26	0.1500	80.0056
182	U049	35,396.25	0.1500	80.1555
183	P097	35,396.25	0.1500	80.3055
184	U051	35,396.25	0.1500	80.4555
185	P042	35,396.24	0.1500	80.6055
186	U010	35,396.24	0.1500	80.7555
187	U087	35,396.24	0.1500	80.9055
188	[illegible]	35,396.23	0.1500	81.0555
189	U066	35,396.22	0.1500	81.2054
190	U078	35,396.22	0.1500	81.3554
191	U058	35,396.22	0.1500	81.5054
192	P040	35,396.22	0.1500	81.6554
193	P140	35,396.22	0.1500	81.8054
194	P054	35,396.22	0.1500	81.9554
195	U007	35,396.22	0.1500	82.1053
196	U042	35,396.22	0.1500	82.2553
197	U097	35,395.32	0.1500	82.4053
198	P088	35,344.97	0.1500	82.5553
199	P114	35,374.02	0.1499	82.7052
200	U091	35,373.60	0.1499	82.8550
201	P034	35,350.27	0.1498	83.0049
202	P051	35,330.70	0.1497	83.1546
203	P103	35,314.20	0.1496	83.3042
204	P038	35,305.80	0.1496	83.4538
205	U090	35,302.16	0.1496	83.6034
206	P081	35,233.12	0.1495	83.7529
207	P001	35,015.16	0.1484	83.9013
208	U033	34,919.04	0.1480	84.0493
209	P082	34,874.06	0.1476	84.1970
210	P120	34,822.81	0.1477	84.3447
211	P119	34,672.49	0.1469	84.4916
212	P091	34,120.54	0.1447	84.6363
213	P041	34,054.47	0.1440	84.7803
214	U043	33,940.07	0.1439	84.9244
215	P110	33,577.40	0.1423	85.0667
216	P014	33,157.20	0.1408	85.2074

TABLE 7 (continued)

(S03,U80,U81)

G-S	WASTE TYPE[a]	WASTE VOLUME[b]	PERCENT	CUMULATIVE PERCENT
217	K016	32,900.57	0.1394	85.3466
218	P010	32,484.01	0.1376	85.4842
219	P011	32,285.64	0.1365	85.6210
220	P016	31,839.95	0.1349	85.7559
221	P022	31,825.33	0.1349	85.8908
222	P007	31,824.12	0.1346	86.0255
223	U122	31,503.74	0.1335	86.1591
224	F017	31,370.67	0.1329	86.2921
225	F011	31,255.00	0.1324	86.4245
226	K045	30,777.18	0.1304	86.5549
227	P060	30,658.98	0.1299	86.6848
228	K032	30,156.69	0.1278	86.8126
229	U156	27,824.42	0.1179	86.9305
230	K029	27,733.66	0.1175	87.0480
231	K034	27,353.29	0.1159	87.1639
232	P012	27,140.13	0.1150	87.2789
233	K090	26,935.07	0.1141	87.3931
234	K089	26,066.58	0.1105	87.5035
235	U063	25,871.19	0.1096	87.6131
236	K017	25,631.64	0.1085	87.7216
237	K021	24,939.34	0.1057	87.8273
238	U124	24,920.94	0.1056	87.9329
239	K033	23,756.66	0.1007	88.0336
240	K035	21,887.71	0.0927	88.1263
241	U219	21,750.01	0.0922	88.2185
242	K010	21,554.47	0.0913	88.3098
243	U226	21,504.57	0.0911	88.4009
244	U228	21,457.50	0.0909	88.4918
245	K001	21,234.36	0.0900	88.5818
246	U238	20,989.54	0.0889	88.6707
247	U227	20,963.55	0.0887	88.7597
248	K076	20,790.37	0.0881	88.8478
249	U154	20,720.94	0.0878	88.9356
250	U231	20,675.72	0.0876	89.0232
251	U236	20,587.43	0.0872	89.1104
252	[illegible]	20,560.52	0.0872	89.1976
253	U235	20,504.75	0.0871	89.2847
254	U234	20,509.92	0.0870	89.3718
255	U237	20,495.16	0.0869	89.4587
256	K095	20,295.60	0.0860	89.5446
257	U110	20,223.32	0.0857	89.6303
258	K079	19,605.53	0.0831	89.7134
259	K100	18,333.06	0.0777	89.7911
260	K086	18,111.45	0.0767	89.8678
261	U161	17,696.44	0.0750	89.9428
262	U159	17,416.32	0.0738	90.0166
263	U210	17,378.02	0.0736	90.0902
264	P051	17,307.42	0.0733	90.1636
265	U165	17,256.48	0.0731	90.2367
266	U155	17,166.95	0.0727	90.3094
267	K083	17,157.27	0.0727	90.3821
268	K064	16,934.63	0.0718	90.4539
269	U081	16,825.96	0.0713	90.5252
270	U082	16,824.96	0.0713	90.5965

TABLE 7 (continued)

(S03,C80,D81)

OBS	WASTE TYPE[a]	WASTE VOLUME[b]	PERCENT	CUMULATIVE PERCENT
271	P037	16,766.42	0.0710	90.6675
272	K053	16,755.53	0.0710	90.7385
273	U084	16,707.92	0.0708	90.8093
274	U099	16,594.50	0.0703	90.8796
275	K067	16,397.71	0.0695	90.9491
276	K094	16,366.60	0.0694	91.0185
277	U117	16,321.47	0.0692	91.0876
278	U140	16,273.71	0.0689	91.1566
279	U172	16,254.31	0.0689	91.2254
280	P122	16,111.58	0.0683	91.2937
281	P050	16,060.22	0.0681	91.3618
282	U223	16,032.43	0.0679	91.4297
283	U103	16,032.05	0.0679	91.4976
284	U169	16,024.34	0.0679	91.5655
285	U106	15,991.25	0.0678	91.6333
286	P033	15,951.66	0.0676	91.7009
287	U067	15,945.33	0.0676	91.7685
288	P044	15,940.42	0.0675	91.8360
289	U066	15,933.47	0.0675	91.9035
290	U211	15,923.66	0.0675	91.9710
291	U196	15,923.04	0.0675	92.0385
292	U209	15,916.11	0.0674	92.1059
293	U206	15,914.27	0.0674	92.1733
294	U213	15,906.82	0.0674	92.2407
295	U031	15,905.46	0.0674	92.3081
296	P067	15,883.29	0.0673	92.3754
297	P056	15,882.11	0.0673	92.4427
298	U003	15,872.82	0.0673	92.5100
299	U214	15,870.34	0.0672	92.5772
300	U215	15,870.79	0.0672	92.6445
301	U073	15,869.62	0.0672	92.7117
302	P064	15,855.54	0.0672	92.7790
303	U028	15,850.04	0.0670	92.8460
304	P115	15,847.04	0.0671	92.9131
305	P119	15,840.50	0.0671	92.9805
306	U191	15,826.90	0.0671	93.0476
307	U201	15,824.30	0.0671	93.1148
308	U041	15,815.36	0.0670	93.1818
309	U152	15,814.45	0.0670	93.2488
310	P047	15,812.95	0.0670	93.3157
311	U114	15,812.31	0.0670	93.3827
312	U157	15,811.60	0.0670	93.4497
313	U173	15,811.59	0.0670	93.5166
314	P023	15,811.14	0.0670	93.5836
315	P102	15,806.53	0.0670	93.6506
316	U039	15,803.34	0.0670	93.7176
317	P026	15,802.62	0.0670	93.7845
318	P049	15,802.56	0.0670	93.8515
319	U116	15,802.07	0.0670	93.9185
320	U064	15,802.01	0.0670	93.9854
321	U101	15,801.77	0.0670	94.0524
322	U011	15,801.69	0.0670	94.1193
323	U139	15,801.66	0.0670	94.1863
324	U141	15,800.65	0.0670	94.2532

TABLE 7 (continued)

(S03,L80,D01)

OBS	WASTE TYPE[a]	WASTE VOLUME[b]	PERCENT	CUMULATIVE PERCENT
325	U181	15,801.16	0.0670	94.3202
326	U074	15,800.86	0.0670	94.3872
327	U211	15,800.83	0.0670	94.4541
328	F116	15,800.82	0.0670	94.5211
329	U047	15,800.81	0.0670	94.5880
330	U017	15,800.81	0.0670	94.6550
331	U016	15,800.80	0.0670	94.7219
332	U050	15,800.80	0.0670	94.7889
333	U154	15,800.79	0.0670	94.8558
334	P069	15,800.76	0.0670	94.9228
335	U164	15,800.76	0.0670	94.9897
336	U137	15,800.75	0.0670	95.0567
337	U109	15,800.73	0.0670	95.1236
338	U097	15,800.73	0.0670	95.1906
339	U034	15,800.72	0.0670	95.2575
340	U098	15,800.70	0.0670	95.3245
341	U203	15,800.70	0.0670	95.3914
342	U143	15,800.70	0.0670	95.4584
343	U150	15,800.70	0.0670	95.5253
344	U174	15,800.70	0.0670	95.5923
345	U175	15,800.70	0.0670	95.6592
346	U177	15,800.70	0.0670	95.7262
347	U179	15,800.70	0.0670	95.7932
348	U180	15,800.70	0.0670	95.8601
349	U192	15,800.70	0.0670	95.9271
350	U193	15,800.70	0.0670	95.9940
351	U206	15,800.70	0.0670	96.0610
352	U115	15,785.24	0.0669	96.1278
353	U149	15,778.10	0.0669	96.1947
354	U163	15,777.17	0.0669	96.2616
355	K055	15,768.95	0.0668	96.3284
356	U200	15,756.55	0.0668	96.3951
357	F020	15,755.39	0.0668	96.4619
358	U204	15,732.51	0.0667	96.5286
359	U135	15,655.65	0.0665	96.5950
360	U131	15,500.00	0.0657	96.6607
361	U029	15,393.99	0.0652	96.7259
362	P063	15,380.55	0.0652	96.7911
363	U189	15,369.79	0.0651	96.8563
364	F005	15,344.04	0.0650	96.9213
365	P054	15,333.62	0.0650	96.9862
366	P073	15,256.39	0.0646	97.0509
367	P096	15,238.47	0.0646	97.1155
368	P098	15,233.73	0.0645	97.1800
369	K073	15,219.49	0.0645	97.2445
370	F018	14,194.99	0.0601	97.3046
371	K062	12,477.06	0.0529	97.3575
372	P004	12,447.10	0.0527	97.4103
373	P005	12,261.53	0.0520	97.4622
374	P006	12,254.11	0.0519	97.5141
375	P014	12,253.50	0.0519	97.5661
376	P016	12,252.37	0.0519	97.6180
377	U062	12,229.62	0.0518	97.6698
378	U121	12,083.51	0.0512	97.7210

TABLE 7 (continued)

(S03,U80,081)

OBS	WASTE TYPE[a]	WASTE VOLUME[b]	PERCENT	CUMULATIVE PERCENT
379	P009	11,806.75	0.0500	97.7710
380	U120	11,740.95	0.0497	97.8208
381	U123	11,263.59	0.0477	97.8685
382	F039	11,255.62	0.0477	97.9162
383	U129	11,238.41	0.0476	97.9638
384	U127	11,220.26	0.0475	98.0114
385	P013	11,156.58	0.0473	98.0586
386	U131	11,152.23	0.0473	98.1059
387	U128	11,151.40	0.0473	98.1532
388	K050	11,098.16	0.0470	98.2002
389	P036	11,072.84	0.0469	98.2471
390	U126	11,037.93	0.0468	98.2939
391	P123	10,156.10	0.0430	98.3369
392	P003	8,658.94	0.0367	98.3736
393	U013	8,194.28	0.0347	98.4083
394	K096	7,926.00	0.0336	98.4419
395	K001	7,930.56	0.0336	98.4756
396	P120	7,884.14	0.0334	98.5090
397	U232	7,494.40	0.0318	98.5407
398	U242	7,420.65	0.0314	98.5722
399	K098	7,257.60	0.0308	98.6029
400	K099	7,257.60	0.0308	98.6337
401	U170	7,175.81	0.0304	98.6641
402	U061	6,931.37	0.0294	98.6934
403	P069	6,877.23	0.0291	98.7226
404	P071	6,841.47	0.0290	98.7516
405	U205	6,724.80	0.0285	98.7801
406	U036	6,456.26	0.0274	98.8075
407	P001	6,447.55	0.0273	98.8348
408	U140	6,394.00	0.0271	98.8619
409	U150	6,375.46	0.0270	98.8889
410	U112	6,339.68	0.0269	98.9158
411	U151	6,347.40	0.0267	98.9426
412	U216	6,345.20	0.0269	98.9697
413	U217	6,345.05	0.0269	98.9965
414	U146	6,344.06	0.0269	99.0234
415	P077	6,312.40	0.0267	99.0502
416	U148	6,312.01	0.0267	99.0769
417	U113	6,300.51	0.0267	99.1036
418	U165	6,299.15	0.0267	99.1303
419	U107	6,294.11	0.0267	99.1570
420	U137	6,296.74	0.0267	99.1837
421	U158	6,295.70	0.0267	99.2104
422	U085	6,291.58	0.0267	99.2370
423	P024	6,289.99	0.0267	99.2637
424	U207	6,287.96	0.0266	99.2903
425	U203	6,285.90	0.0266	99.3170
426	U048	6,281.51	0.0266	99.3436
427	U201	6,278.05	0.0266	99.3702
428	U119	6,277.65	0.0266	99.3968
429	U183	6,277.73	0.0266	99.4234
430	U102	6,275.69	0.0266	99.4500
431	U225	6,275.24	0.0266	99.4766
432	U194	6,275.00	0.0266	99.5032

TABLE 7 (continued)

(503,680,681)

OBS	WASTE TYPE[1]	WASTE VOLUME[5]	PERCENT	CUMULATIVE PERCENT
433	U158	6,275.15	0.0266	99.5296
434	U002	6,275.15	0.0266	99.5563
435	U218	6,275.15	0.0266	99.5829
436	U110	6,275.13	0.0266	99.6095
437	U138	6,275.12	0.0266	99.6361
438	U156	6,275.12	0.0266	99.6627
439	U171	6,252.43	0.0265	99.6892
440	U142	6,212.52	0.0263	99.7155
441	P015	6,111.21	0.0259	99.7414
442	U043	6,051.23	0.0256	99.7671
443	U075	5,824.44	0.0247	99.7917
444	K064	4,017.63	0.0170	99.8088
445	U190	3,791.16	0.0161	99.8248
446	K093	3,628.80	0.0154	99.8402
447	U224	3,286.58	0.0139	99.8541
448	U147	3,145.71	0.0133	99.8675
449	U160	2,520.11	0.0107	99.8782
450	U125	1,979.44	0.0080	99.8861
451	U124	1,809.05	0.0077	99.8939
452	U144	1,763.37	0.0075	99.9013
453	U101	1,687.01	0.0071	99.9084
454	U197	1,547.51	0.0066	99.9150
455	U201	1,539.05	0.0065	99.9215
456	U219	1,535.64	0.0065	99.9280
457	U132	1,510.36	0.0064	99.9344
458	U133	1,511.55	0.0064	99.9408
459	U221	1,493.30	0.0063	99.9470
460	P022	1,493.25	0.0063	99.9533
461	K105	1,114.04	0.0047	99.9582
462	K055	880.93	0.0037	99.9619
463	K053	797.01	0.0034	99.9653
464	K059	666.67	0.0028	99.9681
465	P035	657.61	0.0028	99.9709
466	K054	566.44	0.0024	99.9733
467	F019	535.16	0.0023	99.9756
468	K097	453.60	0.0019	99.9775
469	K101	453.60	0.0019	99.9794
470	K100	453.60	0.0019	99.9813
471	K103	453.60	0.0019	99.9832
472	K104	453.60	0.0019	99.9851
473	K106	453.60	0.0019	99.9871
474	K057	221.13	0.0009	99.9880
475	K074	208.56	0.0009	99.9889
476	F090	204.33	0.0009	99.9898
477	K063	204.12	0.0009	99.9906
478	P050	204.12	0.0009	99.9915
479	K050	186.90	0.0008	99.9923
480	K012	90.72	0.0004	99.9927
481	F019	90.72	0.0004	99.9931
482	P020	90.72	0.0004	99.9935
483	P030	90.72	0.0004	99.9938
484	P052	90.72	0.0004	99.9942
485	P050	90.72	0.0004	99.9946
486	P061	90.72	0.0004	99.9950

TABLE 7 (continued)

(S23,C60,O81)

OBS	WASTE TYPE[a]	WASTE VOLUME[b]	PERCENT	CUMULATIVE PERCENT
487	P079	90.72	0.0004	99.9954
488	P080	90.72	0.0004	99.9958
489	P083	90.72	0.0004	99.9962
490	P085	90.72	0.0004	99.9965
491	P100	90.72	0.0004	99.9969
492	P117	90.72	0.0004	99.9973
493	U040	90.72	0.0004	99.9977
494	U054	90.72	0.0004	99.9981
495	U065	90.72	0.0004	99.9985
496	U100	90.72	0.0004	99.9988
497	U104	90.72	0.0004	99.9992
498	U175	90.72	0.0004	99.9996
499	U229	90.72	0.0004	100.0000
500	ALL2	0.00	0.0000	100.0000
501	U247	0.00	0.0000	100.0000

[a]See Appendix A, Tables A-1 and A-2 for definition.

[b]Metric tons per year based on corrected Part A data.

SECTION 3

DEVELOPMENT OF WASTE CHARACTERIZATION DATA

Waste stream characterization was identified as a key input parameter to the revised hazardous waste ranking of chemical compounds at TSDFs. GCA consulted the literature and contacted OSW's Waste Characterization Branch to obtain useable waste characterization data. When it became clear that no single data base existed, EPA directed GCA to compile existing characterization data for use in the national emissions estimates.

DATA SOURCES

In order to obtain waste characterization data on the multitude of hazardous waste streams handled at various TSDFs, GCA reviewed the following references for useable waste stream characterization data:

- Mitre Corporation Working Paper WP83-00065, "Composition of Hazardous Waste Streams Currently Incinerated", April 1983;[5]

- Industrial Economics Corporation, Draft Report, "Interim Report on Hazardous Waste Incineration Risk Analysis", August 1982;[6]

- ICF Incorporated, "RCRA Risk/Cost Policy Model-Phase II Report", August 1982;[9]

- RCRA background listing documents from the RCRA Docket;

- Waste code delisting information from the RCRA Docket; and

- Waste stream data from the RIA data base.

The first four data sources listed above were the only sources readily available for complete analysis and, although limited in many respects, they represented the best available data on industrial wastes. RCRA delisting information was limited and provided incomplete analyses of constituents likely to be found in waste streams. The RIA data were not made available in time for this review. In addition, GCA contacted OSW's Waste Characterization group for access to the industry studies data. However, no data were received from this source due to apparent problems with data confidentiality.

GCA summarized existing characterization data for 99 RCRA waste codes, 52 of which were single constituent codes (U and P). These 99 codes represent about 50 percent of the total waste volume reported in the screened RCRA Part A data base. Table 8 lists the generic waste codes identified in each of of the primary waste characterization data sources. The term generic waste code is defined herein as those wastes with the following EPA waste code designations.

- DXXX-waste codes identified in §261.21, §261.22 and §261.23 of the Federal Register as nonlisted ignitable, corrosive, reactive or EP toxic wastes.
- FXXX-waste codes identified in §262.31 of the Federal Register as hazardous wastes from nonspecific sources.
- KXXX-waste codes identified in §261.32 of the Federal Register as hazardous wastes from specific sources.

A more complete listing of chemical specific and generic waste code definitions is presented in Appendix A, Tables A-1 and A-2, respectively.

DATA SOURCE QUALITY

The following three limitations generally applied to the waste stream characterization data base:

- laboratory of analytical techniques were frequently undocumented;
- errors were evident in estimation and extrapolation procedures used in the reference;
- evidence of serious inconsistency within the same reference and between references were noted.

A certain bias of the characterization data may be inherent with using the Mitre and IEC data, since these two studies provided analysis of potentially incinerable waste streams. It is anticipated that these data may be biased towards higher volatile organic compound concentrations normally found in incinerated wastes. The following discussion presents salient information about the three data sources which form the basis for the waste characterization data compiled for the national emissions estimates.

Mitre Working Paper WP83-00065[5]

The purpose of the Mitre study was to provide baseline information of hazardous waste streams currently incinerated. Additionally, this report provided an assessment of risks and benefits associated with alternate approaches to incineration.

TABLE 8. EPA HAZARDOUS WASTE CODES FOR WHICH WASTE CHARACTERIZATION DATA EXISTS

Waste code	Mitre[a] report	IEC[b] report	ICF[c] report
D001	X		
D002	X		
D003	X		
F001	X	X	X
F002	X	X	X
F003	X		
F004	X		
F005	X		
F006	X		
F017	X		
K001	X		X
K009		X	
K010		X	
K011	X	X	
K012		X	
K013	X	X	
K014	X	X	
K015			X
K016	X		X
K017			X
K018	X	X	X
K019	X		
K020	X		
K021			X
K022		X	X
K025	X		X
K026		X	X

(continued)

TABLE 8 (continued)

Waste code	Mitre[a] report	IEC[b] report	ICF[c] report
K027	X	X	X
K028		X	
K029		X	
K030			X
K048	X	X	
K049	X	X	
K050		X	
K051	X	X	
K052		X	
K053	X		
K060			X
K070	X		
K073	X	X	X
K083	X		
K085	X		X
K086	X		
K087			X
K095		X	X
K096		X	
K105			X
Total	29	22	19

[a]"Composition of Hazardous Waste Streams Currently Incinerated," Mitre Corporation, Working Paper WP8300065, April 1983.
[b]"Interim Report on Hazardous Waste Incineration Risk Analysis," Industrial Economics, Inc., Draft Report, August 1982.
[c]"RCRA Risk/Cost Policy Model - Phase II Report," ICF, Incorporated, August 1982.

This study identified 413 waste streams with 237 different chemical constituents. However, not all waste streams were useable in GCA's characterization, since individual waste streams were often comprised of a mixture of two or more EPA waste codes as shown in the example provided in Table 9. For a waste stream such as the one shown in Table 9, determination determination of the proper distribution of chemical constituents to individual waste codes could not be determined. Thus, 36 waste streams of this type could not be used in GCA's waste characterization data base.

In the Mitre report, 140 of the 237 constituents are listed in the Federal Register as RCRA hazardous waste. The compounds reported in this study are denoted by the RCRA K, F, D, U, and P codes waste type codes. The remaining constituents included 85 specific compounds not listed in the Federal Register that were denoted by a C code, and 13 nonspecific (e.g., "tars") compounds denoted by a G code. For each constituent, data were provided on the concentration and the total constituent quantity in the waste.

Mitre data were obtained exclusively from industrial incinerators of hazardous waste and thus, the study is limited in scope and the data should be biased towards high Btu content wastes. The Mitre data may also be limited by the accuracy of analytical techniques employed. Data were rounded off to the nearest integer, tenth, or hundredth. This may have introduced an uncertainty factor when the concentration quantities were later manipulated by GCA.

Industrial Economics Corporation (IEC)[6]

The IEC presents data on incinerator facilities including operating practices, identification of waste streams incinerated, waste toxicities, and human population exposure. A calculational technique was provided to estimate human health effects and to indicate potential risks expected across the exposed population. Waste characterization data centers upon those wastes which are "potentially incinerable."

There are 102 waste streams identified in the IEC report, of which 48 are K waste codes, two are F waste codes and 52 are IEC codes. The IEC codes contained no organic constituents, thus they were eliminated from consideration. Due to unavailable quantity or constituent concentration data for most waste streams, only 22 streams were usable for characterization. A total of 71 chemical constituents were identified in these streams.

For many waste streams, only partial information was provided. Various chemical constituents were identified as present in a waste stream, although no concentration data were available. Many of the waste quantitites were based upon "professional judgment," while in some cases the numbers were based upon actual sampling data. Thus, the accuracy of the numbers may vary widely. A measure of this variability was not identified by the authors. Additionally, many constituents were identified inconsistently; several constituents appeared under different synonyms for different streams (i.e., Perchloroethylene and Tetrachloroethylene were used interchangeably) and several constituents were identified under general classifications (i.e., Tetrachloroethanes).

TABLE 9. EXAMPLE OF MITRE REPORT DATA: FACILITY 108[a]

Waste stream ID	EPA hazardous waste code	Waste amount, t/year	Ash content, percent	Chlorine content, percent	Water content, percent	Heating value, Btu/lb	Constituent code	Constituent concentration, percent	Amount of constituent, t/year[b]
1	D001	181.00	20	5	4	10000	U002	1.0	36.00
	F001	1,588.00					U220	8.0	287.00
	F003	1,814.00					U210	3.0	108.00
	TOTAL	3,583.00					U228	3.0	108.00
							U239	12.0	430.00
							C049	2.0	72.00
							C069	5.0	179.00
							U159	30.0	1,075.00
							U226	2.0	72.00

[a]Source: Reference 5.

[b]t/year = metric tons/year.

ICF, Incorporated[9]

The purpose of this study was to provide a description of the characteristics of waste streams from industrial and several nonindustrial sources. From these data a model was developed to generate "risk scores" for hazardous waste streams and their constituents.

There were 83 waste streams from industrial and nonindustrial (i.e., PCB wastes) sources identified in this report. Of the 83 waste streams, 35 did not have an applicable EPA waste code number. Eighteen waste streams were mixtures identified by more than one EPA waste code. Thus, chemical constituents which corresponded to individual waste codes could not be segregated for these waste streams. Of the remaining waste streams, two were identified by the same EPA code (F001) and were subsequently combined as one stream. Ten of the remaining waste streams contained only inorganic constituents and were not considered in the analysis. The remaining 19 waste streams, which were appropriate for characterization contained 29 chemical constituents. All of these constituents were noted as hazardous (RCRA).

Analytical data were reportedly based upon varying degrees of approximation. The resultant uncertainty factors included in the report ranged from ±15 to ±40 percent for each waste stream. Several of the waste streams were defined by using "highly approximate, artificial characteristics." In addition, there was uncertainty as to whether all chemical constituents were actually listed in the ICF tables, as the ICF report typically identified less chemical constituents for waste codes than were identified in the other two characterization reports.

CHARACTERIZATION METHODOLOGY

Each waste characterization study contained tabulated data including the following information:

- identification of each waste stream by one or more EPA hazardous waste codes;
- total waste stream quantity generated on an annual basis;
- chemical constituent codes identified within a particular waste stream; and
- the concentration of each chemical constituent on a weight percent basis.

Using the data provided in each waste characterization report, volume weighted average chemical constituent concentrations were determined for each waste code. However, this analysis was only possible where a waste stream was identified by a single EPA hazardous waste code. Waste streams with multiple waste code listings did not provide a complete breakdown matching each chemical constituent to its respective waste code. In this latter case, all chemical constituents were grouped together for the entire waste stream, and these data were not useful.

Volume or mass-weighting of the concentration data was employed in averaging data from different data sources. This weighting method places greater confidence in concentration data taken from larger waste stream volumes.

In addition to the generic waste types discussed above, GCA also analyzed U and P waste codes, which represent commercial chemical product wastes identified as acute hazardous and toxic wastes, respectively. The Mitre report characterized these wastes as pure compounds containing 100 percent (10^6 ppm concentrations) of the "U" code constituent type. While the Mitre data may be accurate for incineration, it is unlikely that pure volatile organic compounds are disposed as free liquids or solids. GCA assumed for the purposes of this characterization that these compounds would be found in one (1) percent concentrations by weight (10^4 ppm concentrations). This concentration is considered to be reasonable since this estimate may represent either a nonrecoverable concentration, or a waste concentration fixed by a sorbent. This waste dilution assumption should have minor impact on the chemical prioritization ranking. However, the impact of this assumption may be substantial with respect to the waste code ranking results.

Once the average constituent concentrations were developed for each waste code, the weight-based concentrations were converted to mole fractions. The mole fraction of constituent i in waste type k, is expressed as the weight fraction of i, divided by the molecular weight of i, multiplied by the average molecular weight of waste type k:

$$MF_{i,k} = C_{i,k} \frac{\overline{MW}_k}{MW_i}$$

where $MF_{i,k}$ = mole fraction of constituent i in waste type k;

$C_{i,k}$ = weight concentration of constituent i in waste type k;

MW_i = molecular weight of compound i; and

$\overline{MW}_k$ = average molecular weight of waste type k.

The average molecular weight of waste type k ($\overline{MW}_k$) was estimated by taking the weighted average of all constituents in waste type k. Note that the molecular weight of unknown constituents labeled "others" (MW_{others}) was assumed to be equal to the average of all known constituents excluding water. The weight fraction of all unknown constituents is defined as one (1) minus the weight fraction of all known constituents (including water).

CHARACTERIZATION RESULTS

The results of the waste characterization effort for 47 generic waste codes are presented in Table 10. The waste codes are listed in the left hand vertical column of Table 10 and the waste constituents are listed across the top of the table. Because of the large number of waste constituents (55) listed for each code, the constituents for each waste code are listed on several pages. Single constituent waste mole fractions for selected "U" code wastes are presented in the bottom row of Table 10. As noted earlier, these mole fractions are based on single constituent weight fractions of one (1) percent by weight.

TABLE 10. WASTE CHARACTERIZATION RESULTS

WASTE CODE

WASTE CONSTITUENTS CONCENTRATION IN MOLE FRACTION[a]

CODE	U001	U002	U003	U0[illegible]	U00[illegible]	U00[illegible]	U01[illegible]	U01[illegible]	P0[illegible]8	U031	P0[illegible]	U211	U05[illegible]	U0[illegible]4	U05[illegible]
D001	[illegible]E-4	.00[illegible]95[illegible]	.051[illegible]900	0	.0[illegible]E-5	0	.54[illegible]E-5	3.[illegible]74E-4	0	1.5[illegible]1E-5	[illegible]E-4	[illegible]1E-5	[illegible]1E-[illegible]	1.[illegible]E-5	[illegible]E-[illegible]
D00[illegible]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
D00[illegible]	0	.00[illegible]9[illegible]5	0	0	0	0	0	.0011[illegible]3	0	0	1.[illegible]3E-4	0	0	0	0
F001	0	3.0[illegible]1E-4	0	0	0	0	0	0	0	0	0	[illegible]E-4	0	0	0
F00[illegible]	0	0	0	0	0	0	0	0	0	0	0	0	0	[illegible]E-5	0
F00[illegible]	0	.4385645	0	0	0	0	0	1.8[illegible]1E-4	0	.0[illegible]0521	0	0	0	0	0
F004	0	0	0	0	0	0	0	0	0	0	0	0	[illegible]4[illegible]	0	[illegible]4[illegible]
F005	0	1.[illegible]38E-[illegible]	0	0	0	0	0	0	0	0	0	0	0	0	0
F00[illegible]	0	.01[illegible]53	0	0	0	0	0	0	0	0	0	0	0	0	0
F01[illegible]	0	.00[illegible]558[illegible]	0	0	0	0	0	0	0	0	0	0	0	0	0
K001	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
K00[illegible]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
K01[illegible]	.100114[illegible]	0	0	0	0	0	0	0	0	0	0	0	0	0	0
K011	0	0	.00[illegible]	0	0	1.[illegible]E-4	0	0	0	0	0	0	0	0	0
K01[illegible]	0	0	.4[illegible]5[illegible]459	0	0	0	0	0	0	0	0	0	0	0	0
K01[illegible]	0	0	.0[illegible]65	0	0	[illegible]E-[illegible]	0	0	0	0	0	0	0	0	0
K014	0	.00582[illegible]	.0[illegible]5[illegible]	0	0	0	0	.00115[illegible]	0	0	0	0	0	0	0
K015	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
K01[illegible]	0	0	0	0	0	0	0	0	0	0	0	.0[illegible]3[illegible]4	0	0	0
K01[illegible]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
K01[illegible]	0	0	0	0	0	4.[illegible]E-4	0	0	0	0	0	0	0	0	0
K01[illegible]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
K02[illegible]	0	0	0	0	0	0	0	0	0	0	0	[illegible]	0	[illegible]4	0
K0[illegible]1	0	0	0	0	0	0	0	0	0	0	0	5.[illegible]E-4	0	[illegible]E-4	0
K0[illegible]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
K0[illegible]	0	0	0	0	0	0	1[illegible]E-4	0	0	0	0	0	0	0	0
K0[illegible]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
K0[illegible]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
K0[illegible]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
K0[illegible]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
K03[illegible]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
K04[illegible]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
K051	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
K05[illegible]	0	0	0	0	0	0	.10[illegible]	0	0	0	0	0	0	0	0
K0[illegible]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
K0[illegible]6	0	0	0	0	0	[illegible]11[illegible]	0	0	0	0	0	0	0	0	0
K0[illegible]	0	0	0	0	0	0	0	0	0	0	0	.0[illegible]1001	0	.[illegible]0001	0
K0[illegible]	0	0	0	0	0	0	[illegible]	0	0	0	0	0	0	0	0
K0[illegible]5	0	0	0	0	0	0	0	0	.00[illegible]4	0	0	0	0	0	0
K0[illegible]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
K0[illegible]3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
K1[illegible]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
K10[illegible]	0	0	0	0	0	0	0	4.[illegible]45E-4	0	0	0	0	0	0	0
SGF CONS[a]	.004115[illegible]	.00[illegible]5	.0044150	.00[illegible]554	.0025154	[illegible]41.4	.001[illegible]	.00[illegible]0	.0014241	.0024510	.00[illegible]	.0011[illegible]	.001[illegible]	.001[illegible]	[illegible]

TABLE 10 (continued)

WASTE CODE

WASTE CONSTITUENTS CONCENTRATION IN MOLE FRACTION

CODE	U03[illegible]	U045	U057	U070	U07[illegible]	U07[illegible]	U0[illegible]	U041	U11[illegible]	U113	C043	U117	U0[illegible]	U1[illegible]	U1[illegible]	F[illegible]
D001	7.[illegible]34E-5	0	0	0	0	[illegible]147E-4	0	0	9.[illegible]E-5	0	[illegible]9E-7	0	0	.001[illegible]	[illegible]1E-4	0
D002	0	0	0	0	0	0	0	0	0	0	0	0	0	1.[illegible]E-5	[illegible]E-[illegible]	0
D003	0	0	0	0	0	0	0	0	.0151555	0	0	0	0	0	0	0
F001	1.[illegible]10E-5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F002	[illegible]E-6	0	0	.00[illegible]105	0	0	0	0	0	0	0	0	0	0	0	0
F003	0	0	.0[illegible]558[illegible]	0	0	0	0	0	.0[illegible]535[illegible]	0	.0[illegible]1[illegible]	.00[illegible]4[illegible]	0	0	0	0
F004	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F005	0	0	0	0	0	0	0	0	0	0	0	0	0	[illegible]3E-4	0	0
F006	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F0[illegible]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F0[illegible]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F009	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.0[illegible]4[illegible]5[illegible]
F012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F01[illegible]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.01[illegible]51
F014	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	[illegible]E-4
F015	.0[illegible]6[illegible]74[illegible]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F01[illegible]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F01[illegible]	0	0	0	0	0	0	0	.01[illegible]-4	0	0	0	0	0	0	0	0
F01[illegible]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F01[illegible]	5.5[illegible]E-5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F020	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F0[illegible]1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F0[illegible]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F0[illegible]5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F0[illegible]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F0[illegible]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F0[illegible]	0	0	0	0	0	.3[illegible]0[illegible]	0	0	0	0	0	0	0	0	0	0
F0[illegible]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F034	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F0[illegible]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F051	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F05[illegible]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F0[illegible]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5.1[illegible]E-4
F0[illegible]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F0[illegible]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F083	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F085	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F086	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F087	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F[illegible]	0	0	0	0	0	.1737[illegible]	0	0	0	0	0	0	0	0	0	0
F105	1.5[illegible]5E-5	0	0	7.29E-4	7.29E-4	0	0	0	0	0	0	0	0	0	0	0
SOL CONS	.0016127	.0015129	.0018519	.001[illegible]353	.001[illegible]353	.0017[illegible]	.0040[illegible]41	.0019[illegible]17	.0020619	.0018149	.0017027	.0024516	.0018[illegible]	.00[illegible]41	[illegible]	[illegible]

TABLE 10 (continued)

WASTE CONSTITUENTS CONCENTRATION IN MOLE FRACTION

WASTE CODE	U134	U135	U140	U142	U154	U045	U159	U161	U031	U165	U169	U183	U170	U19[illegible]	U2[illegible]	U2[illegible]
D001	3.37[illegible]E-7	0	4.789E-5	2.373E-5	.0021453	0	.0012751	5.161E-[illegible]	6.706E-4	1.973E-5	0	6.771E-4	1.607E-5	4.751E-4	.41[illegible]E-[illegible]	[illegible]11E-4
D002	3.6[illegible]4E-5	0	0	.0021172	.0062598	0	1.970E-6	0	0	0	0	0	.0013[illegible]	0	0	[illegible]E-5
D003	0	0	0	0	.0097250	0	0	0	0	0	0	0	0	0	0	.144[illegible]
F001	0	0	0	0	0	5.3[illegible]E-7	2.492E-4	0	.0774089	0	0	0	0	0	[illegible]	[illegible]
F002	0	0	0	0	8.8[illegible]1E-6	0	[illegible]E-[illegible]	0	.0[illegible]556[illegible]	0	0	0	0	0	[illegible]	[illegible]4E-[illegible]
F003	0	0	0	9.124E-6	.0061444	0	.00[illegible]114[illegible]	[illegible]	0	0	0	0	[illegible]42E-[illegible]	[illegible]5E-5	0	[illegible]E-4
F004	0	0	0	0	0	0	0	0	0	0	.467[illegible]	0	0	0	0	0
F005	0	0	.0661227	0	.1771556	.0[illegible]24[illegible]	.0297[illegible]11	.00[illegible]171[illegible]	0	0	0	0	0	.00[illegible]58	0	[illegible]4[illegible]4[illegible]
F006	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F007	0	0	0	0	0	0	.1411467	.00146[illegible]	0	0	0	0	0	0	0	.11[illegible]
F00[illegible]	0	0	0	0	0	0	0	0	0	.0016104	0	.9[illegible]E-[illegible]	0	0	0	0
F009	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F014	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F015	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.[illegible]01
F016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	[illegible]4[illegible]	0
F017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F018	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F019	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F020	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.0010[illegible]4[illegible]	0
F021	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F022	0	0	0	0	0	0	0	0	0	0	0	.0101[illegible]	0	0	0	0
F025	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F026	0	0	0	0	0	0	0	0	0	0	0	[illegible].751E-[illegible]	0	.0042014	0	0
F027	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F029	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F030	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F046	0	0	0	0	0	0	0	0	0	0	0	9.963E-4	0	0	0	0
F049	0	0	0	0	0	0	0	0	0	0	0	[illegible]54E-4	0	0	0	0
F051	0	0	0	0	0	0	0	0	0	0	0	[illegible]2[illegible]E-5	0	0	0	0
F053	0	0	0	0	0	0	0	0	0	0	0	.099[illegible]64	0	0	0	0
F060	0	0	0	0	0	0	0	0	0	0	0	1.992E-5	0	0	0	0
F070	0	0	0	0	.2619497	0	0	0	0	0	0	0	0	0	0	0
F073	0	0	0	0	0	0	0	0	0	0	0	0	0	0	[illegible]5E-4	0
F083	0	0	0	0	0	0	0	0	0	0	0	.0179833	0	0	0	0
F085	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F086	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	[illegible]4[illegible]5
F087	0	0	0	0	0	0	0	0	0	0	0	.0372356	0	0	0	0
F096	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F105	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SQ CONS.[a]	.0090090	.0053191	.0024510	.0018519	.0056497	.0035874	.00[illegible]513	.0015145	.0021345	.0014162	.0014747	.0019282	.0012276	.00229[illegible]2	.0010751	.001

TABLE 10 (continued)

WASTE CODE — WASTE CONSTITUENTS CONCENTRATION IN MOLE FRACTION

CODE	U223	U226	U228	U121	A055	U043	U078	U239	WATER	OTHER	SUM
D001	1.114E-6	3.808E-4	5.903E-7	6.400E-4	0	0	0	.0127061	.5362794	.2253955	.0260979
D002	0	0	0	0	0	5.506E-7	0	6.805E-5	.9668220	.0207771	1.000071
D003	0	0	0	0	0	0	0	0	.6514108	.1054383	1.005217
F001	0	8.833E-5	.1479235	0	0	0	0	1.652E-4	.3526789	.3388187	.9973049
F002	0	.1188730	.1218814	.0026859	0	0	0	0	.0459671	.3236330	.9999920
F003	0	0	0	0	0	0	0	.2485936	.1738637	.0179425	.9999005
F004	0	0	0	0	0	0	0	0	0	0	1.
F005	0	0	0	0	0	0	0	.0015495	.4540926	0	.993[illegible]
F006	0	0	0	0	0	0	0	.0097610	.3776297	.0941933	1
F017	0	0	0	0	0	0	0	.0937729	.3337503	.3077548	.9504971
K001	0	0	0	0	0	0	0	0	.9720941	.0262916	1
K009	0	0	0	0	0	0	0	0	.9916351	.0083647	1
K010	0	0	0	0	0	0	0	0	.7930846	.1013006	1
K011	0	0	0	0	0	0	0	0	.9757803	.0178207	1
K012	0	0	0	0	0	0	0	0	0	.5741541	1
K013	0	0	0	0	0	0	0	0	.9716760	.0014041	1
K014	0	0	0	0	0	0	0	0	.3827476	.0172099	1
K015	0	0	0	0	0	0	0	0	0	.7538419	.953[illegible]
K01[illegible]	0	0	0	0	0	0	0	0	0	.8093547	1.
K017	0	0	0	0	0	0	0	0	0	.990[illegible]	1
K018	0	0	.2225682	0	0	0	0	0	.0351758	.7413351	1
K019	0	.1323108	0	0	.0599715	0	0	0	0	.8076617	1.
K020	0	.1862454	0	0	0	0	0	0	0	.3079455	1
K021	0	0	0	0	0	0	0	0	.9535682	.0451550	1
K022	0	0	0	0	0	0	0	0	0	.9893720	1
K0[illegible]5	0	0	0	0	0	0	0	0	0	.9998278	1
K0[illegible]	0	0	0	0	0	0	0	0	0	.9756903	1
K027	.0175127	0	0	0	0	0	0	0	.1132191	.8692681	1
K0[illegible]	0	.1[illegible]96177	0	0	0	0	0	0	0	0	1.
K0[illegible]	0	0	0	0	0	0	0	0	0	1	1
K04[illegible]	0	0	0	0	0	0	0	0	.9785731	.0204254	1
K04[illegible]	0	0	0	0	0	0	0	0	.7983760	.0014130	1
K051	0	0	0	0	0	0	0	0	.8590130	.1409626	1
K052	0	0	0	0	0	0	0	0	0	.8006446	1
K0[illegible]	0	0	0	0	0	0	0	0	.9893648	.0101010	1
K0[illegible]	0	0	0	0	0	0	0	0	0	.4119130	1
K0[illegible]	0	9.609E-5	0	0	0	0	0	0	0	.1980736	1.
K0[illegible]	0	0	0	0	0	0	0	0	.8680582	.0888807	1
K085	0	0	0	0	0	0	0	0	0	.9923752	1
K086	0	0	0	0	0	0	0	0	.4529872	.4805884	.9773702
K087	0	0	0	0	0	0	0	0	0	.9027644	1
K0[illegible]	0	.1634641	0	0	0	0	0	0	0	.6628097	1
K105	0	0	0	0	0	0	0	0	.9537781	.0442523	1
SGL CONS.[a]	.0010438	.0013610	.0013819	.0013215	.0012320	.0029007	.0018709	.0017123	.01	1	

[a]Single constituent waste concentrations for U and P codes.

SECTION 4

COMPILATION OF CHEMICAL PROPERTIES AND HEALTH EFFECTS DATA

This section briefly summarizes the data compiled on the chemical constituents identified in the waste characterization portion of this report. Two types of data were identified and compiled: (1) the chemical and/or physical properties:

- molecular weight
- vapor pressure
- solubility
- Henry's Law Constant
- activity coefficient

and, (2) the toxic and carcinogenic effects:

- Threshold Limit Value (TLV)
- maximum allowable concentration at the 10^{-5} Risk Level.

CHEMICAL AND PHYSICAL PROPERTIES DATA

Chemical and physical properties data are particularly important to the waste ranking, since the hazard factor calculation, based on chemical equillibria, requires knowledge of these properties. Specifically, the molecular weight, vapor pressure, solubility, and activity coefficients associated with each chemical compound were employed to assess the gas phase equilibrium concentrations used in the ranking procedure. Additional details on the hazard factor calculation are provided in Section 5 of this report.

All chemical property data were compiled for a temperature of 25°C. The literature provided calculational techniques to estimate these data when not readily available in tabular form. Table 11 summarizes the key data used in the development of the hazardous waste ranking. Following discussions indicate how the data were manipulated into the desired form.

TABLE 11. SUMMARY OF PERTINENT CHEMICAL PROPERTY DATA

Waste code	Molec. weight	Vapor pressure (mmHg)	Activity coeff.
U001	44	916	4.2
U002	58	266	24.6
U003	41	90	10.89
U007	71	.012	34.07
U008	72.1	.45	10.7
U009	53.1	114	34
U012	93	.75	94
U019	78.12	95.2	2094
P028	126.6	1.21	2093
U031	74	7	42.9
U211	153.8	109	95
U052	108	4	132
U044	119.4	192	209
U037	112.56	12	95
U055	120	4.6	1
U057	98	4.8	10495
U070	147	1.4	52000
U072	147	.8	52000
U079	97	497	382
U041	92.5	17	28
U112	88	85	105
U113	100	40	339
U049	126.6	10	15190
U117	74	520	121
U077	99	82	382
U122	30	3500	1.452
U123	46	42	1.29
P063	27	726	1
U134	20	900	1
U135	34	15200	1
U140	74	12	31
U147	98	.3	141
U154	32	114	1.53
U045	50.5	760	95.06
U159	72	100	58
U161	100	7.5	794
U080	85	438	95.06
U165	123.2	.23	71504
U169	123.11	.3	2958
U188	94.11	.341	41
U190	148	.03	2655
U196	78	20	1622
U210	165.85	18.6	382
U220	92.13	28.4	10487
U223	174	.08	1
U226	133.41	123	382
U228	131.39	90	382
U121	137.4	796	1
A055	147.4	4.4	1619
U043	62.5	2600	382
U078	97	500	382
U239	106	8.5	15188
Water	18	23.8	1
Other	91.22821	23.8	1

Molecular Weight and Vapor Pressure

Molecular weights were obtained from the published literature,[10,12] while approximately 60 percent of the vapor pressure data were also available. Vapor pressure data not found in the published literature were calculated in one of two ways. Where vapor pressure data were available at several known temperatures, the Clausius-Clapeyron equation[13] was employed. For those compounds for which these data were not available, the Antione coefficients and equation were used.[14]

The Clausius-Clapeyron equation provides an approximate relationship between vapor pressure and absolute temperature:

$$\ln P^\circ = \frac{-\Delta H_v}{RT} + B$$

where: P° = vapor pressure (mmHg);

ΔH_v = latent heat of evaporation;

R = the gas constant;

T = absolute temperature (°K); and

B = a compound specific constant.

According to this equation, a plot of $\ln P^\circ$ versus $1/T$ would yield a straight line with slope $-\Delta H/R$ and intercept B. Thus, if two vapor pressures are known (P°_1, P°_2) along with their corresponding temperatures (T_1, T_2), a third vapor pressure at it's corresponding temperature can be determined by solving for $-\Delta H_v/R$ and B as follows:

$$\frac{-\Delta H_v}{R} = \frac{T_1 T_2 \ln (P^\circ_2/P^\circ_1)}{(T_1 - T_2)} \quad ;$$

$$B = \ln P^\circ_1 + \frac{\Delta H_v}{RT_1}$$

The validity of this estimation technique is dependent upon the assumption that ΔH_v does not vary with temperature. While this assumption is frequently invalid, the equation provides reasonably good results if used to interpolate vapor pressure over a relatively small temperature range.[13,14] Multiple vapor pressure values for a number of compounds at various temperatures were available in the Chemical Engineer's Handbook.[10]

Antoine's equation is a three constant vapor pressure correlation represented as follows:

$$\log P^\circ = a - \frac{b}{t + c}$$

where: $P°$ = vapor pressure (mmHg)

t = temperature (°C)

a, b, c = Antoines coefficients, chemical specific.

The Antoine coefficients were mainly obtained from Lange's Handbook of Chemistry.[11] For vapor pressure values ranging from 10 to 760 mmHg, there is an estimation error of approximately 3 percent. For low volatility compounds (10^{-3} to 10 mmHg), the error can be as high as 86 percent.[14]

Solubility in Water

Approximately 60 percent of the solubility data were directly obtained from published literature sources. The remaining data were calculated from the following equation:

$$\text{Log } 1/S = 1.214 \log K_{ow} - 0.85$$

where K_{ow} = octanol water partition coefficient

S = solubility, mg/l at 25°C

Although this equation is subject to several data limitations,[14] it provides approximately two-thirds of the estimates within a factor of 10.

Vapor Phase Equilibrium Calculation

The simplest approach for determining vapor-liquid equilibrium is to assume an ideal liquid with an ideal gas. From Raoult's Law, phase equilibrium is determined by the partial pressure of a component in the vapor phase:

$$P_i = X_i P°_i$$

where P_i = partial pressure of compound i

X_i = mole fraction of compound i in the liquid phase

$P°_i$ = true vapor pressure of compound i

However, this equation is of limited use since the assumption of an ideal solution is generally unrealistic. The ideal solution assumption is only approximately valid if the solution is comprised of species of similar molecular weight and chemical structure.

To correct for deviations from Raoult's Law, it is necessary to include the activity coefficient such that:

$$P_i = \gamma_i X_i P°_i$$

r the purposes of this task, the activity coefficient becomes a key rameter in determination of vapor-liquid equilibrium particularly in the se of aqueous mixtures. Thus, the use of activity coefficients is essential r the following storage, treatment and disposal processes where the sumption of dilute aqueous solution holds:

- S04 - Storage Surface Impoundments
- T01 - Treatment Tank
- T02 - Treatment Surface Impoundment
- D83 - Disposal Surface Impoundment

r the remaining processes, it is assumed that waste mixtures are generally similar chemical nature and not dilute aqueous mixtures, thus, γ_i is proximately unity.

tivity Coefficient

Several methods for the estimation of activity coefficients are presented the Handbook of Chemical Property Estimation Methods.[14]

All activity coefficients were estimated using the infinite dilution tivity coefficient correlation shown below:[14]

$$\log \gamma_i^{\infty} = A_{1,2} + B_2 N_1/N_2 + C_1/N_1 + D (N_1 - N_2)^2 + F_2/N_2$$

re: subscript 1 refers to solute and 2 refers to solvent, and

$A_{1,2}$ = coefficient which depends on the nature of solute and solvent functional groups;

B_2 = coefficient which depends only on nature of solvent functional group;

C_1 = coefficient which depends only on solute functional group;

D = coefficient independent of solute and solvent functional group;

F_2 = coefficient which essentially depends only on nature of solvent functional group;

N_1, N_2 = number of carbon atoms in solute and solvent, respectively.

s correlation requires knowledge of the molecular structure of the compound n was obtained from the literature.[10, 17-22] For the case of water as a vent, the above equation simplifies to:

$$\log {}_{i} = A_{1,2} + B_2 N_1 + C_1/N_1$$

This equation serves as the basic equation which varies slightly according to which chemical class a compound is assigned. Once a compound was categorized into one of the chemical classes shown in Table 12, Table 13 indicates which of the nine equation modifications will be incorporated into the basic equation. Table 14 presents correction factors which had to be taken into consideration for each compound.

Large percentage errors can be tolerated in estimating activity coefficients. For example, a ±10 percent variation in γ^∞ does not effect predictions of vapor-liquid equilibria. In general, this method is capable of predicting γ^∞ to within ±25 percent of the true value. Pierotti et al.[23] gave an overall average deviation of 8 percent in γ^∞, although in isolated instances errors as high as 350 percent were shown. In three instances, values were not obtained for γ^∞ and assumed to be equal to 1.

Henry's Law-Constant

Some of the Henry's Law Constants (H_i) were taken directly from the literature.[23-26] For the majority of compounds, the following equation was used:

$$H_i = \frac{P^\circ_{i\ (\text{mmHg})}\ \frac{1\ \text{atm}}{760\ \text{mmHg}}}{S_i\ (\text{g/m}^3)} \times MW_i$$

where: P°_i = vapor pressure of compound i

S_i = solubility for compound i

MW_i = molecular weight of compound i.

When the above equation is used, the data must be for the same temperature (25°C) and physical state of the compound. Appendix A, Table A-3, contains a summary of the chemical and/or physical properties compiled for the chemicals identified in this report.

HEALTH PROPERTIES DATA

As part of GCA's revised ranking approach, it was determined that the wastes should be evaluated based on both carcinogenicity and toxicity. Threshold Limit Value (TLV) data was used for the evaluation of toxic effects while maximum allowable concentrations at the 10^{-5} Risk Level were used for assessing the impact of carcinogenicity.

Toxicity Threshold Limit Values

Threshold Limit Values for several chemicals were compiled for previous chemical ranking efforts conducted by GCA.[1] Other TLV data were available from data published annually by the American Conference of Governmental Industrial Hygienists.[27] The TLV refers to maximum airborne concentrations to which nearly all workers may be repeatedly exposed (8 hr/day, 40 hr/week, without adverse effect. In general, TLV data are well documented and based on

TABLE 12. CORRELATING CONSTANTS FOR ACTIVITY COEFFICIENTS AT INFINITE DILUTION, HOMOLOGOUS SERIES OF SOLUTES AND SOLVENTS[a]

Solute (1)	Solvent (2)	Temp. (°C)	$A_{1,2}$	B_2	C_1	D	F_2	Basic Equation Modification[b]
n-Acids	Water	25	−1.00	0.622	0.490	0	0	a
		50	−0.80	0.590	0.290	0	0	a
		100	−0.620	0.517	0.140	0	0	a
n-Primary alcohols	Water	25	−0.995	0.622	0.558	0	0	a
		60	−0.755	0.583	0.460	0	0	a
		100	−0.420	0.517	0.230	0	0	a
Secondary alcohols	Water	25	−1.220	0.622	0.170	0	0	b
		60	−1.023	0.583	0.252	0	0	b
		100	−0.870	0.517	0.400	0	0	b
Tertiary alcohols	Water	25	−1.740	0.622	0.170	0	0	c
		60	−1.477	0.583	0.252	0	0	c
		100	−1.291	0.517	0.400	0	0	c
Alcohols, general	Water	25	−0.525	0.622	0.475	0	0	d
		60	−0.33	0.583	0.39	0	0	d
		100	−0.15	0.517	0.34	0	0	d
n-Allyl alcohols	Water	25	−1.180	0.622	0.558	0	0	a
		60	−0.929	0.583	0.460	0	0	a
		100	−0.650	0.517	0.230	0	0	a
n-Aldehydes	Water	25	−0.780	0.622	0.320	0	0	a
		60	−0.400	0.583	0.210	0	0	a
		100	−0.3[illegible]	0.517	0	0	0	a
n-Alkene aldehydes	Water	25	−0.720	0.622	0.320	0	0	a
		60	−0.540	0.583	0.210	0	0	a
		100	−0.298	0.517	0	0	0	a
n-Ketones	Water	25	−1.475	0.622	0.500	0	0	b
		60	−1.040	0.583	0.330	0	0	b
		100	−0.621	0.517	0.200	0	0	b
n-Acetals	Water	25	−2.556	0.622	0.486	0	0	e
		60	−2.184	0.583	0.451	0	0	e
		100	−1.780	0.517	0.426	0	0	e
n-Ethers	Water	20	−0.770	0.640	0.195	0	0	b
n-Nitriles	Water	25	−0.587	0.622	0.760	0	0	a
		60	−0.368	0.583	0.413	0	0	a
		100	−0.095	0.517	0	0	0	a
n-Alkene nitriles	Water	25	−0.520	0.622	0.760	0	0	a
		60	−0.323	0.583	0.413	0	0	a
		100	−0.074	0.517	0	0	0	a

(Continued)

TABLE 12 (continued)

Solute (1)	Solvent (2)	Temp. (°C)	$A_{1,2}$	B_2	C_1	D	F_2	Basic Equation Modification[b]
n-Esters	Water	20	−0.930	0.640	0.260	0	0	b
n-Formates	Water	20	−0.585	0.640	0.260	0	0	a
n-Monoalkyl chlorides	Water	20	1.265	0.640	0.073	0	0	a
n-Paraffins	Water	16	0.688	0.642	0	0	0	a
n-Alkylbenzenes	Water	25	3.554	0.622	−0.466	0	0	f
Alcohols, general	Paraffins	25	1.960	0	0.475	−0.00049	0	d
		60	1.460	0	0.390	−0.00057	0	d
		100	1.070	0	0.340	−0.00061	0	d
n-Ketones	Paraffins	25	0.0877	0	0.757	−0.00049	0	b
		60	0.016	0	0.680	−0.00057	0	b
		100	−0.067	0	0.605	−0.00061	0	b
Water	*n*-Alcohols	25	0.760	0	0	0	−0.630	a
		60	0.680	0	0	0	−0.440	a
		100.	0.617	0	0	0	−0.280	a
Water	*sec*-Alcohols	80	1.208	0	0	0	−0.690	c
Water	*n*-Ketones	25	1.857	0	0	0	−1.019	c
		60	1.493	0	0	0	−0.73	c
		100	1.231	0	0	0	−0.557	c
Ketones	*n*-Alcohols	25	−0.088	0.176	0.50	−0.00049	−0.630	g
		60	−0.035	0.138	0.33	−0.00057	−0.440	g
		100	−0.035	0.112	0.20	−0.00061	−0.280	g
Aldehydes	*n*-Alcohols	25	−0.701	0.176	0.320	−0.00049	−0.630	
		60	−0.239	0.138	0.210	−0.00057	−0.440	
Esters	*n*-Alcohols	25	0.212	0.176	0.260	−0.00049	−0.630	g
		60	0.055	0.138	0.240	−0.00057	−0.440	g
		100	0	0.112	0.220	−0.00061	−0.280	g
Acetals	*n*-Alcohols	60	−1.10	0.138	0.451	−0.00057	−0.440	h
Paraffins	Ketones	25	0	0.1821	0	−0.00049	0.402	i
		60	0	0.1145	0	−0.00057	0.402	i
		90	0	0.0746	0	−0.00061	0.402	i
Paraffins[j]	*n*-Alcohols	25	0.87	0.176	0	−0.00049	−0.630	
		60	0.80	0.138	0	−0.00057	−0.440	
		100	0.72	0.112	0	−0.00061	−0.280	
Water[j]	Paraffins	25	2.55	0	0	0	3.88	
Water[j]	*n*-Alkylbenzenes	25	3.04	0	0	0	−3.14	

[a]Source: Reference 14.

[b]Modifications to the basic infinite dilution equation are shown in Table 13.

TABLE 13. MODIFICATION OF TERMS IN THE BASIC ACTIVITY COEFFICIENT EQUATION[a]

Modification of terms

a. $B_2 N_1$

b. $B_2 N_1,\ C_1 \left(\frac{1}{N_1'} + \frac{1}{N_1''} \right)$

c. $B_2 N_1,\ C_1 \left(\frac{1}{N_1'} + \frac{1}{N_1''} + \frac{1}{N_1'''} \right),\ F_2 \left(\frac{1}{N_2'} + \frac{1}{N_2''} \right)$

d. $B_2 N_1,\ C_1 \left(\frac{1}{N_1'} + \frac{1}{N_1''} + \frac{1}{N_1'''} - 3 \right)$

e. $B_2 N_1,\ C_1 \left(\frac{1}{N_1'} + \frac{1}{N_1''} + \frac{2}{N_1'''} \right)$; N_1''' relates to R''' in $R'(R'')C(OR''')_2$

f. $B_2 (N_1 - 6),\ C_1 \left(\frac{1}{N_1 - 4} \right)$

g. $C_1 \left(\frac{1}{N_1'} + \frac{1}{N_1''} \right)$

h. $C_1 \left(\frac{1}{N_1'} + \frac{1}{N_1''} + \frac{2}{N_1'''} \right)$; N_1''' relates to R''' in $R'(R'')C(OR''')_2$

i. $F_2 \left(\frac{1}{N_2'} + \frac{1}{N_2''} \right)$

N_1, N_2 = total number of carbon atoms in molecules 1 and 2, respectively.

N', N'', N''' = number of carbon atoms in respective branches of branched compounds, counting the polar grouping; thus, for *t*-butanol, $N' = N'' = N''' = 2$.

1 Entries contributed by the author of this chapter.

[a]Source: Reference 14.

TABLE 14. CORRECTION FACTORS[b] FOR LOG γ_i, PER GROUP[a]

Group	Δ	Group	Δ
F	0.14	NH_2	−1.35
Cl	0.70	NO_2	
Br	0.92	(hydrocarbons)	0.15
I	1.40	(*m*-, *p*-phenols)	0.30
		(*m*-, *p*-anilines)	1.00
OH		CH_3 ($N_1 \geq 8$)	−0.25
(alcohols)	−1.90	C=C (in side chain)	−0.30
(phenols)	−1.70	C≡C (in side chain)	−0.46
COOH		Polycyclic hydrocarbons (naphthenes and biphenyls)	−1.11 per additional ring
(in side chain)	−1.70		
(on ring)	−0.70		

[a]Groups are attached to ring unless otherwise specified.

[b]Source: Reference 14.

extensive experimental data. However, one valid argument against the use of TLVs in a health impact ranking such as we are presenting, is that the adverse effect endpoints may vary considerably in impact on the quality of life. For example, the TLV adverse effect may be permanent impairment for one compound versus minor skin irritation for another.

Carcinogenicity - 10^{-5} Risk Level

Unit risk estimates define in quantitative terms, the impact of an agent as a carcinogen. This unit risk estimate for an air pollutant is defined as the lifetime cancer risk occuring in a hypothetical population in which all individuals are exposed continuously from birth throughout their lifetimes to a concentration of 1 $\mu g/m^3$ of the agent in the air that they breathe.

The maximum allowable concentrations at 10^{-5} Risk Level were calculated from potency slope data based on ingestion experimental data. The probability of increased cancer risk is defined as:

$$P = 1 - \exp\ (qi^{*}d)$$

where; qi^{*} = potency slope derived from experimental data

d = dose rate (mg/day)

P = probability of increased cancer cases

Assuming, a human body weight of 70 kg with a daily human inhalation volume of 20 m^3/day and 24-hour/day exposure, the equivalent inhalation dose rate, (d) can be expressed in terms of pollutant concentration, C($\mu g/m^3$) as shown below:

$$d = (2.857 \times 10^{-4})\ C$$

This method of converting ingestion data to air inhalation dose rates assumes 100 percent absorption of the chemical compound. Inserting the above expression into the first equation and setting the probable risk to 1/100,000, the 10^{-5} Risk Level concentration can be shown to be:

$$C = \frac{3.5 \times 10^{-2}}{qi^{*}}$$

Table 15 provides a summary of the allowable concentrations at 10^{-5} Risk Level for 52 compounds for which the Carcinogen Assessment Group (CAG) has assessed. The issue of health risk endpoint is not a problem for the carcinogenicity data; since it is generally perceived that cancer results in eventual death. However, the experimental data base for carcinogenicity data is very limited for inhalation data. In fact, the data presented in this report were based on ingestion carcinogenicity data and converted. The data in Table 15 is limited by available carcinogenicity study results.

TABLE 15. MAXIMUM ALLOWABLE CONCENTRATIONS AT 10^{-5} RISK LEVEL

Compound	C
Acrylonitrile	.146
Aflatoxin B_1	1.2×10^{-5}
Aldrin (dimethanonaphthalene)	3.1×10^{-3}
Allyl chloride (3-chloropropene)	2.94
Arsenic	2.5×10^{-3}
B [a] P	3.0×10^{-3}
Benzene	.673
Benzidine	1.5×10^{-4}
Beryllium	7.2×10^{-3}
Cadmium (dust)	5.2×10^{-3}
Carbon tetrachloride	.269
Chlordane	2.2×10^{-2}
Chlorinated ethanes	
1,2-dichloroethane	.507
1,1,2-trichloroethane	.611
1,1,2,2-tetrachloroethane	.175
Hexachloroethane	2.46
Chloroform	.318
Chromium	8.5×10^{-4}
DDT	4.2×10^{-3}
Dichlorobenzidine (3,3'-)	2.1×10^{-2}
1,1-dichloroethylene (vinylidene chloride)	.238
Dieldrin	1.2×10^{-3}
Dinitrotoluene (2,4-)	.113
Diphenylhydrazine (1,2-) (hydrazobenzene)	4.5×10^{-2}
Epichlorohydrin	3.54
Bis(2-chloroethyl)ether	3.1×10^{-2}
Bis(chloromethyl)ether	3.8×10^{-6}

(continued)

TABLE 15 (continued)

Compound	C
Ethylene dibromide (EDB)	4.1×10^{-3}
Ethylene oxide	5.6×10^{-2}
Formaldehyde	1.64
Heptachlor	1.0×10^{-2}
Hexachlorobenzene	2.1×10^{-2}
Hexachlorobutadiene	260.74
Hexachlorocyclohexane	
Technical grade	7.4×10^{-3}
Alpha isomer	3.1×10^{-3}
Beta isomer	1.9×10^{-2}
Gamma isomer	2.6×10^{-2}
Nickel	3.0×10^{-2}
Nitrosamines	
Dimethylintrosamine	1.4×10^{-3}
Diethylnitrosamine	8.0×10^{-4}
Dibutylnitrosamine	6.4×10^{-3}
N-nitrosopyrrolidine	1.6×10^{-2}
N-nitroso-N-ethylurea	1.1×10^{-3}
N-nitroso-N-methylurea	1.2×10^{-4}
N-nitroso-diphenylamine	7.11
PCBs	8.1×10^{-3}
Phenols (2,4,6-trichlorophenol)	1.76
Tetrachlorodioxin	8.2×10^{-3}
Tetrachloroethylene	.659
Toxaphene	3.1×10^{-2}
Trichloroethylene	2.78
Vinyl chloride	2.0

SECTION 5

HAZARDOUS WASTE RANKING METHODOLOGY

The hazardous waste prioritization methodology described below was designed to provide a first cut estimate of the inhalation health impact potential of various hazardous wastes currently being disposed in the United States. Previous prioritization efforts,[1] designed to screen hazardous wastes for air emissions study, were determined to be inadequate in scope. The revised prioritization approach described below was based upon consultation with EPA's Office of Solid Waste, Office of Health and Environmental Assessment (OHEA)/Washington, Environmental Criteria Assessment Office (ECAO)/Cincinatti, and Carcinogen Assessment Group (CAG)/Washington. Changes implemented with the revised ranking methodology included: (1) the development of separate prioritization systems for toxic and carcinogenic effects; (2) the inclusion of data for consideration of a hazardous constituent concentration; and (3) consideration of TSDF disposal practices.

The following section discusses the hazard factor assessment employed in developing the hazardous waste air emission prioritization. The basic elements of the ranking methodology, as previously illustrated in Figure 1, include the following:

- hazardous waste quantity and distribution determination;
- hazardous waste characterization;
- chemical properties and health effects data compilation;
- hazard factor development; and
- quantity-weighted hazardous waste ranking.

The following discussion presents the reasoning behind the evolution of the hazard factor. The closing portion of this section presents the results of the hazardous waste ranking efforts.

DEVELOPMENT OF HAZARD FACTORS

The selected approach towards a numerical comparison of potential hazard for wastes involves the calculation of toxicity and carcinogenicity hazard factors. These factors were obtained by combining the health effects information and vapor phase concentration data for individual chemical constituents of each waste code. The toxicity hazard factor is defined as the ratio of the gas phase equilibrium concentration to the Threshold Limit Value (TLV) for a given substance. The carcinogenicity hazard factor is similarly defined as the ratio of the gas phase equilibrium concentration to the maximum allowable concentration at the 10^{-5} Risk Level (10^{-5} RL). These ratios, which bear analogy to a risk assessment procedure, yield unitless numbers that are useful in comparing wastes on the same basis in a relative manner. In general, lower ratios correspond to lower potential hazard.

Gas Phase Equilibrium Concentration $(C_{eq})_i$

Since the emission rate is somewhat proportional to the equilibrium gas concentration, the downwind concentration can be assumed proportional to the equilibrium gas concentration. The gas phase equilibrium concentration $(C_{eq})_i$ for a compound is defined as follows:

$$(C_{eq})_i = \frac{X_i \, \gamma_i \, P^\circ_i MW_i}{RT}$$

where:

- X_i = mole fraction of compound i in waste mixture (based on waste characterization data);
- γ_i = activity coefficient of compound i;
- P°_i = vapor pressure of compound i;
- MW_i = molecular weight of compound i;
- R = universal gas constant;
- T = temperature.

After computation of the molar gas volume at 25°C (24.45 l/mole), writing the expression for R in the desired units, and converting from mg/m^3 to ppm, the equation reduces to:

$$(C_{eq})_i = (X_i \, \gamma_i) \, (P^\circ_i, \text{mmHg}) \, (1.3158 \times 10^3)$$

In the initial ranking scheme proposed by GCA, a chemical's vapor equilibrium concentration was calculated. After conversion to units of ppm and ppb, the equation reduced to:

$$\text{Concentration (ppm)} = (P^\circ, \text{mmHg}) \, (1.3158 \times 10^3)$$

$$\text{Concentration (ppb)} = (P^\circ, \text{mmHg}) \, (1.3158 \times 10^6)$$

The revised ranking calculation of gas phase equilibrium concentration is an extension of the vapor equilibrium concentration in that it considers X_i, mole fraction data and considers γ_i, activity coefficient data.

The key differences between aqueous and nonaqueous mixtures was in the activity coefficient (γ). The activity coefficient will be of primary importance in aqueous waste mixtures. For nonaqueous waste mixtures, i.e., landfills and landfarms, the activity coefficient will be unity ($\gamma = 1.0$), assuming pure hydrocarbon mixtures.

Hazard Factor Calculation

Once the gas phase equilibrium concentrations were computed, the health effects information and vapor phase concentration data were combined to develop a relative hazard factor for individual chemical constituents of each waste code. In addition, individual chemical constituent hazard factors were summed to produce an overall hazard factor for each waste code by TSDF process category (aqueous and nonaqueous).

The hazard factor computation bears analogy to a risk assessment procedure. Assuming that the equilibrium gas concentration, $(C_{eq})_i$ is proportional to a downwind concentration, the hazard factors shown below provide risk indexes for toxicity and carcinogenicity.

Threshold Limit Values and maximum allowable concentrations at 10^{-5} Risk Level were obtained from the literature or calculated as described earlier. The health effects properties and vapor phase concentration data were combined to develop hazard factors that provide risk indexes for toxicity and carcinogenicity. The calculations are as follows:

$$\text{TOXICITY HAZARD FACTOR} = \frac{(C_{eq})_i}{TLV_i}$$

$$\text{CARCINOGENICITY HAZARD FACTOR} = \frac{(C_{eq})_i}{C_{(10^{-5}RL)_i}}$$

where: $(C_{eq})_i$ = the equilibrium gas concentration of compound i

TLV_i = the Threshold Limit Value of compound i

$C_{(10^{-5}RL)_i}$ = the maximum allowable concentration at the 10^{-5} Risk Level for compound i (10^{-5} Risk Level is the level at which one additional cancer death will occur in one hundred thousand).

The toxicity and carcinogenicity hazard factors represent an appropriate method for comparing relative hazards for wastes. For example, if judged on the basis of TLV alone, Methyl Ethyl Ketone, with a TLV of 200 ppm, might be deemed less harmful than Methyl Chloride, with a TLV of 50 ppm. When the gas phase equilibrium concentration is taken into account, it is apparent that the Methyl Chloride hazard factor of 6.1×10^3, represents more of a potential air hazard than Methyl Ethyl Ketone, with a toxicity hazard factor of 96.12.

Upon examination of approximately 95 percent of the total waste volume identified in Table 7, data appropriate for computation of the toxicity and carcinogenicity hazard factors were found for approximately 100 waste types. Chemicals such as arsenic, chromium, and cadmium as well as many others either had no published vapor pressures or values significantly less than one mmHg at 25°C. Summaries of the chemical specific and generic waste types evaluated by the aforementioned analysis are provided in Appendix A, Tables A-1 and A-2.

Waste Volume Weighting

To account for a given wastes disposal volume, the toxicity and carcinogenicity hazard factors were multiplied by the wastes' aqueous and nonaqueous disposal volume (as presented in Tables 6 and 7, respectively) to yield a waste volume-weighted prioritization ranking. This number accounts for all specified criteria; constituent concentration, gas phase equilibrium concentration, health effects properties (toxicity and carcinogenicity), and reported aqueous and nonaqueous waste volume. The Part A waste volumes were divided into aqueous and nonaqueous (i.e., TSDF type) categories, so that the relative risk for a waste may be evaluated based on disposal method.

HAZARDOUS WASTE PRIORITIZATION RANKING RESULTS

Table 16 presents the waste type toxicity ranking scores for the 83 waste types with sufficient data. The toxicity hazard factor and volume-weighted toxicity hazard scores are shown in Table 16 for both aqueous and nonaqueous TSDF categories. Note that the volume-weighted aqueous TSDF scores are generally greater than the nonaqueous scores in spite of larger nonaqueous waste volumes (shown earlier in Table 7). This general trend is mostly due to greater volatility and toxicity shown by the aqueous wastes as indicated by the significantly higher hazard factors for these waste types. This demonstrates the importance of consideration of the activity coefficient in these calculations. The following five waste types were found in the top ten hazard scores for both TSDF categories:

- D001 - Ignitable wastes, not otherwise listed;
- D002 - Corrosive wastes, not otherwise listed;
- F002 - Spent halogenated solvents;
- F003 - Spent non-halogenated solvents;
- V043 - Vinyl chloride

The generic D-type wastes were found in greater volume and D001 also had a very high hazard factor. In general, the remaining wastes showed both high hazard factors and large waste volumes.

TABLE 16. WASTE TYPE TOXICITY RANKING SCORES FOR AQUEOUS AND NON-AQUEOUS TSDF CATEGORIES[a]

Waste type code	Toxicity hazard factor for non-aqueous TSDFs,[b] $(Ceq)_{NA}/TLV$	Volume-weighted toxicity hazard for non-aqueous TSDFs,[c] $V_{NA}(Ceq)_{NA}/TLV$	Toxicity hazard factor for aqueous TSDFs,[d] $(Ceq)_{AQ}/TLV$	Volume-weighted toxicity hazard for aqueous TSDFs,[e] $V_{AQ}(Ceq)_{AQ}/TLV$
D001	46552.04	1.606E10	3.6153E8	3.620E14
D002	1902.005	1.4862E9	2700708.	5.880E13
D003	431.9910	1.6320E8	500017.3	9.216E11
F001	8939.513	4.1554E8	2835826.	1.081E12
F002	33341.35	2.0612E9	2.0737E8	1.298E13
F003	39481.39	1.4941E9	5.3465E8	6.646E13
F004	436.9573	16485087	1231309.	2.525E10
F005	3747.682	2.7801E8	7062429.	9.720E11
F006	1306.330	5.4300E8	18161156	1.813E13
F017	13336.48	6.4166E8	1.8396E8	6.331E12
K001	26.48517	210053.9	1890795.	3.150E10
K010	1430.601	30835173	22317.37	2.5038E8
K011	2.149157	106729.3	46.88457	31617544
K012	417.3716	37780.82	4545.177	4545.177
K013	10.43969	4099394.	114.1196	32231589
K014	338.5851	11226465	482661.2	9.9148E9
K015	2113.995	1.3378E8	21518101	1.033E10
K016	8859.744	5.3396E8	6832676.	7.943E12
K017	9.391692	240436.7	252.9674	236670.6
K018	7653.815	2.5181E8	2923101.	1.934E11
K019	6651.017	5.7557E8	3140440.	2.0950E9
K020	8963.620	6.6671E8	3478740.	2.3829E9
K021	62.01167	1316818.	40562.14	5800385.
K022	.0488896	4718.036	.6595201	4544.753
K025	.0121371	501.0946	1.140835	593.2601
K026	139.5379	5782170.	226330.4	75141679
K029	171335.8	4.7518E9	65450269	1.568E11
K048	.0045843	1746.746	.0618422	19705.33
K049	9.451E-4	288.3793	.0127491	4871.409

[a] Aqueous TSDF categories include treatment tank and treatment, storage, and disposal surface impoundment. Non-aqueous TSDF categories include landfill, land application, and waste pile.

[b] Based on non-aqueous activity coefficient (1.0).

[c] Weighted by non-aqueous waste code volume (metric tons/yr).

[d] Based on aqueous activity coefficient estimated by infinite dilution procedure.

[e] Weighted by aqueous waste code volume (metric tons/yr).

(continued)

TABLE 16 (continued)

Waste type code	Toxicity hazard factor for non-aqueous TSDFs,[a] $(Ceq)_{NA}/TLV$	Volume-weighted toxicity hazard for non-aqueous TSDFs,[b] $V_{NA}(Ceq)_{NA}/TLV$	Toxicity hazard factor for aqueous TSDFs,[c] $(Ceq)_{AQ}/TLV$	Volume-weighted toxicity hazard for aqueous TSDFs,[d] $V_{AQ}(Ceq)_{AQ}/TLV$
K051	1.116E-4	34.65334	.0015053	467.4871
K053	7.524771	5997.242	670.6315	2676490.
K060	9.163E-5	4.485362	.0012361	16.80579
K073	20241.75	3.0806E8	6958803.	5.3374E9
K083	1.850711	31010.52	167.3067	60397.71
K085	19.31010	331303.4	40416.04	12528973
K086	215.0558	3894876.	24516.37	3.8407E8
K087	.4472925	56253.30	6.033976	690950.6
K096	40663.14	5.0723E8	15533320	0
K105	183.9972	250420.2	4558790.	0
U001	45500	3.3330E9	709800	1.352E11
U002	35.88	1365593.	832.648	10569710
U003	141.2	2241268.	1537.668	3765749.
U007	13.75	492978.8	458.4625	23423.13
U008	1.59	56988.78	17.013	79314.61
U009	10200	3.6147E8	408000	1.0098E9
U012	90.5	3216732	8507	81650195
U019	60900	2.3098E9	1.2752E8	1.607E12
P028	4780	75538340	10004540	2.5011E8
			832.639	2034221.
U031	19.41	308716.1	21868800	1.950E11
U211	27200	4.3313E8	0	0
U044	3650	1.3070E8	346750	1.152E11
U037	3650	1.3187E8	32306750	1.264E10
U055	8260	6.2732E8	3.7228E8	3.322E12
U057	110.4	3913680	26054.4	60472262
U070	2360	85146440	1.2272E8	8.166E11
U072	901.6	32226790	16983200	3.107E11
U079	2340	83102760	392880	5.9005E9
U041	614.3	9715769.	17200.4	722416.8
U112	60.53	1906937.	6355.65	68679154

[a]Aqueous TSDF categories include treatment tank and treatment, storage, and disposal surface impoundment. Non-aqueous TSDF categories include landfill, land application, and waste pile.

[b]Based on non-aqueous activity coefficient (1.0).

[c]Weighted by non-aqueous waste code volume (metric tons/yr).

[d]Based on aqueous activity coefficient estimated by infinite dilution procedure.

[e]Weighted by aqueous waste code volume (metric tons/yr).

(continued)

TABLE 16 (continued)

Waste type code	Toxicity hazard factor for non-aqueous TSDFs,[a] $(Ceq)_{NA}/TLV$	Volume-weighted toxicity hazard for non-aqueous TSDFs,[b] $V_{NA}(Ceq)_{NA}/TLV$	Toxicity hazard factor for aqueous TSDFs,[c] $(Ceq)_{AQ}/TLV$	Volume-weighted toxicity hazard for aqueous TSDFs,[d] $V_{AQ}(Ceq)_{AQ}/TLV$
U113	7910	6.0091E8	3274740	2.246E10
U117	933	15228426	112893	5080185
U077	756	26895456	288792	3.290E10
U122	20100	6.3323E8	29195.2	3.1538E8
U123	56.13	463970.6	72.4077	500626.8
U140	33.28	541498.9	1431.04	10236229
U147	119.89	377054.1	4915.49	216281.6
U154	6.48	396232.6	9.9144	147585.8
U045	6100	36917200	579866	1.3975E8
U159	96.12	1674026.	5574.96	64507862
U161	284	5025948	225496	1.5259E9
U080	2.49	158553.2	236.6994	1694294.
U165	3.06	52803.36	218802.2	8.7433E8
U169	1720	27563000	5087760	1.3126E9
U188	2.33	64829.92	31.4317	678296.1
U190	129	489039	342495	4794930
U196	19600	3.1209E8	31791200	7.557E10
U210	205	3562490	78310	1.0144E9
U220	88.63	3329120.	10103.82	1.3656E8
U226	240	5160960	91680	9.7905E8
U228	1250	26823750	477500	4.9698E9
U043	758000	6.121E10	1.8954E8	6.023E12
U078	56400	2.0039E9	21544800	1.911E11
U239	2910	63292500	44197080	4.451E11

[a] Aqueous TSDF categories include treatment tank and treatment, storage, and disposal surface impoundment. Non-aqueous TSDF categories include landfill, land application, and waste pile.

[b] Based on non-aqueous activity coefficient (1.0).

[c] Weighted by non-aqueous waste code volume (metric tons/yr).

[d] Based on aqueous activity coefficient estimated by infinite dilution procedure.

[e] Weighted by aqueous waste code volume (metric tons/yr).

(continued)

Table 17 presents the results of the toxicity making scores by chemical constituent. As expected, the chemical constituent results follow the same trends as did the waste type results. Aqueous hazard factors were generally several orders of magnitude higher than nonaqueous hazard factors. The volume weighted ranking scores were generally three to four orders of magnitude greater for the aqueous TSDF category.

A review of the top ten waste constituents listed in each TSDF category shows that the following five waste constituents appear in both categories:

- U019 - Benzene
- U043 - Vinyl chloride
- U196 - Pyridine
- U211 - Carbon tetrachloride
- U239 - Xylene

All of these wastes exhibit relatively high toxicity hazard factors. Most of the listed chemicals have low TLVs, while 1,2-dichloroethylene and vinyl chloride were particularly volatile. Note that xylene showed a low solubility in water and high activity coefficient, thus contributing to its high hazard factor.

Table 18 presents the waste type carcinogenicity ranking results for the 36 waste types with sufficient data. As noted earlier, the higher aqueous vapor phase equilibirum concentration C_{eq} tends to produce higher ranking scores for the aqueous TSDF category wastes. In general, the aqueous hazard factors were two to three orders of magnitude greater than the nonaqueous. The final volume weighted scores were approximately four orders of magnitude greater for the aqueous wastes.

A review of the top ten waste codes in each TSDF category shows that the following seven waste types are found in both categories:

- K016 - Carbon tetrachloride production heavy ends;
- K073 - Chlorinated hydrocarbon wastes from chlorine production;
- F002 - Spent halogenated solvents;
- D003 - Reactive wastes, not otherwise listed;
- F001 - Spent halogenated degreasing solvents;

TABLE 17. CHEMICAL CONSTITUENT TOXICITY RANKING SCORES FOR AQUEOUS AND NON-AQUEOUS TSDF CATEGORIES[a]

Chemical constituent code	Toxicity hazard factor for non-aqueous TSDFs,[b] $(Ceq)_{NA}/TLV$	Volume-weighted toxicity hazard for non-aqueous TSDFs,[c] $V_{NA}(Ceq)_{NA}/TLV$	Toxicity hazard factor for aqueous TSDFs,[d] $(Ceq)_{AQ}/TLV$	Volume-weighted toxicity hazard for aqueous TSDFs,[e] $V_{AQ}(Ceq)_{AQ}/TLV$
U001	47066.35	3.4108E9	734242.8	1.376E11
U002	3112.341	1.7215E8	76563.60	1.207E10
U003	2317.330	5.8704E8	25235.73	1.834E10
U007	13.75	492978.3	468.4625	23423.13
U008	1.647576	76051.40	17.62906	696127.5
U009	11211.13	3.6159E8	408109.6	1.0368E9
U012	100.9943	3320245.	9493.515	2.3925E8
U019	71393.06	5.9220E9	1.4951E8	2.327E13
P028	4799.310	75869643	10044956	2.6254E8
U031	30.65693	771246.4	1315.192	61508164
U211	44298.12	1.5955E9	35615688	9.125E12
U052	22.26066	844949.6	4656.658	98412097
U044	16881.24	7.4859E8	1603718.	1.202E11
U037	24796.42	1.4566E9	2.5499E8	1.381E13
U055	8260	6.2732E8	3.7209E8	3.322E12
U057	105.9539	4830718.	32085.12	7.4602E8
U070	2575.900	96517590	1.3499E8	1.411E12
U072	931.9652	32268117	43462189	3.107E11
U079	201335.9	5.3420E9	76910321	4.507E11
U041	623.6917	9956205.	17463.37	959087.4
U112	399.7841	61304088	41977.33	2.854E10
U113	7910	6.0091E8	3274740	2.246E10
C049	9640.461	1.3627E8	2.6037E8	1.105E13
U117	1529.305	37794390	185045.9	0.2071E9
U077	756	26895456	288792	3.290E10
U122	26116.23	2.7294E9	37920.77	1.057E10
U123	60.93737	2122803.	73 60921	6733081.
U140	68.04956	3296896.	2926.131	2.4015E8
U147	255.4855	1.0800E8	10597.90	1.224E11

[a] Aqueous TSDF categories include treatment tank and treatment, storage, and disposal surface impoundment. Non-aqueous TSDF categories include landfill, land application, and waste pile.

[b] Based on non-aqueous activity coefficient (1.0).

[c] Weighted by non-aqueous waste volumes for all wastes containing that chemical constituent.

[d] Based on aqueous activity coefficient estimated by infinite dilution procedure.

[e] Weighted by aqueous volumes containing that chemical constituent.

(continued)

TABLE 17 (continued)

Chemical constituent code	Toxicity hazard factor for non-aqueous TSDFs,[a] $(Ceq)_{NA}/TLV$	Volume-weighted toxicity hazard for non-aqueous TSDFs,[b] $V_{NA}(Ceq)_{NA}/TLV$	Toxicity hazard factor for aqueous TSDFs,[c] $(Ceq)_{AQ}/TLV$	Volume-weighted toxicity hazard for aqueous TSDFs,[d] $V_{AQ}(Ceq)_{AQ}/TLV$
U154	189.2636	36029713	191.6481	4.5265E8
U045	6276.535	50001148	595647.4	2.4594E9
U159	1441.701	92830782	83618.68	8.4367E9
U161	703.1415	34483936	558294.3	4.613E10
U080	7583.001	5.2650E8	720840.0	1.764E11
U165	72.34238	15027036	5172770.	3.096E12
U169	2134.691	43208041	6314416.	2.647E10
U188	4.190166	412395.4	56.52534	12494556
U190	277.5352	1.1573E8	736855.9	3.481E12
U196	26057.18	1.8955E9	42264746	7.170E12
U210	2445.950	1.3426E8	934352.7	4.129E11
U220	1052.763	74644325	120008.2	2.562E10
U226	34639.73	1.8275E9	13222376	1.703E11
U228	18178.32	7.7420E8	6944120.	1.039E12
A055	450.3137	36970222	729057.9	4.5926E8
U043	759439.1	6.234E10	2.9011E8	1.800E13
U078	56400	2.0039E9	21544800	1.911E11
U239	70224.94	9.9090E9	1.0666E9	4.473E14
SUM	1473744.	1.035E11	2.8067E9	5.494E14

[a] Aqueous TSDF categories include treatment tank and treatment, storage, and disposal surface impoundment. Non-aqueous TSDF categories include landfill, land application, and waste pile.

[b] Based on non-aqueous activity coefficient (1.0).

[c] Weighted by non-aqueous waste volumes for all wastes containing that chemical constituent.

[d] Based on aqueous activity coefficient estimated by infinite dilution procedure.

[e] Weighted by aqueous volumes containing that chemical constituent.

(continued)

Waste type code	for non-aqueous TSDFs,[b] $(Ceq)_{NA}/(10^{-5}$ risk)	hazard for non-aqueous TSDFs,[c] $(V_{NA})(Ceq)_{NA}/(10^{-5}$ risk)	for aqueous TSDFs,[d] $(Ceq)_{AQ}/(10^{-5}$ risk)	hazard for aqueous TSDFs,[e] $(V_{AQ})(Ceq)_{AQ}/(10^{-5}$ risk)
D001	6.7430E8	2.326E14	1.135E12	1.137E16
D002	9272662.	7.246E12	3.5138E9	7.649E16
D003	1.4562E9	5.501E14	3.049E12	5.532E19
F001	8.5172E9	3.959E14	3.697E12	1.409E17
F002	1.325E10	8.191E14	5.057E12	3.164E17
F003	2.2807E8	8.631E12	4.776E11	5.429E15
F005	4454749.	3.305E11	6466275.	8.902E11
K001	51.26927	406616.5	691.6224	11505139
K011	15788679	7.841E11	6.3155E3	4.257E14
K013	290022.3	1.139E11	11600392	3.277E12
K014	1.4349E9	4.756E13	3.005E12	6.172E16
K016	2.608E11	1.572E16	2.057E14	2.391E20
K017	13207663	3.331E11	3.6931E8	3.328E11
K018	37560376	1.236E12	1.5024E9	9.942E13
K020	5.8919E9	4.382E14	4.061E12	2.781E15
K021	1.7697E9	3.758E13	1.235E12	1.766E14
K022	140696.4	1.356E10	1897994.	1.309E10
K026	102.6044	4251723.	1384.134	459532.5
K048	113192.88	5.0269E9	177972.0	5.671E10
K049	2719.765	8.3135E6	36689.91	1.402E10
K051	321.1379	99726800	4332.150	1.3454E9
K053	1311738.	1.0455E9	17695341	7.062E10
K060	263.6955	12908158	3557.252	48364399
K073	4.839E11	7.364E15	2.009E14	1.541E17
K083	238069.4	3.9891E9	3211557.	1.1594E9
K087	1287237.	1.619E11	17364824	1.988E12
U009	3.0458E8	1.079E13	1.218E10	3.015E13

[a]Aqueous TSDF categories include treatment tank and treatment, storage, and disposal surface impoundment. Non-aqueous TSDF categories include landfill, land application, and waste pile.

[b]Based on non-aqueous activity coefficient (1.0).

[c]Weighted by non-aqueous waste code volume (metric tons/yr).

[d]Based on aqueous activity coefficient estimated by infinite dilution procedure.

[e]Weighted by aqueous waste code volume (metric tons/yr).

(continued)

TABLE 18 (continued)

Waste type code	Carcinogenicity hazard factor for non-aqueous TSDFs,[b] $(Ceq)_{NA}/(10^{-5}$ risk)	Volume-weighted carcinogenicity hazard for non-aqueous TSDFs,[c] $(V_{NA})(Ceq)_{NA}/(10^{-5}$ risk)	Carcinogenicity hazard factor for aqueous TSDFs,[d] $(Ceq)_{AQ}/(10^{-5}$ risk)	Volume-weighted carcinogenicity hazard for aqueous TSDFs,[e] $(V_{AQ})(Ceq)_{AQ}/(10^{-5}$ risk)
U019	2.3918E9	1.077E14	6.055E12	7.629E16
U011	3.1842E9	5.070E13	2.56E12	2.283E16
U014	5.6043E8	2.007E13	5.324E10	1.769E16
U041	1313203.	2.077E10	36769685	1.5443E9
U122	30140307	9.495E11	43763726	4.729E11
U1[illegible]3	25526.80	7.1026E8	344356.6	7.4312E9
U010	1.0579E8	1.631E12	4.026E10	5.215E14
U043	4.8454E9	3.913E14	1.851E12	3.857E16
U078	9.4060E9	3.342E14	3.593E12	3.187E16

[a]Aqueous TSDF categories include treatment tank and treatment, storage, and disposal surface impoundment. Non-aqueous TSDF categories include landfill, land application, and waste pile.

[b]Based on non-aqueous activity coefficient (1.0).

[c]Weighted by non-aqueous waste code volume (metric tons/yr).

[d]Based on aqueous activity coefficient estimated by infinite dilution procedure.

[e]Weighted by aqueous waste code volume (metric tons/yr).

- D001 - Ignitable wastes, not otherwise listed; and
- U019 - Benzene, discarded off specification wastes.

The top two K-type wastes (K016 and K073) are listed here primarily due to very high hazard factors. The other generic F and D type wastes showed substantial waste volumes.

Table 19 presents the waste type carcinogenicity ranking results by chemical constituent type for only ten chemical compounds. As expected the aqueous category showed notably higher ranking scores than did the nonaqueous category.

CONCLUSIONS

The foregoing analysis has provided a means of comparing specific chemicals with each other with respect to the degree of air hazard. The Toxicity and Carcinogenicity Hazard Factors are useful tools for relative comparisons, especially on a national level. However, other factors including TSD-specific criteria and exposed populations would also have to be weighed prior to any decisions regarding chemicals to be sampled, etc. Although we have evaluated approximately 100 waste types, this analysis may omit specific chemicals that are equally or more hazardous than those listed in this report. In addition, it is noted that site specific hazards due to local disposal patterns and volumes may differ substantially from the results presented in this study.

TABLE 19. CHEMICAL CONSTITUENT CARCINOGENICITY RANKING SCORES FOR AQUEOUS AND NON-AQUEOUS TSDF CATEGORIES.[a]

Chemical constituent code	Carcinogenicity hazard factor for non-aqueous TSDFs,[b] $(Ceq)_{NA}/(10^{-5}$ risk)	Volume-weighted carcinogenicity hazard for non-aqueous TSDFs,[c] $(V_{NA})(Ceq)_{NA}/(10^{-5}$ risk)	Carcinogenicity hazard factor for aqueous TSDFs,[d] $(Ceq)_{AQ}/(10^{-5}$ risk)	Volume-weighted carcinogenicity hazard for aqueous TSDFs,[e] $(V_{AQ})(Ceq)_{AQ}/(10^{-5}$ risk)
[illegible]	[illegible]	[illegible]	1.43 E10	5.58[illegible]E14
[illegible]	6.451E[illegible]	8.7[illegible]E14	[illegible]	6.710E12
[illegible]	4.807E11	1.904E16	[illegible]	2.35[illegible]E20
U014	[illegible]71E11	4.1[illegible]E15	[illegible]	[illegible].77 E16
[illegible]	[illegible]	[illegible]	4.0[illegible]E8	3.344E11
[illegible]	[illegible]	4.416E12	[illegible]	1.571E12
[illegible]	[illegible]	1.905E11	[illegible]	2.274E12
[illegible]	[illegible]	1.74[illegible]E15	1.1[illegible]E13	5.546E13
[illegible]	[illegible]	3.7[illegible]E14	1.851E12	1.151E17
[illegible]	[illegible]	3.34[illegible]E14	[illegible]	3.18[illegible]E1[illegible]

[a] Aqueous TSDF categories include treatment tank and treatment, storage, and disposal surface impoundment. Non-aqueous TSDF categories include landfill, land application, and waste pile.

[b] Based on non-aqueous activity coefficient (1.0).

[c] Weighted by non-aqueous waste code volume (metric tons/yr).

[d] Based on aqueous activity coefficient estimated by infinite dilution procedure.

[e] Weighted by aqueous waste code volume (metric tons/yr).

REFERENCES

1. Roeck, D. R. and A. M. Kiddie. Assessment of Air Emissions from Hazardous Waste Treatments, Storage, and Disposal Facilities (TSDFs) and Determination of Human Health Impact - Development of Prioritize chemical Listing. GCA/Technology Division, Bedford, MA. Draft Final Report. December 1982.

2. Breton, Marc et al. Assessment of Air Emissions from Hazardous Waste Treatments, Storage, and Disposal Facilities. Preliminary National Emissions Estimates. Draft Final Report. Submitted by GCA/Technology Division to U.S.E.P.A., Office of Solid Waste. August 1983.

3. Westat, Inc. Report on the Telephone Verification Survey of Hazardous Waste TSDFs Regulated Under RCRA in 1981. Submitted to U.S. EPA, Office of Solid Waste in November 1982. U.S. EPA-68-01-6322.

4. K. W. Brown and Associates, Inc. Hazardous Waste Land Treatment. Submitted to U.S. EPA, Office of Solid Waste in February 1983. U.S. EPA-SW-874.

5. Mitre Corp. Composition of Hazardous Waste Streams Currently Incinerated. Submitted to U.S. EPA, Office of Solid Waste in April 1983. U.S. EPA-68-01-6092.

6. Industrial Economics Inc. Interim Report on Hazardous Waste Incineration Risk Analysis. Submitted to EPA, Office of Solid Waste in August 1982. U.S. EPA-SW-894.

7. State of California Air Resources Board. Letter dated July 27, 1983 to concerned parties to announce Consultation Meeting on AB 3197 Report Discussing Air Emissions from the Incineration of Hazardous Waste.

8. Federal Register, Volume 45. May 19, 1980. pp. 33119-33133.

9. ICF Incorporated. RCRA Risk/Cost Policy Model - Phase II Report. August 1982.

10. Perry, R. H. and C. H. Chilton. Chemical Engineers Handbook, 5th Edition. McGraw Hill Inc. 1973.

11. Dean, J. (Editor). Langes Handbook of Chemistry, 12th Edition. McGraw Hill Inc. 1979.

12. Reid, R. C., J. M. Prausnitz, and T. K. Sherwood. Properties of Gases and Liquids. McGraw Hill Book Co. 1977.

13. Felder, R. M. and R. W. Rousseau. Elementary Principles of Chemical Processes. John Wiley & Sons, Inc. 1978.

14. Lyman, W. J., W. F. Reehl and D. H. Rosenblatt. Handbook of Chemical Property Estimation Methods - Environmental Behavior of Organic Compounds. McGraw Hill Inc. 1982.

15. National Climate Center; Ashville, North Carolina. Comparative Climate Data through 1978. Average Annual Wind Speeds for U.S. Locations.

16. Freeman, R. A. Stripping of Hazardous Chemicals from Surface Aerated Waste Treatment Basin. APCA/WPCF Specialty Conference on Control of Specific (Toxic) Pollutants, Gainsville, Florida. February 13-16, 1979.

17. Morrison, R. T. and R. N. Boyd. Organic Chemistry. Allyn & Bacon Inc. 1973.

18. Handbook of Chemistry and Physics, 5th Edition. Chemical Rubber Publisning Co. 1976.

19. Streitwieser, A. and C. H. Heathcock. Introduction of Organic Chemistry. Macmillan Publishing Co., Inc. 1976.

20. Windholz, M. (Editor). Merck Index, 9th Edition. Merck & Co., Inc. 1976.

21. Lewis R. and R. Tatker (Editors). 1980 Registry of Toxic Effects of Chemical Substances, Volumes I and II. U.S. Dept. of Health and Human Services. February 1982.

22. Stevens, R. PhD. (Editor). Dictionary of Organic Chemistry, 4th Edition. Oxford University Press. 1969.

23. Mackay, D. Environmental and Laboratory Rates of Volatilization of Toxic Chemicals from Water. Academic Press, Inc. 1981.

24. Mackay, D. and B. J. Leinonen. Rate of Evaporation of Low-Solubility Contaminants from Water Bodies to Atmosphere. Environmental Science of Technology, Vol. 9, No. 13. December 1975. p. 1179.

25. Shen, T. T. A Simplified Method for Estimation of Hazardous Emissions from Waste Lagoons. New York State Dept. of Environmental Conservation. Albany, New York. 1982.

26. Mabey, W. R., J. H. Smith, and R. T. Bodoll. Aquatic Fate Process Data for Organic Priority Pollutants. SRI International. EPA-440/4-81-014. December 1982.

27. American Conference of Governmental Industrial Hygienists. TLV's Threshold Limit Values for Chemical Substances in Work Air Adopted by ACGIH for 1982. ISBN: 0-936712-39-2.

APPENDIX A

WASTE TYPE DESCRIPTIONS AND PROPERTIES

TABLE A-1. SUMMARY OF SPECIFIC WASTE TYPES SELECTED FOR ANALYSIS

Waste Code	Stream Description
U001	Acetaldehyde
U002	Acetone
U003	Acetonitrile
U007	Acrylamide
U008	Acrylic acid
U009	Acrylonitrile
U012	Aniline
U019	Benzene
P028	Benzyl chloride
U031	Butanol
P022	Carbon disulfide
U211	Carbon tetrachloride
U052	Cresols
U044	Chloroform
U054	Cresylic acid
U037	Chlorobenzene
U055	Cumene
U057	Cyclohexanone
U070	o-dichlorobenzene
U072	p-dichloroethane
U079	1,2-dichloroethane
U092	Dimethylamine
U041	Epichlorohydrin
U112	Ethyl acetate
U113	Ethyl acrylate
U049	Ethyl benzene
U177	Ethyl ether
U077	Ethylene dichloride
U122	Formaldehyde

(continued)

TABLE A-1 (continued)

Waste Code	Stream Description
U123	Formic acid
P063	Hydrocyanic acid
U134	Hydrofluoric acid
U135	Hydrogen sulfide
U140	Isobutanol
U147	Maleic anhydride
U154	Methanol
U045	Methyl chloride
U159	Methyl ethyl ketone
U161	Methyl isobutyl ketone
U080	Methylene chloride
U165	Naphthalene
U169	Nitrobenzene
U188	Phenol
U190	Phthalic anhydride
U196	Pyridine
U210	Tetrachloroethylene
U220	Toluene
U223	Toluene diisocyanate
U226	1,1,1-trichloroethane
U228	Trichloroethylene
U121	Trichlorotrifluoroethane
A055	1,2,3-trichloropropane
U043	Vinyl chloride
U078	Vinylidene chloride
U239	Xylene

TABLE A-2. GENERIC WASTE TYPES SELECTED FOR ANALYSIS

Waste Code	Stream Description
D001	A solid waste exhibiting the characteristics of ignitability, but is not listed as a hazardous waste in Subpart D.
D002	A solid waste exhibiting the characteristics of corrosivity, but is not listed as a hazardous waste in Subpart D.
D003	A solid waste exhibiting the characteristics of reactivity, but is not listed as a hazardous waste in Subpart D.
F001	The spent halogenated solvents used in degreasing, tetrachloroethylene, trichloroethylene, methylene chloride, 1,1,1-trichloroethane, carbon tetrachloride, and the chlorinated fluorocarbons, and sludges from the recovery of these solvents in degreasing operations.
F002	The spent halogenated solvents, tetrachloroethylene, methylene chloride, trichloroethylene, 1,1,1-trichloroethane, chlorobenzene, 1,1,2-trichloro-1,2,2-trifluoroethane, o-dichlorobenzene, trichlorofluoromethane and the still bottoms from the recovery of these solvents.
F003	The spent non-halogenated solvents, xylene, acetone, ethyl acetate, ethyl benzene, ethyl ether n-butyl alcohol, cyclohexanone, and the still bottoms from the recovery of these solvents.
F004	The spent non-halogenated solvents, cresol and cresylic acid, nitrobenzene, and the still bottoms from the recovery of those solvents.
F005	The spent non-halogenatee solvents, methanol, toluene, methy ethyl ketone, methyl isobutyl ketone, carbon didulfide, isobutanol, pyridine and the still bottoms from the recovery of these solvents.
F006	Wastewater treatment sludges from electroplating operations.
F007	Paint residues or sludges from industrial painting in the mechanical and electrical products industry.
K001	Bottom sediment sludge from the treatment of wastewaters from wood preserving processes that use creosote and/or pentachlorophenol.

(continued)

TABLE A-2 (continued)

Waste Code	Stream Description
K009	Distillation bottoms from the production of acetaldehyde from ethylene.
K010	Distillation side cuts from the production of acetaldehyde from ethylene.
K011	Bottom stream from the wastewater stripper in the production of acrylonitrile.
K012	Still bottoms from the final purification of acrylonitrile in the production of acrylonitrile.
K013	Bottom stream from the acetonitrile column in the production of acrylonitrile.
K014	Bottoms from the acetronitrile purification column in the production of acrylonitrile.
K015	Still bottoms from the acetronitrile purification column in the production of acrylontrile.
K016	Heavy ends of distillation residues from the production of carbon tetrachloride.
K017	Heavy ends (still bottoms) from the purification column in the production of epichlorohydrin.
K018	Heavy ends from fractionation in ethyl chloride production.
K019	Heavy ends from the distillation of ethylene dichloride in ethylene dichloride production.
K020	Heavy ends from the distillation of vinyl chloride monomer production.
K021	Aqueous spent antimony catalyst waste from fluoromethanes production.
K022	Distillation bottom tars from the production of phenol/acetone from cumene.
K025	Distillation bottoms from the production of nitrobenzene by the nitration of benzene.

(continued)

TABLE A-2 (continued)

Waste Code	Stream Description
K026	Stripping still tails from the production of methyl ethyl pyridines.
K027	Centrifuge residue from toluene diisocyanate production.
K029	Waste from the product stream stopper in the production of 1,1,1-trichloroethane.
K030	Column bottoms or heavy ends from the combined production of trichloroethylene and perchloroethylene.
K048	Dissolved air flotation (DAF) float from the petroleum refining industry.
K049	Stop oil emission solids from the petroleum refining industry.
K051	API separator sludge from the petroleum refining industry.
K053	Chrome (blue) trimmings generated by subcategories of the leather tanning and finishing industry (deleted by 45 FR 72039, October 30, 1980).
K060	Ammonia still lime sludge from coking operations.
K073	Chlorinated hydrocarbon wastes from the purification step of the diaphragm cell process using graphite anodes in chlorine production.
K083	Distillation bottoms from aniline production.
K085	Distillation of fractionating column bottoms from the production of chlorobenzenes.
K086	Sludge from treatment of process wastewater and/or acid plant blowdown from primary zinc production.
K087	Decanter tank tar sludge from coking operations.
K096	Heavy ends from the heavy ends column from the production of 1,1,1-trichloroethane.
K105	Separated aqueous stream from the reactor product washing step in the production of chlorobenzene.

TABLE A-3. SUMMARY OF CHEMICAL PROPERTY DATA FOR EPA CONSTITUENT CODES

Constituent Code	Constituent Name	MW	VP 25 C mm Hg	$D_{i,air}$ cm^2/sec	D_{i,H_2O} cm^2/sec	Sc_{air}	Sc_{H_2O}	S ppm, mg/l	H m^3 atm/mole	Ki, 25	TLV, PPM
U001	Acetaldehyde (Ethanal)	44	916	.124	1.41×10^{-5}	1.235	651	5.6×10^{5}	9.5×10^{-5}	5.2	100
U002	Acetone (2-propanone)	58	266	.124	1.14×10^{-5}	1.235	792	8×10^{5}	2.5×10^{-5}	4.6	750
U003	Acetonitrile	41	90	.143	1.66×10^{-5}	1.196	544	8.5×10^{5}	5.8×10^{-6}	10.8	40
U007	Acrylamide (2-propenamide)	71	.012	.096	1.05×10^{-5}	1.578	600	21.6×10^{5}	5.2×10^{-10}	35.1	0.1
U008	Acrylic acid (2-propenoic acid)	72.1	0.45	.098	1.06×10^{-5}	1.562	832	3.5×10^{5}	1.0×10^{-7}	10.7	10
U009	Acrylonitrile (2-propenenitrile)	53.1	114	.122	1.34×10^{-5}	1.255	674	7.9×10^{4}	8.8×10^{-5}	35	2
U012	Aniline	93	0.75	.070	8.3×10^{-6}	2.187	1,089	3.5×10^{4}	2.6×10^{-6}	95	2
U019	Benzene	78.12	95.2	.088	9.8×10^{-6}	1.708	922	1.78×10^{3}	5.5×10^{-3}	2095	10
P028	Benzyl chloride	126.6	1.21	.075	7.8×10^{-6}	2.051	1,158	33	6.1×10^{-3}	2093	1
U031	n-butyl alcohol (1-butanol)	74	7	.080	9.3×10^{-6}	1.914	972	7.7×10^{4}	8.9×10^{-6}	43	50
P022	Carbon disulfide (Carbon bisulfide)	76	350	.102	1.22×10^{-5}	1.501	741	2×10^{3}	1.8×10^{-2}	-	10
U211	Carbon tetrachloride	153.8	109	.078	8.8×10^{-6}	2.174	986	8.0×10^{2}	3.0×10^{-2}	94	5
P023	Chloroacetaldehyde	78.5	60	.089	1.15×10^{-5}	1.596	786	2.4×10^{5}	2.6×10^{-5}	4.2	1
U037	Chlorobenzene	112.56	12	.073	8.7×10^{-6}	2.152	995	4.88×10^{2}	3.93×10^{-3}	10,355	75
U044	Chloroform	119.4	192	.104	1.0×10^{-5}	1.572	904	7.8×10^{3}	3.39×10^{-3}	55	10
U052	Cresols	108	0.4	.074	8.3×10^{-6}	2.069	1,039	1.9×10^{4}	2.6×10^{-6}	132	5
U052	Cresylic acid	108	0.3	.074	8.3×10^{-6}	2.069	1,089	2.5×10^{4}	1.7×10^{-6}	132	5
U055	Cumene	120	4.6	.065	7.1×10^{-6}	2.355	1,273	50	1.4×10^{-2}	67112	50
U057	Cyclohexanone	98	4.8	.079	8.0×10^{-6}	1.933	1,129	1.5×10^{5}	4.1×10^{-6}	236	25
U070	o-Dichlorobenzene	147	1.5	.069	7.9×10^{-6}	2.353	1,071	1.5×10^{2}	1.95×10^{-3}	5.2×10^{4}	50
U072	p-Dichlorobenzene	147	0.8	.069	7.9×10^{-6}	2.219	1,144	80	1.6×10^{-3}	5.2×10^{4}	75
U079	1,2-trans-dichloroethylene (1,2-dichloroethylene)	97	497	.090	1.04×10^{-5}	1.701	869	4.0×10^{3}	5.32×10^{-3}	362	200
U092	Dimethylamine	45	1,500	.118	1.31×10^{-5}	1.297	717	1.3×10^{6}	6.83×10^{-5}	--	10
U041	Epichlorohydrin (1-chloro-2,3-epoxypropane)	92.5	17	.036	9.8×10^{-6}	1.780	972	6.4×10^{4}	3.23×10^{-5}	28	2
U112	Ethyl acetate	88	85	.084	9.3×10^{-6}	1.823	972	8.7×10^{4}	$.128 \times 10^{-3}$	105	400
U113	Ethyl acrylate	100	40	.077	8.6×10^{-6}	1.985	1,051	1.5×10^{4}	3.5×10^{-4}	339	5
[illegible]	Ethyl benzene	106.16	10	.075	7.8×10^{-6}	2.041	1,158	1.0×10^{2}	6.44×10^{-3}	15190	100
U077	Ethylene dichloride	99	82	.104	9.9×10^{-6}	1.750	913	8.7×10^{3}	1.2×10^{-3}	382	10
U117	Ethyl ether	74	520	.074	9.3×10^{-6}	1.780	972	7.5×10^{4}	6.8×10^{-4}	121	500
U076	Ethylidene chloride	99	230	.074	9.9×10^{-6}	1.740	913	1×10^{3}	2.9×10^{-2}	471	200

(continued)

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TABLE A-3 (continued)

[illegible]	Constituent	MW	VP 25°C mm Hg	$D_{i,air}$ cm²/s	D_{i,H_2O} cm²/s	Sc_{air}	Sc_{H_2O}	S, ppm, mg/l	H m³ atm/mole	[illegible], 25°	TLV, PPM
U1[illegible]	Formaldehyde (methylene oxide)	30	3,500	.074	1.95×10^{-5}	.906	[illegible]	$2.[illegible] \times 10^{6}$	$5.76 \times 10^{-[illegible]}$	1.452	2
U1[illegible]	Formic acid (methanoic acid)	46	[illegible]	.071	1.37×10^{-6}	1.0[illegible]8	659	3.8×10^{6}	7×10^{-7}	1.2[illegible]	[illegible]
U1[illegible]	Hexachloroethane	[illegible]37	0.65	.069	6.8×10^{-6}	.[illegible]69	1,3[illegible]9	50	2.49×10^{-3}	382	10
P063	Hydrocyanic acid (hydrogen cyanide)	27	726	.197	$1.8[illegible] \times 10^{-5}$	.777	[illegible]36	misc	--	--	10
U1[illegible]	Hydrofluoric acid (hydrogen fluoride)	20	900	.333	3.33×10^{-5}	.33[illegible]	[illegible]71	misc	--	--	3
U1[illegible]	Hydrogen sulfide	34	15,200	.176	1.61×10^{-5}	.670	561	$2.9 \times 10^{[illegible]}$	$[illegible].3 \times 10^{-2}$	-	10
U1[illegible]	Isobutyl alcohol	74	12	.0[illegible]	9.3×10^{-6}	1.780	97[illegible]	8.7×10^{4}	2.2×10^{-6}	31	[illegible]0
U1[illegible]	Maleic anhydride (2,5-furandione)	98	0.3	.0[illegible]5	1.11×10^{-5}	1.612	814	9.7×10^{5}	5×10^{-8}	151	[illegible]
U1[illegible]	Methyl alcohol (methanol)	32	114	.1[illegible]	1.6×10^{-5}	1.015	56[illegible]	1.8×10^{6}	2.7×10^{-6}	1.53	[illegible]00
U0[illegible]	Methyl chloride	50.5	760	.1[illegible]6	6.5×10^{-6}	1.[illegible]15	1,[illegible]30	6.27×10^{3}	8.14×10^{-3}	9[illegible].06	[illegible]0
U0[illegible]	Methylene chloride	85	438	.101	1.17×10^{-5}	1.516	77[illegible]	1.94×10^{4}	3.19×10^{-3}	9[illegible].06	100
U1[illegible]	Methyl ethyl ketone (2-butanone)	72	100	.088	9.8×10^{-6}	1.88	8[illegible]3	$2.7 \times 10^{[illegible]}$	4.35×10^{-5}	58	[illegible]00
U161	Methyl isobutyl ketone	100	7.5	.07[illegible]	7.8×10^{-6}	[illegible].051	1,158	--	--	795	[illegible]0
U16[illegible]	Naphthalene	128.2	0.[illegible]3	.0[illegible]9	7.5×10^{-6}	2.39[illegible]	1,20[illegible]	33	1.18×10^{-3}	71.50[illegible]	10
U16[illegible]	Nitrobenzene	123.11	0.3	.076	8.6×10^{-6}	2.015	1,051	1.9×10^{3}	1.31×10^{-5}	[illegible]950	1
U1[illegible]	Phenol	94.11	.341	.08[illegible]	9.1×10^{-6}	1.867	993	9.3×10^{4}	4.54×10^{-7}	41	5
U190	Phthalic anhydride	148	0.03	.071	8.6×10^{-6}	[illegible].156	1,051	6.2×10^{3}	9×10^{-7}	2655	1
U196	Pyridine	79	20	.091	$.76 \times 10^{-5}$	1.682	1,189	8.8×10^{4}	2.36×10^{-5}	1622	5
U209	1,1,2,2 tetrachlorethane	167.8	9	.071	7.9×10^{-6}	2.156	1,144	2.9×10^{3}	3.8×10^{-4}	38[illegible]	1
U210	Tetrachloroethylene	165.85	18.6/14.2	.072	8.2×10^{-6}	2.126	1,102	140/120	2.9×10^{-2}	382	50
P110	Tetraethyl lead	323.4	0.35	.057	6.4×10^{-6}	2.686	1,412	insol.	--	--	.0076
U220	Toluene	92.13	30	.087	8.6×10^{-6}	1.760	1,051	515	6.68×10^{-3}	19487	100
U223	Toluene Diisocyanate	174	0.08	.061	6.2×10^{-6}	2.510	1,457	2.2×10^{3}	8.3×10^{-6}	--	.005
U226	1,1,1-trichloroethane (methylchloroform)	133.41	123	.078	8.8×10^{-6}	1.963	1,027	7.2×10^{2}	3.0×10^{-2}	382	350
U227	1,1,2-trichloroethane	133.41	25	.078	8.8×10^{-6}	1.963	1,027	4.5 x103	7.42×10^{-4}	382	10
U228	Trichloroethylene (trichloroethene)	131.39	90	.079	9.1×10^{-6}	1.938	993	1.1×10^{3}	9.1×10^{-3}	382	50
U121	Trichlorofluoromethane	137.4	796	.087	9.7×10^{-6}	1.760	931	1.1×10^{3}	58.3×10^{-3}	-	1000
A055	1,2,3 trichloropropane	147.4	4.4	.071	7.9×10^{-6}	2.156	1,144	213	2.8×10^{-2}	1619	50
F002	1,1,2-trichloro-1,2,2-trifluoroethane	187.4	300	.078	8.2×10^{-6}	1.963	1,102	170	4.35×10^{-1}	--	1000
U043	Vinyl chloride	62.5	2,600	.106	1.23×10^{-5}	1.444	735	2.5×10^{3}	8.6×10^{-2}	382	5
U078	Vinylidene chloride (1,1-dichloroethylene)	97	600	.090	1.04×10^{-5}	1.701	869	400	1.9×10^{-1}	382	10
U239	Xylene	106	8.5	.070	7.8×10^{-6}	2.187	1,158	.5	5.2×10^{-3}	15188	100

TABLE A-3 (continued)

Constituent	Constituent Name	MW	VP 25°C mm Hg	$D_{i\,air}$ cm^2/sec	$D_{i\,H_2O}$ cm^2/sec	Sc_{air}	Sc_{H_2O}	S ppm, mg/l	H_i m^3-atm/mole	γ_i, 25°	TLV, PPM
C001	Acetic acid	60.05	15.411	0.113	1.196×10^{-5}	1.16	1140	00	0.0627	3.083	10
C002	Acetic anhydride	102.09	5.288	0.235	9.127×10^{-6}	3.51	8.848×10^{4}	12×10^{4}	5.91×10^{-6}	40.78	--
U006	Acetyl chloride	78.5	287.8	9.876×10^{2}	1.154×10^{-5}	0.844	7221	Reacts	--	3.08	--
P003	Acrolein	56.07	244.2	1.051×10^{1}	1.216×10^{-5}	--	--	22×10^{4}	5.66 x105	10.70	--
C007	Adipic acid	146.14	2.25×10^{-5}	6.587×10^{-2}	6.838×10^{6}	--	--	1.4×10^{4}	5.09×10^{-11}	651	--
P005	Allyl alcohol	58.08	23.324	0.264	1.14×10^{-5}	5.50	1080	00	--	7.45	2
C252	o Aminophenyl	109.12	--	7.744×10^{-2}	8.64×10^{-6}	--	--	1.7x104	--	1.87	--
C253	p Aminophenyl	109.12	--	7.744×10^{2}	2.389×10^{-6}	--	--	1.1x104	--	1.87	--
C146	Ammonia	17.03	7473.255	2.592×10^{-1}	6.925×10^{-5}	0.829	570	5.1x104	3.28×10^{-4}	--	25
C011	Amyl acetate	130.18	5.422	6.398×10^{-2}	1.196×10^{-6}	--	--	0.2x104	4.64×10^{-4}	--	100
D004	Arsenic	74.95	1.8×10^{-13}	--	-	--	--	--	--	--	--
C015	Benzoic acid	122.13	7.04×10^{-3}	0.206	7.965×10^{-6}	995.9	2.576×10^{7}	6.2×10^{4}	1.82×10^{-8}	--	--
U025	Bis(2 chloroethyl)ether	143.0	0.71	6.919×10^{-2}	7.533×10^{-6}	--	--	1.02×10^{4}	1.3×10^{-5}	96.6	--
U027	Bis(2-chloroisopropyl)ether	171.1	0.85	6.018×10^{-2}	6.414×10^{-6}	--	--	1.7×10^{3}	1.1×10^{-4}	1585	--
P016	Bis(chloromethyl)ether	115.0	30.0	8.354×10^{2}	9.376×10^{-6}	-	--	2.2×10^{4}	2.1×10^{-4}	7.9	--
U028	Bis(2-ethylhexyl)phthalate	391.07	2.0×10^{-7}	3.511×10^{2}	3.664×10^{-6}	--	--	0.4	3.0 x10-7	--	--
C016	1,3 butadiene	54.09	2095.045	0.249	1.078×10^{-5}	0.926	2.14×10^{4}	0.05×10^{4}	1.42×10^{-1}	--	1000
U053	Crotonaldehyde	70.09	30.0	9.025×10^{-2}	1.023×10^{-5}	--	--	18×10^{4}	1.537×10^{-5}	61.37	2
C150	Cyanopyridine	104.11	--	7.976×10^{-2}	8.775×10^{-6}	--	--	--	--	2181	--
C028	Cyclohexanol	100.16	1.22	0.214	8.310×10^{-6}	307.43	7.917×10^{6}	3.6×10^{4}	4.466×10^{-6}	8.5	50
U057	Cyclohexanone	98.15	4.8	7.836×10^{-2}	8.618×10^{-6}	26.85	2.441×10^{5}	15×10^{4}	4.133×10^{-6}	236	25
U069	Dibutylphthalate	278.3	1.0×10^{-5}	4.383×10^{-2}	7.86×10^{-6}	--	--	0.45×10^{4}	2.8×10^{-7}	--	--
A029	1,3-dichlorobenzene	147.01	2.28	6.915×10^{-2}	7.86×10^{-6}	15.12	1.33×10^{5}	123	3.61×10^{-3}	52602	50
C182	Dichlorobiphenyl	223.10	--	5.295×10^{-2}	5.835×10^{-6}	--	--	0.062	--	3.2×10^{7}	--
U074	1,4-dichloro-2-butene	125.0	--	7.252×10^{-2}	8.117×10^{-6}	--	--	Insoluble	--	--	--
U080	Dichloromethane	84.94	429.44	1.005×10^{-1}	1.66×10^{-5}	3.075	2.65×10^{4}	2.0×10^{4}	2.03×10^{-3}	9506	100
U081	2,4-dichlorophenol	163.0	0.9975	6.316×10^{-2}	7.181×10^{-6}	--	--	4.6×10^{3}	2.8×10^{-6}	676	--

(continued)

TABLE A-3 (continued)

Constituent	Constituent Name	MW	VP 25°C mm Hg	$D_{i\,air}$ cm^2/sec	$D_{i\,H_2O}$ cm^2/sec	Sc_{air}	Sc_{H_2O}	S ppm, mg/l	H_i m^3-atm/mole	γ_i, 25°	TLV, PPM
U016	2,4-dichlorophenoxyacetic acid	186.60	--	5.877×10^{-2}	6.49×10^{6}	--	--	620	--	--	--
U083	1,2 dichloropropane	112.99	49.6	7.824×10^{-2}	8.725×10^{-6}	--	--	2700	2.3×10^{-3}	--	75
C034	Diethylene glycol	106.12	1.57×10^{-3}	7.820×10^{-2}	8.609×10^{6}	367	3.33×10^{6}	--	--	--	--
U088	Diethyl phthalate	222.23	2.825×10^{-3}	5.132×10^{-2}	5.873×10^{-6}	--	--	Insoluble	--	--	--
U094	7,12-dimethylbenz(a)anthracene	256.331	--	4.61×10^{-2}	4.976×10^{-6}	--	--	Insoluble	--	--	--
C265	Dimethyl formamide	73.09	3.995	9.386×10^{-2}	1.027×10^{-5}	--	--	00	--	32.36	10
U098	1,1-dimethylhydrazine	60.10	157	1.056×10^{-1}	1.088×10^{-5}	--	--	--	--	10.89	--
U102	Dimethyl phthalate	194.2	1.87×10^{-4}	5.675×10^{-2}	6.293×10^{-6}	--	--	4320	2.15×10^{-6}	1.8×10^{5}	--
A032	Dinitrobenzene	168.11	--	0.279	7.644×10^{-6}	--	--	18×10^{4}	--	4178	.15
U105	2,4-Dinitrotoluene	182.14	--	0.203	7.055×1^{-6}	--	--	300	4.5×10^{-6}	20925	--
U108	1,4 Dioxane	88.12	39.6	0.229	1.024×10^{-5}	4.74	1.06×10^{5}	00	--	96.6	25
A077	Diphenylamine	169.23	3.75×10^{-3}	5.755×10^{2}	6.308×10^{-6}	--	--	0.03×10^{4}	2.783×10^{-6}	--	--
C046	Ethanol	46.07	54.72	1.231×10^{-1}	1.307×10^{-5}	10.86	1005	00	--	--	1000
C047	Ethanolamine	61.09	--	1.669×10^{1}	1.139×10^{-5}	--	--	00	--	--	--
C266	Ethyl chloride	64.52	1200	0.273	1.154×10^{-5}	1.137	2.67×10^{4}	0.57×10^{4}	--	381.50	1000
C054	Ethylene glycol	62.07	0.1256	1.082×10^{-1}	1.216×10^{-5}	141.23	1.26×10^{6}	--	--	--	50
U124	Furan	68.08	596.207	1.04×10^{-1}	1.218×10^{-5}	3.697	3.16×10^{4}	1×10^{4}	5.341×10^{-3}	--	--
U125	Furfural	96.09	53.226	8.717×10^{-2}	1.04×10^{-5}	--	--	8.3×10^{4}	8.108×10^{-5}	--	2
U127	Hexachlorobenzene	284.79	2.9×10^{-3}	5.419×10^{-2}	5.914×10^{-6}	--	--	0.035	6.8×10^{-4}	3.3×10^{7}	--
U128	Hexachlorobutadiene	260.76	0.15	5.614×10^{-2}	6.161×10^{-6}	--	--	0.005	0.0256	6970	.02
U130	Hexachlorocydopentadiene	272.77	0.081	5.652×10^{-2}	6.161×10^{-6}	--	--	27.3	0.016	4.78×10^{8}	.01
C063	Hexane	86.18	150.3	0.2	7.766×10^{-6}	2.22	5.72×10^{4}	0.014×10^{4}	1.217×10^{-1}	--	50
C272	1-Hexanol	102.18	0.8115	0.059	7.53×10^{-6}	2.60	7.03×10^{5}	0.6×10^{4}	1.818×10^{-5}	--	--
C271	Isoheptane	100.21	65.97	0.187	7.11×10^{-6}	2.756	7.249×10^{4}	--	--	--	--
C067	Isophorone	138.21	0.439	6.23×10^{-2}	6.755×10^{-6}	--	--	1.2×10^{4}	5.75×10^{-6}	--	--
D013	Lindane	290.83	9.4×10^{-6}	6.23×10^{-2}	6.755×10^{-6}	--	--	7.8	7.8×10^{-6}	--	.5

(continued)

TABLE A-3 (continued)

Constituent	Constituent Name	MW	VP 25°C mm Hg	Di_{air} cm²/sec	Di_{H_2O} cm²/sec	Sc_{air}	Sc_{H_2O}	S ppm, mg/l	Hi m³-atm/mole	γ_i, 25°	TLV, PPM
U152	Methacrylonitrile (2-methy-2-propenenitrile)	67.09	71	.091	9.9×10^{-6}	1.68	913	16	.392	144	1
U222	2 methylbenzenamine	107.7	.242	.073	7.5×10^{6}	2.10	1,205	1.5×10^{4}	2.3×10^{-6}	468	2
U162	Methyl Methacrylate	100.13	39	.077	8.6×10^{-6}	1.99	1,051	7.8×10^{4}	6.6×10^{-5}	161	100
U191	2 Methylpyridine (2-picoline)	93.14	10.4	.075	9×10^{-6}	2.04	1,004	--	--	2181	--
C082	Morpholine (diethyleneimide oxide)	87.12	720	.091	9.6×10^{6}	1.68	941	Misc.	--	123	2
C279	Neoprene (Duprene)	88.54	--	--	--	--	--	--	--	6970	10
C275	o nitroaniline	138.14	.003	.073	8×10^{-6}	2.1	1,129	1×10^{3}	5×10^{-7}	97.4	--
P081	Nitroglycerine (trinitrin)	227.09	.0036	--	--	--	--	1.3×10^{14}	6×10^{-19}	34	--
C094	Alcohol-octyl (1-octanol)	130.26	.124	.064	6.8×10^{-6}	2.39	1,329	540	3.94×10^{-5}	--	--
U183	Pentachlorobenzene	250.32	.0046	.057	6.3×10^{-6}	2.69	1,434	.208	7.3×10^{-3}	6.6×10^{5}	--
U184	Pentachloroethane (Pentalin)	202.31	4.4	.066	7.3×10^{-6}	2.32	1,238	55	2.1×10^{-2}	132130	--
U242	Pentachlorophenol (chlorophen)	266.44	.00099	.056	6.1×10^{-6}	2.73	1,481	14	2.8×10^{-6}	--	.5
U187	Phenacetin (p-ethoxydiacet anilide)	179.24	--	.057	--	2.69	--	7×10^{3}	--	--	--
P095	Phosgene (carbonic acid dichloride)	98.2	1,394	.108	1.12×10^{-5}	1.42	807	1,052	.171	1.3	1
C125	Phthalicacid (1,2-benzenedicarboxylic acid)	166.14	--	.064	6.8×10^{-6}	2.39	1,329	7×10^{3}	--	4.3	--
C277	Piperazine (diethylenediamine)	86.14	--	.091	--	1.68	--	--	--	204	--
C069	2-Propanol (isopropylalcohol)	60.11	42.8	.098	1.04×10^{-5}	1.56	869	--	--	9.68	--
C104	Propionaldehyde (propanal)	58.08	--	.102	1.14×10^{-5}	1.50	793	2×10^{5}	--	15.6	--
C219	Propylene glycol (1,2-propanediol)	76.11	--	.093	1.02×10^{-5}	1.65	886	60	--	--	--
U200	Reserpine (rivasin, serparsin)	608.7	--	.032	--	4.78	--	1.9×10^{4}	--	--	--
U201	Resorcinol (benzene, 1,3-dihydroxy)	110.11	--	.078	$.87 \times 10^{-5}$	1.96	1,260	8.3×10^{4}	--	.834	10
C113	Styrene (ethylenebenzene, vinly benzene)	104.16	7.3	.071	8×10^{-6}	2.16	1,129	300	3.3×10^{-3}	24071	100
C230	Sulfuric acid (oil of vitriol)	98.08	<.001	.112	1.97×10^{-5}	1.37	580	Misc.	--	--	--
U208	1,1,1,2-tetrachloroethane	167.85	13.9	.071	7.9×10^{-6}	2.16	1,144	236	.013	382	--
A051	Tetrachloroethane, NOS	167.86	6.5	.071	7.9×10^{-6}	2.16	1,144	701	.002	382	--
U213	Tetrahydrofuran (diethylene oxide)	72.12	72.10	.098	1.05×10^{-5}	1.56	860	1.4×10^{5}	4.9×10^{-5}	see sheet	200
U219	Thiourea (Urea, 2-thio)	76.12	145	.107	--	1.43	--	7.1×10^{6}	--	7.28	--

(continued)

TABLE A-3 (continued)

Constituent	Constituent Name	MW	VP 25°C mm Hg	Di_{air} cm^2/sec	Di_{H_2O} cm^2/sec	Sc_{air}	Sc_{H_2O}	S ppm, mg/l	Hi m^3-atm/mole	γ_i, 25°	TLV, PPM
C287	1,2,3 trichlorobutane	161.46	4.39	.066	7.2×10^{-6}	2.32	1,255	--	--	6970	--
A055	Trichhloropropane, NOS	147.43	3.1	.071	7.9×10^{-6}	2.16	1,144	213	2.8×10^{-2}	1619	--
C123	Urea (carbamide, carbonyl diamide)	60.06	--	.122	1.37×10^{-5}	1.25	946	1×10^{6}	--	6.24	--
U238	Urethane (urethan, carbamic acid)	89.09	--	.889	1.06×10^{-5}	1.72	1,090	9.6×10^{6}	--	--	--
C124	Vinyl acetate (acetic acid)	86.09	109	.085	9.2×10^{-6}	1.80	982	2×10^{4}	6.2×10^{-4}	--	--
A055	1,1,1-trichloropropane	147.43	31.42	.071	7.9×10^{-6}	2.16	1,144	213	.029	1619	--
A055	1,1,1-trichloropropane	147.43	--	.071	7.9×10^{-6}	2.16	1,144	213	.029	1619	--
A055	1,1,1-trichloropropane	147.43	3.1	.071	7.9×10^{-6}	2.16	1,144	213	.029	1619	50

APPENDIX B

COMPUTER OUTPUT OF HAZARDOUS WASTE PRIORITIZATION RANKING SCORES

TABLE B-1. WASTE TYPE TOXICITY HAZARD FACTORS BY WASTE CONSTITUENT FOR AQUEOUS TSDF CATEGORIES*

CODE	U001	U002	U003	U007	U008	U00[illegible]	[illegible]
D001	2125.455	591.8070	13253.57	0	.3160[illegible]32	0	154.7[illegible]
D002	0	0	0	0	0	0	
D003	0	370.1492	0	0	0	0	0
F001	0	48.62187	0	0	0	0	[illegible]
F002	0	0	0	0	0	0	[illegible]
F003	0	7059[illegible].8[illegible]	0	0	0	0	
F004	0	0	0	0	0	0	[illegible]
F005	0	.1993108	0	0	0	0	
F006	0	2724.508	0	0	0	0	
F017	0	411.808[illegible]	0	0	0	0	
K001	0	0	0	0	0	0	
K010	22317.37	0	0	0	0	0	
K011	0	0	14.[illegible]04[illegible]	0	0	32.2[illegible]	
K012	0	0	4545.177	0	0	0	
K013	0	0	113.52[illegible]	0	0	.5[illegible]	
K014	0	93[illegible].9[illegible]	771.1[illegible]1	0	0	0	
K015	0	0	0	0	0	0	
K016	0	0	0	0	0	0	
K017	0	0	0	0	0	0	
K018	0	0	0	0	0	7[illegible].[illegible]54[illegible]	
K019	0	0	0	0	0	0	
K020	0	0	0	0	0	0	
K021	0	0	0	0	0	0	
K022	0	0	0	0	0	0	
K025	0	0	0	0	0	0	1.14[illegible]
K026	0	0	0	0	0	0	
K029	0	0	0	0	0	0	
K048	0	0	0	0	0	0	
K049	0	0	0	0	0	0	
K051	0	0	0	0	0	0	
K052	0	0	0	0	0	0	[illegible]4.4[illegible]
K061	0	0	0	0	0	0	
K073	0	0	0	0	0	0	
K083	0	0	0	0	0	0	1[illegible]
K085	0	0	0	0	0	0	
K086	0	0	0	0	0	0	
K087	0	0	0	0	0	0	
K093	0	0	0	0	0	0	
K105	0	0	0	0	0	0	
SSL.CON.	709800	992.[illegible]43	1517.[illegible]8	4[illegible]8.4[illegible]25	17.[illegible]1[illegible]	4[illegible]	[illegible]
SUM	734242.8	7[illegible]5[illegible]3.[illegible]0	25235.73	4[illegible]8.4[illegible]25	17.[illegible]29[illegible]	40810[illegible].[illegible]	[illegible]

TABLE B-1 (continued)

CODE	U019	P028	U031	U211	U052	U044	U037
D001	20731036	0	5.155837	1275911.	2.970161	4005.233	1677427.
D002	0	0	0	0	0	0	0
D003	488099.0	0	0	0	0	0	0
F001	0	0	0	27484.52	0	0	21282.91
F002	0	0	0	0	0	65.55558	1.9338E8
F003	76447.18	0	477.3376	0	0	0	0
F004	0	0	0	0	4653.687	0	0
F005	0	0	0	0	0	0	0
F006	0	0	0	0	0	0	0
F017	0	0	0	0	0	0	0
K001	0	0	0	0	0	0	0
K010	0	0	0	0	0	0	0
K011	0	0	0	0	0	0	0
K012	0	0	0	0	0	0	0
K013	0	0	0	0	0	0	0
K014	480950.0	0	0	0	0	0	0
K015	0	0	0	0	0	0	21510731
K016	0	0	0	6569658.	0	0	0
K017	0	0	0	0	0	0	0
K018	0	0	0	0	0	0	0
K019	0	0	0	0	0	0	71981.19
K020	0	0	0	127307.3	0	4032.873	0
K021	0	0	0	37316.65	0	1245.488	0
K022	0	0	0	0	0	0	0
K025	0	0	0	0	0	0	0
K026	0	0	0	0	0	0	0
K029	0	0	0	0	0	0	0
K048	0	0	0	0	0	0	0
K049	0	0	0	0	0	0	0
K051	0	0	0	0	0	0	0
K053	0	0	0	0	0	0	0
K060	0	0	0	0	0	0	0
K073	0	0	0	5707211.	0	1247619.	0
K083	0	0	0	0	0	0	0
K085	0	40416.04	0	0	0	0	0
K086	0	0	0	0	0	0	0
K087	0	0	0	0	0	0	0
K096	0	0	0	0	0	0	0
K105	2064099.9	0	0	0	0	0	20159.6
SBL.CON.	1.2752E8	10004540	832.687	21869800	0	346750	3330675
SUM	1.4951E8	10044956	1315.182	35615688	4656.658	1603718.	2.5499E8

TABLE B-1 (continued)

CODE	U055	U057	U070	U072	U079	U041	U112
D001	0	0	0	0	293275.2	0	300.1311
D002	0	0	0	0	0	0	0
D003	0	0	0	0	0	0	14202.60
F001	0	0	0	0	0	0	0
F002	0	0	9503721.	0	0	0	0
F003	0	6030.721	0	0	0	0	21118.95
F004	0	0	0	0	0	0	0
F005	0	0	0	0	0	0	0
F006	0	0	0	0	0	0	0
F017	0	0	0	0	0	0	0
K001	0	0	0	0	0	0	0
K010	0	0	0	0	0	0	0
K011	0	0	0	0	0	0	0
K012	0	0	0	0	0	0	0
K013	0	0	0	0	0	0	0
K014	0	0	0	0	0	0	0
K015	0	0	0	0	0	0	0
K016	0	0	0	0	0	0	0
K017	0	0	0	0	0	262.9874	0
K018	0	0	0	0	0	0	0
K019	0	0	0	0	0	0	0
K020	0	0	0	0	0	0	0
K021	0	0	0	0	0	0	0
K022	0	0	0	0	0	0	0
K023	0	0	0	0	0	0	0
K026	0	0	0	0	0	0	0
K029	0	0	0	0	63123306	0	0
K048	0	0	0	0	0	0	0
K049	0	0	0	0	0	0	0
K051	0	0	0	0	0	0	0
K052	0	0	0	0	0	0	0
K060	0	0	0	0	0	0	0
K073	0	0	0	0	0	0	0
K083	0	0	0	0	0	0	0
K085	0	0	0	0	0	0	0
K086	0	0	0	0	0	0	0
K087	0	0	0	0	0	0	0
K093	0	0	0	0	12599360	0	0
K105	0	0	2763231.	1578989.	0	0	0
SGL.CIN.	3.7238E8	26054.4	1.2272E8	46883200	893880	17200.4	6355.65
SUM	3.7238E8	32085.12	1.3499E8	48462199	76910321	17463.37	41977.33

TABLE B-1 (continued)

CODE	U113	C049	U117	U077	U122	U123	U14.
D001	0	34913.43	0	0	8656.050	6.200381	27.96073
D002	0	0	0	0	72.94597	.0011266	0
D003	0	0	0	0	0	0	0
F001	0	0	0	0	0	0	0
F002	0	0	0	0	0	0	0
F003	0	96936260	72152.89	0	0	0	0
F004	0	0	0	0	0	0	0
F005	0	0	0	0	6.570051	0	1467.130
F006	0	0	0	0	0	0	0
F017	0	0	0	0	0	0	0
K001	0	0	0	0	0	0	0
K010	0	0	0	0	0	0	0
K011	0	0	0	0	0	0	0
K012	0	0	0	0	0	0	0
K013	0	0	0	0	0	0	0
K014	0	0	0	0	0	0	0
K015	0	0	0	0	0	0	0
K016	0	0	0	0	0	0	0
K017	0	0	0	0	0	0	0
K018	0	0	0	0	0	0	0
K019	0	0	0	0	0	0	0
K020	0	0	0	0	0	0	0
K021	0	0	0	0	0	0	0
K022	0	0	0	0	0	0	0
K025	0	0	0	0	0	0	0
K026	0	0	0	0	0	0	0
K029	0	0	0	0	0	0	0
K043	0	0	0	0	0	0	0
K049	0	0	0	0	0	0	0
K051	0	0	0	0	0	0	0
K052	0	0	0	0	0	0	0
K060	0	0	0	0	0	0	0
K073	0	0	0	0	0	0	0
K083	0	0	0	0	0	0	0
K085	0	0	0	0	0	0	0
K086	0	0	0	0	0	0	0
K087	0	0	0	0	0	0	0
K096	0	0	0	0	0	0	0
K105	0	0	0	0	0	0	0
SGL.COM.	3274740	1.6340E3	112893	288792	29185.2	72.4077	1431.04
SUM	3274740	2.6037E3	185045.9	288792	37920.77	78.60921	292[illegible].131

TABLE B-1 (continued)

CODE	U147	U154	U045	U159	U161	U080	U165
D001	62.99352	109.1087	0	2522.050	385.9044	35966.14	3030173.
D002	5619.415	15.20362	0	4.361044	0	0	0
D003	0	2.630605	0	0	0	0	0
F001	0	0	41.08049	81.85237	0	306380.3	0
F002	0	.0023540	0	1.318817	0	378253.9	0
F003	.0046013	1.641047	0	814.0273	33570.09	0	0
F004	0	0	0	0	0	0	0
F005	0	53.14718	16740.36	26838.35	291826.6	0	0
F006	0	0	0	0	0	0	0
F017	0	0	0	47481.76	7015.745	0	0
K001	0	0	0	0	0	0	1993795.
K010	0	0	0	0	0	0	0
K011	0	0	0	0	0	0	0
K012	0	0	0	0	0	0	0
K013	0	0	0	0	0	0	0
K014	0	0	0	0	0	0	0
K015	0	0	0	0	0	0	0
K016	0	0	0	0	0	0	0
K017	0	0	0	0	0	0	0
K018	0	0	0	0	0	0	0
K019	0	0	0	0	0	0	0
K020	0	0	0	0	0	0	0
K021	0	0	0	0	0	0	0
K022	0	0	0	0	0	0	0
K025	0	0	0	0	0	0	0
K026	0	0	0	0	0	0	0
K027	0	0	0	0	0	0	0
K048	0	0	0	0	0	0	0
K049	0	0	0	0	0	0	0
K051	0	0	0	0	0	0	0
K052	0	0	0	0	0	0	0
K060	0	0	0	0	0	0	0
K071	0	0	0	0	0	0	0
K083	0	0	0	0	0	0	0
K085	0	0	0	0	0	0	0
K086	0	0	0	0	0	0	0
K087	0	0	0	0	0	0	0
K096	0	0	0	0	0	0	0
K105	0	0	0	0	0	0	0
EGL.CON.	4915.49	9.9144	579866	5574.96	225496	236.6994	213502.2
SUM	10597.90	191.6481	596647.4	83618.68	558294.3	720340.0	5172[illegible]

TABLE B-1 (continued)

CODE	U169	U188	U190	U196	U210	U220	U22[illegible]
D001	0	11.05730	5029.103	6582476.	2437.356	2724.729	25698.23
D002	0	0	389330.5	0	0	378.7319	0
D003	0	0	0	0	0	5342.935	0
F001	0	0	0	0	210541.5	1619.595	1595.400
F002	0	0	0	0	373251.5	1.130806	2138610.
F003	0	0	1.277621	1191.544	0	85.99766	0
F004	1226656.	0	0	0	0	0	0
F005	0	0	0	3663547.	0	23851.87	0
F006	0	0	0	0	0	0	0
F017	0	0	0	0	0	44044.26	0
K001	0	2.403E-4	0	0	0	0	0
K010	0	0	0	0	0	0	0
K011	0	0	0	0	0	0	0
K012	0	0	0	0	0	0	0
K013	0	0	0	0	0	0	0
K014	0	0	0	0	0	0	0
K015	0	0	0	0	0	7338.727	0
K016	0	0	0	0	263017.5	0	0
K017	0	0	0	0	0	0	0
K018	0	0	0	0	0	0	0
K019	0	0	0	0	0	0	2374800.
K020	0	0	0	0	4546.110	0	3342854.
K021	0	0	0	0	0	0	0
K022	0	.6595211	0	0	0	0	0
K025	0	0	0	0	0	0	0
K026	0	4.810E-4	0	226330.4	0	0	0
K029	0	0	0	0	0	0	2326433.
K048	0	.0618422	0	0	0	0	0
K049	0	.0112791	0	0	0	0	0
K051	0	.0015053	0	0	0	0	0
K052	0	6.148825	0	0	0	0	0
K060	0	.0012361	0	0	0	0	0
K071	0	0	0	0	2248.743	0	1724.692
K083	0	1.115960	0	0	0	0	0
K085	0	0	0	0	0	0	0
K086	0	0	0	0	0	24516.37	0
K087	0	6.033976	0	0	0	0	0
K093	0	0	0	0	0	0	2933961.
K105	0	0	0	0	0	0	0
SBL.CON.	5087760	31.4317	342495	31791200	78310	10103.82	91380
SUM	6314416.	56.52534	736855.9	42264746	934352.7	120008.2	[illegible]

TABLE B-1 (continued)

CODE	U228	A055	U043	U078	U239	SUM
D001	204.0007	0	0	0	3.2781E8	3.6156E8
D002	0	0	549753.5	0	1755533.	2700706.
D003	0	0	0	0	0	508017.3
F001	1942703.	0	0	0	324057.4	1835816.
F002	1600689.	0	0	0	0	2.0737E8
F003	0	0	0	0	4.8743E9	5.8465E9
F004	0	0	0	0	0	1231309.
F005	0	0	0	0	3032096.	7062419.
F006	0	0	0	0	18158434	18161158
F017	0	0	0	0	1.8386E8	1.8396E8
K001	0	0	0	0	0	1393795.
K010	0	0	0	0	0	22317.37
K011	0	0	0	0	0	46.96457
K012	0	0	0	0	0	4545.177
K013	0	0	0	0	0	114.1192
K014	0	0	0	0	0	481661.2
K015	0	0	0	0	0	21518101
K016	0	0	0	0	0	6832676.
K017	0	0	0	0	0	252.9674
K018	2923024.	0	0	0	0	2913101.
K019	0	591659.0	0	0	0	3140440.
K020	0	0	0	0	0	3478740.
K021	0	0	0	0	0	40562.14
K022	0	0	0	0	0	.6595201
K023	0	0	0	0	0	1.140335
K024	0	0	0	0	0	226330.4
K029	0	0	0	0	0	65450219
K048	0	0	0	0	0	.0618422
K049	0	0	0	0	0	.0127491
K051	0	0	0	0	0	.0015053
K052	0	0	0	0	0	670.6315
K060	0	0	0	0	0	.0012361
K073	0	0	0	0	0	6953802.
K083	0	0	0	0	0	167.5067
K085	0	0	0	0	0	40412.04
K086	0	0	0	0	0	24512.37
K087	0	0	0	0	0	6.03972
K103	0	0	0	0	0	15533320
K105	0	0	0	0	0	4568790.
BBL.CON.	477500	37398.9	2.8956E9	21544800	44197080	1.3035E9
SUM	6944122.	729057.9	2.9011E3	21544800	1.0666E9	

*Hazard Factor = Ci,eq/TLV. Aqueous TSDF categories include treatment tanks and treatment, storage, and disposal surface impoundments.

TABLE B-2. WASTE TYPE TOXICITY HAZARD FACTORS BY WASTE CONSTITUENT FOR NON-AQUEOUS TSDF CATEGORIES*

CODE	U001	U002	U003	U007	U008	U009	U012
D001	136.2471	24.05719	1676.177	0	.0575760	0	1.5457[illegible]
D002	0	0	0	0	0	0	0
D003	0	15.04671	0	0	0	0	0
F001	0	1.976499	0	0	0	0	0
F002	0	0	0	0	0	0	0
F003	0	2869.791	0	0	0	0	0
F004	0	0	0	0	0	0	0
F005	0	.0081021	0	0	0	0	0
F006	0	110.7523	0	0	0	0	0
F017	0	1[illegible].74019	0	0	0	0	0
K001	0	0	0	0	0	0	0
K010	1430.601	0	0	0	0	0	0
K011	0	0	1.342553	0	0	.8066041	0
K012	0	0	417.3716	0	0	0	0
K013	0	0	10.42483	0	0	.0143165	0
K014	0	38.08942	70.31415	0	0	0	0
K015	0	0	0	0	0	0	0
K016	0	0	0	0	0	0	0
K017	0	0	0	0	0	1.913366	0
K018	0	0	0	0	0	0	0
K019	0	0	0	0	0	0	0
K020	0	0	0	0	0	0	0
K021	0	0	0	0	0	0	0
K022	0	0	0	0	0	0	.0122371
K025	0	0	0	0	0	0	0
K026	0	0	0	0	0	0	0
K029	0	0	0	0	0	0	0
K048	0	0	0	0	0	0	0
K049	0	0	0	0	0	0	0
K051	0	0	0	0	0	0	7.0[illegible]
K053	0	0	0	0	0	0	0
K060	0	0	0	0	0	0	0
K073	0	0	0	0	0	0	1.7677[illegible]
K083	0	0	0	0	0	0	0
K085	0	0	0	0	0	0	0
K086	0	0	0	0	0	0	0
K087	0	0	0	0	0	0	0
K096	0	0	0	0	0	0	0
K105	0	0	0	0	0	0	0
SGL.CON.	45500	35.88	141.2	13.75	1.59	10200	51.5
SUM	47[illegible].95	3112.341	2317.330	13.75	1.647576	11211.13	101.[illegible]

TABLE B-2 (continued)

U019	P119	U031	U211	U052	U044	U037
9900.208	0	.1201827	1586.953	.0142137	42.13088	159.8312
0	0	0	0	0	0	0
233.0941	0	0	0	0	0	0
0	0	0	34.18473	0	0	2.027910
0	0	0	0	0	.6900598	18425.97
36.50773	0	11.12675	0	0	0	0
0	0	0	0	22.26644	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
229.6815	0	0	0	0	0	0
0	0	0	0	0	0	2049.620
0	0	0	8171.217	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	7.049194
0	0	0	155.3424	0	42.45136	0
0	0	0	48.90131	0	13.11032	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	7098.521	0	13132.93	0
0	0	0	0	0	0	0
0	19.31010	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
98.57205	0	0	0	0	0	1.92087
60900	4780	17.41	27200	0	3350	3650
71398.05	4799.310	30.65693	44298.12	22.28066	16881.24	24296.42

TABLE B-2 (continued)

U055	U057	U070	U072	U079	U041	U112
0	0	0	0	767.7360	0	2.858391
0	0	0	0	0	0	0
0	0	0	0	0	0	135.2629
0	0	0	0	0	0	0
0	0	182.7639	0	0	0	0
0	25.55390	0	0	0	0	201.1326
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	9.391691	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	165245.6	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	32982.62	0	0
0	0	53.12907	30.36518	0	0	0
8260	110.4	2360	901.6	2340	614.3	60.53
8260	105.9539	2595.905	931.9652	201335.9	623.6917	399.7541

TABLE B-2 (continued)

U113	C049	U117	U077	U121	U123	U140
0	1.292707	0	0	5961.457	4.806497	.0502476
0	0	0	0	50.23620	6.734E-4	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	3589.168	596.3048	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	4.524828	0	34.11921
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
7910	6050	933	756	20100	56.13	33.88
7910	9640.461	1529.305	756	26116.23	60.93737	68.04956

TABLE B-2 (continued)

U147	U154	U045	U159	U161	U080	U155
1.536427	71.31299	0	48.65603	.4860258	378.3520	42.79722
137.0589	9.937007	0	.0751904	0	0	0
0	1.719480	0	0	0	0	0
0	0	.4321533	1.411248	0	3223.021	0
0	.0015385	0	.0227382	0	3979.138	0
1.122E-4	1.072580	0	14.03495	42.27971	0	0
0	0	0	0	0	0	0
0	34.73672	175.1031	462.7301	367.5398	0	0
0	0	0	0	0	0	0
0	0	0	818.6511	8.835951	0	0
0	0	0	0	0	0	16.48516
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
114.89	6.48	6100	96.12	284	2.49	3.06
253.4855	189.2636	6275.535	1441.701	703.1415	7583.001	62.34238

TABLE B-2 (continued)

U159	U188	U190	U196	U210	U220	U226
0	.8196364	1.894201	4058.247	6.380514	23.90113	67.27282
0	0	146.6405	0	0	8.322210	0
0	0	0	0	0	46.86785	0
0	0	0	0	551.1558	14.20697	4.150261
0	0	0	0	977.0983	.0099193	5585.362
0	0	4.812E-4	.7346140	0	.7543655	0
414.6905	0	0	0	0	0	0
0	0	0	2258.661	0	209.2269	0
0	0	0	0	0	0	0
0	0	0	0	0	383.3531	0
0	1.782E-5	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	64.37480	0
0	0	0	0	688.5275	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	6216.754
0	0	0	0	11.90081	0	9751.912
0	0	0	0	0	0	0
0	.0483395	0	0	0	0	0
0	0	0	0	0	0	0
0	3.565E-5	0	139.5373	0	0	0
0	0	0	0	0	0	6090.212
0	.0345843	0	0	0	0	0
0	9.451E-4	0	0	0	0	0
0	1.116E-4	0	0	0	0	0
0	.4558062	0	0	0	0	0
0	9.163E-5	0	0	0	0	0
0	0	0	0	5.886763	0	4.514900
0	.0927250	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	215.0553	0
0	.4472925	0	0	0	0	0
0	0	0	0	0	0	7630.522
0	0	0	0	0	0	0
1720	2.33	129	19600	205	66.63	223
2134.691	4.190133	277.5351	26057.15	2445.950	1052.703	34139.73

TABLE B-2 (continued)

U228	A055	U043	U078	U239	SUM
.5340334	0	0	0	21583.57	46551.04
0	0	1439.145	0	115.5868	1902.005
0	0	0	0	0	431.9910
5085.610	0	0	0	21.33641	8939.512
4190.284	0	0	0	0	33341.35
0	0	0	0	32092.93	39481.29
0	0	0	0	0	436.9573
0	0	0	0	200.0328	3747.682
0	0	0	0	1195.578	1306.330
0	0	0	0	12105.90	13336.48
0	0	0	0	0	25.48517
0	0	0	0	0	1430.601
0	0	0	0	0	2.149157
0	0	0	0	0	417.3716
0	0	0	0	0	10.43769
0	0	0	0	0	338.5851
0	0	0	0	0	2113.995
0	0	0	0	0	8859.744
0	0	0	0	0	9.391682
7651.896	0	0	0	0	7653.815
0	417.2137	0	0	0	6651.017
0	0	0	0	0	8913.123
0	0	0	0	0	62.01157
0	0	0	0	0	.0438891
0	0	0	0	0	.0121371
0	0	0	0	0	139.5379
0	0	0	0	0	171335.8
0	0	0	0	0	.0045842
0	0	0	0	0	9.451E-4
0	0	0	0	0	1.116E-4
0	0	0	0	0	7.524771
0	0	0	0	0	9.133E-5
0	0	0	0	0	20241.75
0	0	0	0	0	1.855711
0	0	0	0	0	19.31010
0	0	0	0	0	215.0558
0	0	0	0	0	.4472925
0	0	0	0	0	40663.14
0	0	0	0	0	183.9972
1250	23.1	758000	56400	2910	
13178.32	450.3137	759439.1	56400	70224.94	

*Hazard Factor = Ci,eq/TLV. Activity coefficient equals 1.0 non-aqueous TSDF categories include landfill, land application, and waste pile.

TABLE B-3. WASTE TYPE VOLUME WEIGHTED TOXICITY HAZARD BY WASTE CONSTITUENT FOR AQUEOUS TSDF CATEGORIES*

CODE	U001	U002	U003	U007	U008	U009	U012
D001	2.1280E9	5.9253E9	1.828E10	0	616812.9	0	1.5489E9
D002	0	0	0	0	0	0	0
D003	0	6.7151E8	0	0	0	0	0
F001	0	18518967	0	0	0	0	0
F002	0	0	0	0	0	0	0
F003	0	8.0251E9	0	0	0	0	0
F004	0	0	0	0	0	0	0
F005	0	27431.34	0	0	0	0	0
F006	0	2.7199E9	0	0	0	0	0
F017	0	14172904	0	0	0	0	0
K001	0	0	0	0	0	0	0
K010	2.5038E8	0	0	0	0	0	0
K011	0	0	9859559.	0	0	2175[illegible]	0
K012	0	0	4545.177	0	0	0	0
K013	0	0	32064200	0	0	157339.3	0
K014	0	19247846	15341294	0	0	0	0
K015	0	0	0	0	0	0	0
K016	0	0	0	0	0	0	0
K017	0	0	0	0	0	0	0
K018	0	0	0	0	0	5079007.	0
K019	0	0	0	0	0	0	0
K020	0	0	0	0	0	0	0
K021	0	0	0	0	0	0	0
K022	0	0	0	0	0	0	0
K025	0	0	0	0	0	0	593.2301
K026	0	0	0	0	0	0	0
K029	0	0	0	0	0	0	0
K048	0	0	0	0	0	0	0
K049	0	0	0	0	0	0	0
K051	0	0	0	0	0	0	0
K052	0	0	0	0	0	0	2651950.
K060	0	0	0	0	0	0	0
K073	0	0	0	0	0	0	0
K083	0	0	0	0	0	0	59994.85
K085	0	0	0	0	0	0	0
K086	0	0	0	0	0	0	0
K087	0	0	0	0	0	0	0
K093	0	0	0	0	0	0	0
K105	0	0	0	0	0	0	0
SGL.CON.	1.352E11	10569710	3765749.	23423.13	79314.61	1.0093E9	8165013[illegible]
SUM	1.376E11	1.207E10	1.834E10	23423.13	696127.5	1.0368E9	2.3915E9

TABLE B-3 (continued)

CODE	U019	P018	U031	U211	U052	U044	U037
D001	2.076E13	0	5162112.	1.277E12	2974276.	4.0102E9	1.679E12
D002	0	0	0	0	0	0	0
D003	8.855E11	0	0	0	0	0	0
F001	0	0	0	1.047E10	0	0	8.1106E9
F002	0	0	0	0	0	4102278.	1.210E13
F003	8.6902E9	0	54261832	0	0	0	0
F004	0	0	0	0	95437811	0	0
F005	0	0	0	0	0	0	0
F006	0	0	0	0	0	0	0
F017	0	0	0	0	0	0	0
K001	0	0	0	0	0	0	0
K010	0	0	0	0	0	0	0
K011	0	0	0	0	0	0	0
K012	0	0	0	0	0	0	0
K013	0	0	0	0	0	0	0
K014	9.8797E9	0	0	0	0	0	0
K015	0	0	0	0	0	0	1.033E10
K016	0	0	0	7.637E12	0	0	0
K017	0	0	0	0	0	0	0
K018	0	0	0	0	0	0	0
K019	0	0	0	0	0	0	49123510
K020	0	0	0	87205503	0	2762522.	0
K021	0	0	0	5622291.	0	178104.3	0
K022	0	0	0	0	0	0	0
K025	0	0	0	0	0	0	0
K026	0	0	0	0	0	0	0
K029	0	0	0	0	0	0	0
K048	0	0	0	0	0	0	0
K049	0	0	0	0	0	0	0
K051	0	0	0	0	0	0	0
K052	0	0	0	0	0	0	0
K060	0	0	0	0	0	0	0
K073	0	0	0	4.3774E9	0	9.5691E8	0
K083	0	0	0	0	0	0	0
K085	0	12518973	0	0	0	0	0
K086	0	0	0	0	0	0	0
K087	0	0	0	0	0	0	0
K096	0	0	0	0	0	0	0
K105	0	0	0	0	0	0	0
SGL.CON.	1.607E12	2.5011E8	2084221.	1.950E11	0	1.152E11	1.264E10
SUM	2.327E13	2.6264E8	61508164	9.125E12	98412087	1.202E11	1.381E13

TABLE B-3 (continued)

CODE	U055	U057	U070	U072	U079	U041	U112
D001	0	0	0	0	2.936E11	0	3.0050E8
D002	0	0	0	0	0	0	0
D003	0	0	0	0	0	0	2.577E10
F001	0	0	0	0	0	0	0
F002	0	0	5.947E11	0	0	0	2.4007E9
F003	0	6.8555E8	0	0	0	0	0
F004	0	0	0	0	0	0	0
F005	0	0	0	0	0	0	0
F006	0	0	0	0	0	0	0
F017	0	0	0	0	0	0	0
K001	0	0	0	0	0	0	0
K010	0	0	0	0	0	0	0
K011	0	0	0	0	0	0	0
K012	0	0	0	0	0	0	0
K013	0	0	0	0	0	0	0
K014	0	0	0	0	0	0	0
K015	0	0	0	0	0	0	0
K016	0	0	0	0	0	0	0
K017	0	0	0	0	0	236670.6	0
K018	0	0	0	0	0	0	0
K019	0	0	0	0	0	0	0
K020	0	0	0	0	0	0	0
K021	0	0	0	0	0	0	0
K022	0	0	0	0	0	0	0
K025	0	0	0	0	0	0	0
K026	0	0	0	0	0	0	0
K029	0	0	0	0	1.512E11	0	0
K048	0	0	0	0	0	0	0
K049	0	0	0	0	0	0	0
K051	0	0	0	0	0	0	0
K053	0	0	0	0	0	0	0
K060	0	0	0	0	0	0	0
K073	0	0	0	0	0	0	0
K083	0	0	0	0	0	0	0
K085	0	0	0	0	0	0	0
K086	0	0	0	0	0	0	0
K087	0	0	0	0	0	0	0
K096	0	0	0	0	0	0	0
K105	0	0	0	0	0	0	0
SGL.CON.	3.322E12	60472232	6.166E11	3.107E11	5.9005E9	722416.8	68679154
SUM	3.322E12	7.4602E8	1.411E12	3.107E11	4.507E11	959087.4	2.854E10

TABLE B-3 (continued)

CODE	U113	C049	U117	U077	U122	U123	U140
D001	0	3.496E10	0	0	8.6666E9	6207927.	279447[illegible]
D002	0	0	0	0	1.5881E9	24527.42	0
D003	0	0	0	0	0	0	0
F001	0	0	0	0	0	0	0
F002	0	0	0	0	0	0	0
F003	0	1.102E13	8.2021E9	0	0	0	0
F004	0	0	0	0	0	0	0
F005	0	0	0	0	904242.6	0	2.0192E9
F006	0	0	0	0	0	0	0
F017	0	0	0	0	0	0	0
K001	0	0	0	0	0	0	0
K010	0	0	0	0	0	0	0
K011	0	0	0	0	0	0	0
K012	0	0	0	0	0	0	0
K013	0	0	0	0	0	0	0
K014	0	0	0	0	0	0	0
K015	0	0	0	0	0	0	0
K016	0	0	0	0	0	0	0
K017	0	0	0	0	0	0	0
K018	0	0	0	0	0	0	0
K019	0	0	0	0	0	0	0
K020	0	0	0	0	0	0	0
K021	0	0	0	0	0	0	0
K022	0	0	0	0	0	0	0
K023	0	0	0	0	0	0	0
K026	0	0	0	0	0	0	0
K029	0	0	0	0	0	0	0
K048	0	0	0	0	0	0	0
K049	0	0	0	0	0	0	0
K051	0	0	0	0	0	0	0
K052	0	0	0	0	0	0	0
K060	0	0	0	0	0	0	0
K071	0	0	0	0	0	0	0
K083	0	0	0	0	0	0	0
K085	0	0	0	0	0	0	0
K086	0	0	0	0	0	0	0
K087	0	0	0	0	0	0	0
K096	0	0	0	0	0	0	0
K105	0	0	0	0	0	0	0
SGL.CON.	2.246E10	0	5090185	3.290E10	3.1538E8	500626.9	1023229
SUM	2.246E10	1.105E13	8.2071E9	3.290E10	1.057E10	6733081.	2.4015E9

TABLE B-3 (continued)

CODE	U147	U154	U045	U159	U161	U080	U165
D001	63070186	1.0924E8	0	2.9255E9	3.8637E8	3.601E10	3.064E12
D002	1.223E11	3.3099E8	0	94941661	0	0	0
D003	0	4772715.	0	0	0	0	0
F001	0	0	15655077	31192547	0	1.165E11	0
F002	0	147.3036	0	82527.60	0	2.367E10	0
F003	523.0523	186547.7	0	92535371	3.8161E9	0	0
F004	0	0	0	0	0	0	0
F005	0	7314700.	2.3040E9	3.6938E9	4.016E10	0	0
F006	0	0	0	0	0	0	0
F017	0	0	0	1.6341E9	2.4145E8	0	0
K001	0	0	0	0	0	0	3.150E10
K010	0	0	0	0	0	0	0
K011	0	0	0	0	0	0	0
K012	0	0	0	0	0	0	0
K013	0	0	0	0	0	0	0
K014	0	0	0	0	0	0	0
K015	0	0	0	0	0	0	0
K016	0	0	0	0	0	0	0
K017	0	0	0	0	0	0	0
K018	0	0	0	0	0	0	0
K019	0	0	0	0	0	0	0
K020	0	0	0	0	0	0	0
K021	0	0	0	0	0	0	0
K022	0	0	0	0	0	0	0
K025	0	0	0	0	0	0	0
K026	0	0	0	0	0	0	0
K029	0	0	0	0	0	0	0
K048	0	0	0	0	0	0	0
K049	0	0	0	0	0	0	0
K051	0	0	0	0	0	0	0
K053	0	0	0	0	0	0	0
K060	0	0	0	0	0	0	0
K073	0	0	0	0	0	0	0
K083	0	0	0	0	0	0	0
K085	0	0	0	0	0	0	0
K086	0	0	0	0	0	0	0
K087	0	0	0	0	0	0	0
K094	0	0	0	0	0	0	0
K105	0	0	0	0	0	0	0
SGL.CON.	216281.6	147585.8	1.3975E9	64507862	1.5259E9	1694294.	8.7433E8
SUM	1.224E11	4.5265E8	2.4594E9	9.4367E9	4.613E10	1.764E11	3.096E12

TABLE B-3 (continued)

CODE	U169	U188	U190	U196	U210	U220	U22[illegible]
D001	0	11070756	5.0352E9	6.590E12	2.4403E9	2.7280E9	2.573E10
D002	0	0	6.476E12	0	0	8.2451E9	0
D003	0	0	0	0	0	9.6930E7	0
F001	0	0	0	0	8.023E10	6.1720E8	6.0417E8
F002	0	0	0	0	2.336E10	70762.42	1.335E11
F003	0	0	145234.8	1.3545E8	0	9775870.	0
F004	2.516E10	0	0	0	0	0	0
F005	0	0	0	5.042E11	0	3.2828E9	0
F006	0	0	0	0	0	0	0
F017	0	0	0	0	0	1.5158E9	0
K001	0	3.997837	0	0	0	0	0
K010	0	0	0	0	0	0	0
K011	0	0	0	0	0	0	0
K012	0	0	0	0	0	0	0
K013	0	0	0	0	0	0	0
K014	0	0	0	0	0	0	0
K015	0	0	0	0	0	3522599.	0
K016	0	0	0	0	3.058E11	0	0
K017	0	0	0	0	0	0	0
K018	0	0	0	0	0	0	0
K019	0	0	0	0	0	0	1.5769E9
K020	0	0	0	0	3114085.	0	2.2599E9
K021	0	0	0	0	0	0	0
K022	0	4544.753	0	0	0	0	0
K025	0	0	0	0	0	0	0
K026	0	.1596796	0	75141678	0	0	0
K029	0	0	0	0	0	0	5.5719E9
K048	0	19705.33	0	0	0	0	0
K049	0	4871.409	0	0	0	0	0
K051	0	467.4871	0	0	0	0	0
K053	0	24539.96	0	0	0	0	0
K060	0	16.80579	0	0	0	0	0
K073	0	0	0	0	1724786.	0	1322339.
K083	0	402.8617	0	0	0	0	0
K085	0	0	0	0	0	0	0
K086	0	0	0	0	0	3.8407E8	0
K087	0	690950.6	0	0	0	0	0
K096	0	0	0	0	0	0	0
K105	0	0	0	0	0	0	0
SGL.CON.	1.3126E9	678296.1	4794930	7.557E10	1.0144E9	1.3656E8	9.7905E8
SUM	2.647E10	11494556	8.481E12	7.170E12	4.128E11	2.662E10	1.703E11

TABLE B-3 (continued)

CODE	U226	A055	U043	U078	U239	SUM
D001	2.0425E8	0	0	0	3.281E14	3.620E14
D002	0	0	1.197E13	0	3.822E13	5.880E13
D003	0	0	0	0	0	9.216E11
F001	7.403E11	0	0	0	1.235E11	1.081E12
F002	1.002E11	0	0	0	0	1.298E13
F003	0	0	0	0	5.541E13	6.646E13
F004	0	0	0	0	0	2.525E10
F005	0	0	0	0	4.181E11	9.720E11
F006	0	0	0	0	1.813E13	1.813E13
F017	0	0	0	0	6.328E12	6.331E12
K001	0	0	0	0	0	3.150E10
K010	0	0	0	0	0	2.5038E8
K011	0	0	0	0	0	31617544
K012	0	0	0	0	0	4545.177
K013	0	0	0	0	0	32231589
K014	0	0	0	0	0	9.9148E9
K015	0	0	0	0	0	1.033E10
K016	0	0	0	0	0	7.943E12
K017	0	0	0	0	0	236670.[illegible]
K018	1.934E11	0	0	0	0	1.934E11
K019	0	4.5926E8	0	0	0	2.0853E9
K020	0	0	0	0	0	2.3829E9
K021	0	0	0	0	0	5800185.
K022	0	0	0	0	0	4524.753
K025	0	0	0	0	0	593.2601
K026	0	0	0	0	0	75141679
K029	0	0	0	0	0	1.568E11
K048	0	0	0	0	0	19705.33
K049	0	0	0	0	0	4871.409
K051	0	0	0	0	0	467.4871
K053	0	0	0	0	0	2676490.
K060	0	0	0	0	0	16.80579
K073	0	0	0	0	0	5.3374E9
K083	0	0	0	0	0	60397.71
K085	0	0	0	0	0	12518973
K086	0	0	0	0	0	3.8427E8
K087	0	0	0	0	0	690950.[illegible]
K096	0	0	0	0	0	0
K105	0	0	0	0	0	0
SGL.CON.	4.9698E9	0	6.033E12	1.911E11	4.451E11	1.333E13
SUM	1.039E12	4.5926E8	1.809E13	1.911E11	4.479E14	

Aqueous volume-weighted toxicity hazard factor equals: (Ci,eq/TLV)(Part A aqueous waste type volume). Aqueous TSDF categories include treatment tank and treatment, storage, and disposal surface impoundments.

TABLE B-4. WASTE TYPE VOLUME-WEIGHTED TOXICITY HAZARD BY WASTE CONSTITUENT FOR NON-AQUEOUS TSDF CATEGORIES*

CODE	U001	U002	U003	U007	U008	U009	U012
D001	47002658	8299275.	5.7825E8	0	19862.62	0	567753.3
D002	0	0	0	0	0	0	0
D003	0	5684347.	0	0	0	0	0
F001	0	91873.59	0	0	0	0	0
F002	0	0	0	0	0	0	0
F003	0	1.0860E9	0	0	0	0	0
F004	0	0	0	0	0	0	0
F005	0	601.0355	0	0	0	0	0
F006	0	46036092	0	0	0	0	0
F017	0	805420.6	0	0	0	0	0
K001	0	0	0	0	0	0	0
K010	30835173	0	0	0	0	0	0
K011	0	0	66672.51	0	0	40058.77	0
K012	0	0	37980.82	0	0	0	0
K013	0	0	4092577.	0	0	5816.637	0
K014	0	1262931.	2347985.	0	0	0	0
K015	0	0	0	0	0	0	0
K016	0	0	0	0	0	0	0
K017	0	0	0	0	0	0	0
K018	0	0	0	0	0	63130.63	0
K019	0	0	0	0	0	0	0
K020	0	0	0	0	0	0	0
K021	0	0	0	0	0	0	0
K022	0	0	0	0	0	0	0
K025	0	0	0	0	0	0	501.3942
K026	0	0	0	0	0	0	0
K029	0	0	0	0	0	0	0
K048	0	0	0	0	0	0	0
K049	0	0	0	0	0	0	0
K051	0	0	0	0	0	0	0
K053	0	0	0	0	0	0	5622.965
K060	0	0	0	0	0	0	0
K073	0	0	0	0	0	0	0
K083	0	0	0	0	0	0	29624.32
K085	0	0	0	0	0	0	0
K086	0	0	0	0	0	0	0
K087	0	0	0	0	0	0	0
K096	0	0	0	0	0	0	0
K105	0	0	0	0	0	0	0
SGL.CON.	3.3330E9	1365593.	2241268.	492973.8	56988.78	3.6147E9	3216722
SUM	3.4108E9	1.7215E9	5.8704E8	492978.8	76851.40	3.6158E9	3820245.

TABLE B-4 (continued)

U019	P028	U031	U111	U052	U044	U037
3.4154E9	0	41460.74	5.4747E8	4903.452	14544701	55138732
0	0	0	0	0	0	0
88058285	0	0	0	0	0	0
0	0	0	1589009.	0	0	94263.33
0	0	0	0	0	42660.88	1.1391E9
1381562.	0	421069.8	0	0	0	0
0	0	0	0	840046.2	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
7615543.	0	0	0	0	0	0
0	0	0	0	0	0	1.2971E8
0	0	0	4.9246E8	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	610022.3
0	0	0	11777509	0	3157532.	0
0	0	0	1033419.	0	278398.6	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	1.0803E8	0	1.9987E8	0
0	0	0	0	0	0	0
0	331303.4	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
134156.6	0	0	0	0	0	2614.313
2.3098E9	75538340	308716.1	4.3313E8	0	1.3070E8	1.3187E8
5.8223E9	75869643	771246.4	1.5955E9	844949.6	3.4859E8	1.4566E9

TABLE B-4 (continued)

U055	U057	U070	U072	U079	U041	U112
0	0	0	0	2.6485E8	0	936090.7
0	0	0	0	0	0	0
0	0	0	0	0	0	51099590
0	0	0	0	0	0	0
0	0	11298827	0	0	0	0
0	967036.3	0	0	0	0	7611470.
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	240436.7	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	4.5829E9	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	4.1143E8	0	0
0	0	72322.27	41327.01	0	0	0
6.2732E9	3913690	85146440	32226790	83102760	9715769.	1906937.
6.2732E9	4880716.	96517590	32268117	5.3420E9	9956205.	61604088

TABLE B-4 (continued)

U113	C047	U117	U077	U122	U123	U140
0	445959.3	0	0	2.0566E9	1658150.	224323.8
0	0	0	0	39255981	682.4449	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	1.3582E8	22565964	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	335665.3	0	2531073.
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
6.0091E8	0	15229426	26895456	6.3323E8	463970.6	541498.9
6.0091E8	1.3627E8	37794390	26895456	2.7294E9	2122803.	[illegible]

TABLE B-4 (continued)

U147	U154	U045	U159	U161	U080	U165
530038.3	24601589	0	16785404	167669.6	1.3052E8	14764229
1.0710E8	7764747.	0	58753.56	0	0	0
0	649585.3	0	0	0	0	0
0	0	20087.78	65599.03	0	1.4982E8	0
0	95.11529	0	1405.722	0	2.4600E8	0
4.246958	40589.65	0	531124.8	1599991.	0	0
0	0	0	0	0	0	0
0	2576874.	13063858	34326708	27265203	0	0
0	0	0	0	0	0	0
0	0	0	39387761	425124.1	0	0
0	0	0	0	0	0	210053.8
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
377054.1	396232.6	36917200	1674026.	5025948	158553.2	52803.36
1.0800E8	36029713	50001146	92830782	34483936	5.2650E8	15027086

TABLE B-4 (continued)

U169	U188	U190	U196	U210	U220	U22[illegible]
0	282769.3	653463.3	1.4000E9	2201156.	8245435.	23207858
0	0	1.1456E8	0	0	2595965.	0
0	0	0	0	0	17705736	0
0	0	0	0	25619373	660382.6	192916.6
0	0	0	0	60406169	613.2339	3.4530E8
0	0	18.21055	27800.00	0	28547.45	0
15645041	0	0	0	0	0	0
0	0	0	1.6755E8	0	15521082	0
0	0	0	0	0	0	0
0	0	0	0	0	18588609	0
0	.1412922	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	4073959.	0
0	0	0	0	41496175	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	5.3799E8
0	0	0	0	835182.3	0	6.5059E8
0	0	0	0	0	0	0
0	4718.036	0	0	0	0	0
0	0	0	0	0	0	0
0	1.477400	0	5782169.	0	0	0
0	0	0	0	0	0	1.6891E8
0	1746.746	0	0	0	0	0
0	289.8793	0	0	0	0	0
0	34.65334	0	0	0	0	0
0	363.2775	0	0	0	0	0
0	4.485362	0	0	0	0	0
0	0	0	0	89590.64	0	69712.27
0	1356.140	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	3394676.	0
0	56258.30	0	0	0	0	0
0	0	0	0	0	0	9580687.
0	0	0	0	0	0	0
27563000	64829.92	489039	3.1209E8	3562490	3329120.	5130960
43208041	412396.4	1.1573E9	1.8855E9	1.3426E9	74644325	1.8275E9

TABLE B-4 (continued)

U228	A055	U043	U078	U239	SUM
184231.4	0	0	0	7.4459E9	1.606E10
0	0	1.1245E9	0	90319215	1.4862E9
0	0	0	0	0	1.6320E8
2.3639E8	0	0	0	991780.5	4.1554E8
2.5905E8	0	0	0	0	2.0612E9
0	0	0	0	1.2145E9	1.4941E9
0	0	0	0	0	16485087
0	0	0	0	14839030	2.7801E8
0	0	0	0	4.9696E8	5.4300E8
0	0	0	0	5.8245E8	6.4166E8
0	0	0	0	0	210053.9
0	0	0	0	0	30835173
0	0	0	0	0	106729.3
0	0	0	0	0	37980.82
0	0	0	0	0	4098394.
0	0	0	0	0	11226465
0	0	0	0	0	1.3378E8
0	0	0	0	0	5.3396E8
0	0	0	0	0	240436.7
1.5175E8	0	0	0	0	1.5181E8
0	36970222	0	0	0	5.7557E8
0	0	0	0	0	6.6671E8
0	0	0	0	0	1316813.
0	0	0	0	0	4718.086
0	0	0	0	0	501.3946
0	0	0	0	0	5782170.
0	0	0	0	0	4.7518E9
0	0	0	0	0	1746.746
0	0	0	0	0	288.8793
0	0	0	0	0	34.65334
0	0	0	0	0	5997.141
0	0	0	0	0	4.485361
0	0	0	0	0	3.0806E8
0	0	0	0	0	31010.51
0	0	0	0	0	331303.4
0	0	0	0	0	3894876.
0	0	0	0	0	56251.30
0	0	0	0	0	5.0713E8
0	0	0	0	0	250413.2
2[illegible]313750	0	6.121E10	2.0039E9	63292500	
7.7420E8	36970222	6.234E10	2.0039E9	9.9093E9	

Non-aqueous volume weighted toxicity hazard factor equals: (Ci,eq/TLV)(Part A Non-aqueous waste type volume). Non-aqueous categories include landfill, land application, and waste pile.

TABLE B-5. WASTE TYPE CARCINOGENICITY HAZARD FACTORS BY WASTE CONSTITUENT FOR AQUEOUS TSDF CATEGORIES*

CODE	U009	U019	U211	U044	U041	U122	U188
D001	0	9.842E11	1.492E11	6.1513E8	0	12952305	120919.3
D002	0	0	0	0	0	109159.6	0
D003	0	3.047E12	0	0	0	0	0
F001	0	0	8.457E11	0	0	0	0
F002	0	0	0	1.3247E9	0	0	0
F003	0	4.776E11	0	0	0	0	0
F005	0	0	0	0	0	6468295.	0
K001	0	0	0	0	0	0	691.6224
K011	6.3155E8	0	0	0	0	0	0
K013	11600891	0	0	0	0	0	0
K014	0	3.005E12	0	0	0	0	0
K016	0	0	2.022E14	0	0	0	0
K017	0	0	0	0	3.6981E8	0	0
K019	1.5024E9	0	0	0	0	0	0
K020	0	0	3.917E12	8.150E10	0	0	0
K021	0	0	1.210E12	2.517E10	0	0	0
K022	0	0	0	0	0	0	1897994.
K025	0	0	0	0	0	0	1334.134
K048	0	0	0	0	0	0	177972.3
K049	0	0	0	0	0	0	36239.91
K051	0	0	0	0	0	0	4322.150
K053	0	0	0	0	0	0	17695341
K060	0	0	0	0	0	0	3557.252
K073	0	0	1.756E14	2.521E13	0	0	0
K083	0	0	0	0	0	0	3211557.
K087	0	0	0	0	0	0	17364324
ENGCON.	1.218E10	6.055E12	2.560E12	5.324E10	36769685	43768726	344256.6
SUM	1.433E10	1.357E13	3.965E14	2.537E13	4.0658E8	63294485	4035968

TABLE B-5 (continued)

CODE	U210	U043	U078	SUM
D001	1.2545E9	0	0	1.135E12
D002	0	3.5135E9	0	3.5136E9
D003	0	0	0	3.049E12
F001	2.851E12	0	0	3.697E12
F002	5.056E11	0	0	5.057E11
F003	0	0	0	4.776E11
F005	0	0	0	6468295.
K001	0	0	0	691.6224
K011	0	0	0	6.3155E8
K013	0	0	0	11600892
K014	0	0	0	3.005E12
K016	3.5[illegible]E11	0	0	2.057E14
K017	0	0	0	3.6981E9
K018	0	0	0	1.5024E9
K020	6.158E10	0	0	4.061E12
K021	0	0	0	1.235E12
K022	0	0	0	1897991.
K023	0	0	0	1394.134
K048	0	0	0	177972.0
K049	0	0	0	36689.91
K051	0	0	0	4222.15[illegible]
K052	0	0	0	17695341
K060	0	0	0	3557.252
K073	3.046E10	0	0	2.009E14
K083	0	0	0	3211557.
K087	0	0	0	17364824
SNGCON.	4.02[illegible]E10	1.851E12	3.593E12	1.417E13
SUM	1.160E13	1.854E12	3.593E12	4.425E14

*Hazard Factor = Ci,eq/(10^{-5} Risk). Aqueous TSDF categories include treatment tank and treatment, storage, and disposal surface impoundments.

TABLE B-6. WASTE TYPE CARCINOGENICITY HAZARD FACTORS BY WASTE CONSTITUENT FOR NON-AQUEOUS TSDF CATEGORIES*

CODE	U009	U019	U211	U044	U041	U122	U188
D001	0	4.7005E8	1.8556E8	6475007.	0	8921009.	8963.624
D002	0	0	0	0	0	75178.79	0
D003	0	1.4562E9	0	0	0	0	0
F001	0	0	1.0519E9	0	0	0	0
F002	0	0	0	13944650	0	0	0
F003	0	2.2807E8	0	0	0	0	0
F005	0	0	0	0	0	4454749.	0
K001	0	0	0	0	0	0	51.26927
K011	15788679	0	0	0	0	0	0
K013	290022.3	0	0	0	0	0	0
K014	0	1.4349E9	0	0	0	0	0
K016	0	0	2.514E11	0	0	0	0
K017	0	0	0	0	13207663	0	0
K018	37560376	0	0	0	0	0	0
K020	0	0	4.8724E9	8.5785E8	0	0	0
K021	0	0	1.5048E9	2.6493E8	0	0	0
K022	0	0	0	0	0	0	140596.4
K026	0	0	0	0	0	0	102.2044
K048	0	0	0	0	0	0	13192.35
K049	0	0	0	0	0	0	2719.755
K051	0	0	0	0	0	0	321.1377
K153	0	0	0	0	0	0	1311733.
K060	0	0	0	0	0	0	263.6955
K073	0	0	2.184E11	2.654E11	0	0	0
K083	0	0	0	0	0	0	238069.4
K087	0	0	0	0	0	0	1287237.
SNGCON.	3.0459E8	2.8918E9	3.1842E9	5.6043E8	1313203.	30140307	25522.80
SUM	3.5822E8	6.4810E9	4.807E11	2.671E11	14520866	43591243	3029892.

TABLE B-6 (continued)

CODE	U210	U043	U078	SUM
D001	3284045.	0	0	6.7430E8
D002	0	9197684.	0	9272862.
D003	0	0	0	1.4562E9
F001	7.4653E9	0	0	8.5172E9
F002	1.323E10	0	0	1.325E10
F003	0	0	0	2.2807E8
F005	0	0	0	4454749.
K001	0	0	0	51.26927
K011	0	0	0	15788679
K013	0	0	0	290022.3
K014	0	0	0	1.4349E9
K016	9.3260E9	0	0	2.608E11
K017	0	0	0	13207663
K018	0	0	0	37560376
K020	1.6119E8	0	0	5.8915E9
K021	0	0	0	1.7697E9
K022	0	0	0	140696.4
K026	0	0	0	102.6044
K048	0	0	0	13192.88
K049	0	0	0	2719.785
K051	0	0	0	321.1379
K052	0	0	0	1311739.
K060	0	0	0	263.6955
K073	79735234	0	0	4.839E11
K083	0	0	0	238069.4
K087	0	0	0	1287237.
SNGCON.	1.0539E8	4.8454E9	9.4060E9	2.133E10
SUM	3.038E10	4.8546E9	9.4060E9	7.993E11

*Hazard Factor = $C_{i,eq}/(10^{-5}$ Risk). Non-aqueous TSDF categories include landfill, land application, and waste pile.

TABLE B-7. WASTE TYPE VOLUME WEIGHTED CARCINOGENICITY HAZARD BY WASTE CONSTITUENT FOR AQUEOUS TSDF CATEGORIES*

CODE	U009	U019	U211	U044	U041	U122	U188
D001	0	9.855E17	1.494E17	6.159E14	0	1.297E13	1.211E11
D002	0	0	0	0	0	2.376E12	0
D003	0	5.532E16	0	0	0	0	0
F001	0	0	3.223E17	0	0	0	0
F002	0	0	0	8.290E13	0	0	0
F003	0	5.429E16	0	0	0	0	0
F005	0	0	0	0	0	8.902E11	0
K001	0	0	0	0	0	0	11505139
K011	4.259E14	0	0	0	0	0	0
K013	3.277E12	0	0	0	0	0	0
K014	0	6.172E16	0	0	0	0	0
K016	0	0	2.350E20	0	0	0	0
K017	0	0	0	0	3.329E11	0	0
K019	9.942E12	0	0	0	0	0	0
K020	0	0	2.693E15	5.582E13	0	0	0
K021	0	0	1.730E14	3.599E12	0	0	0
K022	0	0	0	0	0	0	1.309E10
K025	0	0	0	0	0	0	459532.5
K048	0	0	0	0	0	0	5.671E10
K049	0	0	0	0	0	0	1.402E11
K051	0	0	0	0	0	0	1.2454E9
K052	0	0	0	0	0	0	7.062E10
K060	0	0	0	0	0	0	4533[illegible]41[illegible]
K073	0	0	1.347E17	1.934E16	0	0	0
K083	0	0	0	0	0	0	1.1594E9
K087	0	0	0	0	0	0	1.983E12
SNGCON.	3.015E13	7.629E16	2.293E15	1.769E16	1.5443E9	4.729E11	7.4312E9
SUM	5.587E14	6.710E18	2.356E20	3.778E16	3.344E11	1.671E13	2.274E11

TABLE B-7 (continued)

CODE	U210	U043	U078	SUM
D001	1.256E15	0	0	1.137E18
D002	0	7.649E16	0	7.649E16
D003	0	0	0	5.531E18
F001	1.087E18	0	0	1.409E18
F002	3.164E17	0	0	3.164E17
F003	0	0	0	5.429E16
F005	0	0	0	8.902E11
K001	0	0	0	11505139
K011	0	0	0	4.259E14
K013	0	0	0	3.277E12
K014	0	0	0	6.172E16
K016	4.141E19	0	0	2.391E20
K017	0	0	0	3.329E11
K019	0	0	0	9.942E13
K020	4.213E13	0	0	2.781E15
K021	0	0	0	1.765E14
K022	0	0	0	1.308E10
K026	0	0	0	459532.5
K048	0	0	0	5.671E10
K049	0	0	0	1.402E10
K050	0	0	0	1.3454E9
K051	0	0	0	7.062E10
K052	0	0	0	43364399
K073	2.316E13	0	0	1.541E17
K083	0	0	0	1.1594E9
K087	0	0	0	1.989E12
SNSCON.	5.215E11	3.857E16	3.187E16	1.878E17
SUM	5.546E19	1.151E17	3.187E16	2.481E20

Aqueous volume weighted carcinogenicity hazard factor equals: (Ci,eq/(10^{-5} Risk))(Part A aqueous waste type volume). Aqueous TSDF categories include treatment tank and treatment, storage, and disposal surface impoundments.

TABLE B-8. WASTE TYPE VOLUME WEIGHTED CARCINOGENICITY HAZARD BY WASTE CONSTITUENT FOR NON-AQUEOUS TSDF CATEGORIES*

CODE	U009	U019	U211	U044	U041	U122	U189
D001	0	1.622E14	6.402E13	2.234E12	0	3.078E12	3.0923E9
D002	0	0	0	0	0	5.874E10	0
D003	0	5.501E14	0	0	0	0	0
F001	0	0	4.890E13	0	0	0	0
F002	0	0	0	8.621E11	0	0	0
F003	0	8.631E12	0	0	0	0	0
F005	0	0	0	0	0	3.305E11	0
K001	0	0	0	0	0	0	466216.5
K011	7.841E11	0	0	0	0	0	0
K013	1.139E11	0	0	0	0	0	0
K014	0	4.758E13	0	0	0	0	0
K016	0	0	1.515E16	0	0	0	0
K017	0	0	0	0	3.391E11	0	0
K018	1.236E12	0	0	0	0	0	0
K020	0	0	3.624E14	6.381E13	0	0	0
K021	0	0	3.195E13	5.626E12	0	0	0
K022	0	0	0	0	0	0	1.253E10
K025	0	0	0	0	0	0	4251722.
K048	0	0	0	0	0	0	5.0269E9
K049	0	0	0	0	0	0	5.3135E8
K051	0	0	0	0	0	0	99712800
K053	0	0	0	0	0	0	1.0455E9
K060	0	0	0	0	0	0	12908153
K073	0	0	3.324E15	4.039E15	0	0	0
K083	0	0	0	0	0	0	3.9991E9
K087	0	0	0	0	0	0	1.619E11
SNGCON.	1.079E12	1.097E14	5.070E13	2.007E13	2.077E10	9.495E11	7.1025E8
SUM	1.293E13	8.782E14	1.904E16	4.132E15	3.589E11	4.416E12	1.908E11

TABLE B-8 (continued)

CODE	U210	U043	U078	SUM
D001	1.133E12	0	0	2.326E14
D002	0	7.187E12	0	7.246E12
D003	0	0	0	5.501E14
F001	3.470E14	0	0	3.959E14
F002	8.182E14	0	0	8.191E14
F003	0	0	0	8.631E12
F005	0	0	0	3.305E11
K001	0	0	0	406616.5
K011	0	0	0	7.841E11
K013	0	0	0	1.139E11
K014	0	0	0	4.758E13
K016	5.621E14	0	0	1.572E16
K017	0	0	0	3.381E11
K018	0	0	0	1.236E12
K020	1.199E13	0	0	4.382E14
K021	0	0	0	3.758E13
K022	0	0	0	1.358E10
K026	0	0	0	4251723.
K048	0	0	0	5.0269E9
K049	0	0	0	8.3135E8
K051	0	0	0	99726800
K053	0	0	0	1.0455E9
K060	0	0	0	12908158
K073	1.213E12	0	0	7.364E15
K083	0	0	0	3.9891E9
K087	0	0	0	1.619E11
SNGCOM.	1.831E12	3.913E14	3.342E14	9.195E14
SUM	1.743E15	3.965E14	3.342E14	2.654E16

Non-aqueous volume weighted carcinogenicity hazard factor equals: (Ci,eq/(10^{-5} Risk))(Part A non-aqueous waste type volume). Non-aqueous TSDF categories include landfill, land application, and waste-pile.

ATE DUE

TECHNICAL REPORT DATA

(Please read Instructions on the reverse before completing)

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15. SUPPLEMENTARY NOTES

16. ABSTRACT This Final Report presents ranking scores for select RCRA wastes that are likely to be emitted to the ambient air based on: (1) hazardous waste characterization data (expected constituent concentrations); (2) idealized gas phase equilibrium concentration; (3) health effects properties (toxicity and carcinogenicity); and (4) estimated waste volumes disposed by treatment, storage and disposal facility (TSDF) type. The RCRA Part A permit application data base was manipulated to generate a list of wastes handled by TSDFs in the United States. This list of 501 wastes comprises an estimated hazardous waste disposal volume of approximately 92 million metric tons nationwide. Approximately 100 of the 501 waste types were evaluated with respect to the four parameters influencing air releases described above. These 100 wastes were then assigned ranking scores according to the methodology presented in this report.

The ranking scheme reported here provides a starting point for the selection of wastes that may have the greatest potential for adversely affecting human health due to air releases. Using this ranking scheme, specific wastes will be selected for further study of air emission release rates, dispersion modeling, and field measurements for validation of release rate models.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
Air Pollution Pollution Control Hazardous Waste TSDF Volatile Organic Compounds Health Effects Ranking		

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